Transcripts

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TABLE OF CONTENTS

1989 CASUALTY LOSS RESERVE SEMINAR

1B: SELF-INSURANCE RESERVING

Moderator

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Panel

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Governmental Accounting Standards Board

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MR. VAN SLYKE: Good morning. Welcome to the session on Self-Insurance Reserving. I'm Lee Van Slyke from Coopers & Lybrand. Before I introduce the panelists, I'd like to do a little housekeeping. There are a number of things I'm supposed to announce at the beginning.

For the record, when you have questions, please identify yourself. The entire session is being recorded so we'll ask you, in spite of the small size of the room and the fact that the panelists could undoubtedly hear you if you ask a question, we're going to ask you to step to the microphone when you have a question so that we can get it on the record.

I'm going to ask the panelists to repeat each question that is asked to that the questions and answers will show up together in the record.

We have handouts. Suesan's handout is back there, is it? So is Richard's. Okay, so there are handouts back there. If you don't have them, be sure and look for those.

You have been given seminar evaluation forms that are part of the registration information. We would sincerely appreciate your filling those out. If we have a panel that you think is valuable, that gives us a big ego boost and we all need that before Christmas. If this isn't valuable, then we certainly don't want to haul ourselves out to Chicago or wherever to do this again next year. So, it is important that you fill those out for us.

We have a relatively small turnout here this morning, so I think you should feel free to move to the front of the room, or anything else you want to do to be able to participate in the discussion.

We're going to be talking this morning about self-insurance reserves. In the Alice in Wonderland World of reserving where we so often make words mean whatever we wish them to mean, self-insurance reserves have taken on a particular irony because they are affected by essentially the same accounting standards as are the reserves of insurance companies, although radically different tax accounting effects.

Yet, we find time after time, as consultants working with self-insured risk, that the self-insured risk don't think that the same accounting standards apply as would apply to an insurance company.

Our first speaker, Suesan Monks, is a CPA who has been with the Governmental Accounting Standards Board since 1984. Prior to that she worked with the AICPA and with Price Waterhouse. Among her other responsibilities, Suesan is responsible for the current project to develop a statement of opinion on accounting for risk management activities for governmental entities. She'll tell you about the progress of that. But more broadly, she'll tell you about the context in which the governmental accounting standards board is trying to set those standards.

Richard Zatorski, from Coopers & Lybrand's Philadelphia office, is an FCAS and among his responsibilities are to be the national coordinator of our work pursuant to Statement of Opinion 87-1 which has to do with the accounting of liabilities of health care providers. He will be putting the health care provider problem in a broader context of self-insurance reserves.

After Suesan and Rich have spoken, I'll probably have a few brief remarks. We had thought that we would have a larger attendance and we would save all the questions to the end. I think with this small a group, though, with the speakers' consent, as long as we can always retreat from this position if we begin to lose the train of thought --

MR. ZATORSKI: Or if we don't like the question.

MR. VAN SLYKE: Or if we don't like the question. Thanks. Why don't we go ahead and allow you to raise your hands as we go along here to make sure that the points are being made clear as they are made. But, again, in doing so, let me ask you to use the microphone that has been provided.

I'm not going to give a further introduction of Rich. We're going to have Suesan give her remarks and discuss her material and then Rich. Then we'll take questions more broadly.

MS. MONKS: Thank you, Lee, for the introduction. It's a pleasure to be here. As Lee mentioned, I have been working hard on our own GASB project on risk management, and that will be what I'll be covering first.

(Slide.)

The GASB Statement 10, as it's going to be called, will be issued this October, probably later in the month [Ed. noe: was issued in November '89]. We began work on that project in 1986 when the GASB became concerned about the financial reporting implications of the hard insurance market and what state and local governments were doing about that.

Just to back up a second, I'll tell you that the GASB began its work not much before then. We were set up in 1984 as the standard-setting body for state and local governments. Our jurisdiction currently is based on ownership. So, if it's a government owned entity, no matter what form it takes, it is covered by the GASB. That would include hospitals, colleges, and universities, and so forth.

GASB Statement 10, as I mentioned, is in the final drafting stages. There are a few things that I'll talk about today that are a little bit tentative and I'll tell you when I get to those points.

The scope of the document applies to all state and local governments, including governmental hospitals, public authorities, utilities, colleges and universities, and public entity risk pools. We define a public entity risk pool as a cooperative group of governmental entities joining together to finance an exposure or a loss, and so forth.

The risks of loss that are included in the scope include torts, theft or damage to or destruction of assets, business interruption, errors and omissions, workers' compensation, employee health benefits, acts of God -- natural disasters -- and any other risk that is transferred to a public entity risk pool by a governmental entity. So, the scope for entities' governments themselves is limited but if the pool provides coverage for any risk of loss, then it's covered by the scope of the Statement.

Excluded from the document are a few important things. One of those is other post-employment benefits. So, if you're providing benefits in the future -- and you all know about that project that the Financial Accounting Standards Board has -- that is excluded from the document. However, if you're providing health benefits to current employees based on events that have happened already, that is included within the scope of the document.

Specifically excluded are state Medicaid plans. Some people call them insurance plans. We don't like to think of them that way. Unemployment compensation is also excluded.

So, that's the scope of the statement. The Statement is split into two, it talks about pools and then entities other than pools, which are state and local governments that retain their own risks.

Pools are required to follow FASB Statement 60 which is the current standard for the insurance industry and was issued in 1982. It requires insurers to recognize liabilities for unpaid claims when the insured events occur. It's based on historical events.

Included in the liability are incurred but not reported claims, amounts for claim adjustment expenses (legal and adjuster's fees), allocated internal claims costs, as well as a deduction for salvage and subrogation (unlike regulatory accounting).

The liability should be the estimated ultimate cost of the claims including the effects of inflation and societal and other factors and using past experience adjusted for current trends, and any other factors that would modify past experience.

(Slide.)

The Statement goes a bit further than FASB Statement 60 in that it defines incurred but not reported claims. It defines them as including known loss events that are expected to be reported as claims, unknown loss events -- a provision for those that are expected to be reported as claims -- and future development on claims reported.

The third item is the more important one in this definition in that we specifically make it a part of IBNR claims. However, the Statement also modifies 60 a bit to say that the IBNR calculation still needs to be within the parameters of FASB Statement 5, Accounting for Contingencies. Its requirements are that it must be probable that a loss has been incurred and the amount can be reasonably estimated.

The reason we put this in the Statement was not to limit the IBNR calculation but to quell the comments that we got from state and local preparers that we are asking for an unreasonable number or something they can't estimate. So what we were trying to say in the Statement is that we want the number you can estimate. We're not trying to limit it.

However, I must say that I am afraid that if push comes to shove on this and you're putting in a big number for adverse deviation this language may limit what you are able to do in reporting a liability. It won't, of course, limit what you can fund. It may reduce the liability amount that gets reported by a pool.

Unlike FASB Statement 60, this Statement also discusses discounting. As you know, there is currently a Financial Accounting Standards Board project on discounting called "interest methods." Until that project is completed, this Statement requires discounting for structured settlements, but it neither mandates nor prohibits discounting for all other claims.

However, it does say that if you're going to discount, the rate should consider the pool's own settlement rate and investment yield rate. My emphasis there is on the word "consider."

Finally, pools are required to present ten-year claims development data. A lot of this data is going to be based on the new Schedule P and we've thrown in a few bells and whistles.

The first line item in the ten-year data will be a number called net premium and investment revenue. That's a number that you probably won't be responsible for. The same thing is true for the second line -- unallocated claim adjustement expenses and overhead costs. Then we get down to where you'll be working. The initial estimate of the incurred liability for each of the ten years makes up the third line.

Then, ten years worth of paid loss development information. This is going to be on an accident year basis, like it is in Schedule P. It will be a basic loss triangle basically. The same thing for the next item, the reestimated incurred liability.

Finally, then, a single-line item that shows the difference between the initial and the current estimate of your incurred liability.

Other requirements may require presenting more than one schedule. For example, you may need to present a separate triangle for a different type of contract if it's material. Also, you may need to provide detail by gross, ceded, and net amounts if there is a material change in reinsurance.

This whole ten-year requirement is a change from the project exposure draft. What we required in last year's exposure draft was the SEC's ten-year data. That data, of course, is cumulative data. It doesn't provide any information about revenues or unallocated costs. But we have tentatively gone with this schedule because we believe it provides much better information for the pools.

QUESTION: This requirement applies specifically to the pools as opposed to a self-insured?

MS. MONKS: Right. Just to a pool.

QUESTION: Is the Statement written to separate those two pieces?

MS. MONKS: As I mentioned, there are two separate sections in the Statement. One for pools and one for entities other than pools. This data is far too detailed for what we would require for a government entity on its own.

An unusual situation here is that the data will be required to be presented immediately after the notes to the pool's financial statements, and it will be presented as what we call "required supplementary information." That has a few auditing bells and whistles on it. RSI says that the auditor must look at the schedule and be satisfied that the data conforms in all material respects to the information contained in the financial statements.

Depending on the auditor, you may be asked to certify the data or provide some other assurance. The other alternative would be that the auditor may work with you based on a standard called "Using the work of a specialist." It requires the audit to obtain certain detailed information about your practice and other data. Lee will be able to discuss that with you.

Let's look at the Statement's requirements for entities other than pools or governments with self-insured retentions. The general principle here is that these entities follow FASB Statement 5. This is nothing new. Governments have been required to follow FASB Statement 5 since 1979 when National Council Governmental Accounting Statement 4 was issued.

Statement 5 requires that a liability be recognized when it is probable that an asset has been impaired or a liability incurred based on an event that occurred before year end. So, it's based on historical events.

The amount of the loss must be reasonably estimable. If you cannot make an estimate but it's probable that you have a loss, then you're required to disclose that fact. Or, if you have a loss that is reasonably possible, as opposed to probable, that also requires disclosure.

Of course, again, this is the basic principle for establishing a liability for the government, and it has no effect on funding. But in this Statement, the GASB will be setting up what a lot of people would consider a funding mechanism. That is set up through the internal service fund of the government.

The internal service fund, as you probably know, is a fund within a government that's set up to allocate costs to all the other funds of the governments. It is typically used right now for things like motor pools and other depreciable assets. But there are a lot of internal service funds being set up for insurance purposes, and you'll see a lot more.

Statement 10 will say that if you use an internal service fund to account for all of your risk management activities, then you may charge all the other funds of the entity either based on FASB Statement 5 -- the actual losses -- or based on an actuarial method, or a historical cost method that results in approximately equal revenues and expenses in the internal service fund.

What it's intended to do is to focus on smoothing the charge to all the other funds of the entity to result in a level premium, if you will, to all the other funds. The charges that are made to all the other funds are reported as revenue in the internal service fund and will result in a retained equity in that fund that will represent a rainy day fund.

In addition to the actuarial method or historical cost method, the internal service fund may also charge all the other funds of the entity a provision for future catastrophe losses. So, there is a cushion amount in there. Again, this is going to result in a retained earnings balance -- absent a catastrophe -- that will build up over time for servicing the losses that are retained by the entity.

Again, this is a funding mechanism, but there is nothing in the Statement that requires that the funding is actually made. So, an internal service fund can charge the general fund of a government a million dollars and the government general fund can report an account payable to the internal service fund of a million dollars. There does not need to be any cash going back and forth, although we hope that most people will realize this.

Let's look at the liability calculation for these entities other than pools. Again, like pools, we look for the estimated ultimate costs which includes inflation and other societal and economic factors. It looks at past experience modified for current trends. There is no requirement to report a liability for claim adjustment expenses. The Statement is silent on this, the rationale being that it's not required by FASB Statement

5, which we do not intend to modify. Also, because a lot of governments have their own internal claims process, these are amounts that will be incurred and charged to expense no matter what happens.

Discounting, as for pools, is required for structured settlements, optional for all others. You may make a calculation on a case-by-case basis, or a historical experience basis applied to outstanding claims. IBNR must be based on historical experience. We do not discuss industry experience, so by way of not discussing it, it seems to be an option.

If historical data is used, it should be stratified by amount and type of claim, and the strata should be sufficiently refined to assure a reasonable estimate.

Other provisions for entities other than pools are that they report liabilities for probable assessments from pool participation. If you participate in a risk sharing or a risk transfer pool and it has the option of assessing you, then the entity, the government, needs to look at the probability that it will be assessed for bad loss experience during the year.

Entities also must report the estimated ultimate cost of retrospectively rated policies as well as amounts for claims-made policies for which the entity does not carry tail coverage. It also applies to any self-insured retention, so that it would also look to deductibles and any other type of retention that might exist.

The effective date of the Statement. For pools, it will be for fiscal years beginning after June 15th, 1990. So, it will be next year for some pools, but most pools will be 1991.

For entities other than pools, the GASB has a large project on the agenda that talks about measurement focus and basis of accounting for governmental funds -- all the operating funds of the government. Right now that project is in process and they're trying to decide where to report non-capital liabilities -- whether in the funds or, as it is now, in the general long-term debt account group.

The effective date for entities other than pools is linked to that large project because of the large claims and judgments liabilities, and would not be effective until fiscal years beginning after June 15th, 1993.

However, you may early-implement the Statement, and this is a decision that we made last week. The entity would do that by either leaving the the long-term portion of those liabilities in the general long-term debt account group, or, if it sets up an internal service fund, the entity would transfer those liabilities to the internal service fund by adjusting beginning balances in the internal service fund. If an entity just set up an internal service fund, it would probably have a fairly large deficit in the fund in this year.

Because of this, many entities other than pools will be looking to use the internal service fund actuarial charge or historical method to recover a lot of that deficit. So you may be asked to make a charge that would, like a pension expense, recover the prior service costs, if you will, of old claims and judgments.

Putting all this effective date information aside, I will point out that FASB Statement 5 has been effective for governments since 1979. Governments should have already been reporting on this basis. The difference, really, is the funding mechanism for the entities other than pools.

Now, I'd like to cover briefly AICPA Statement of Position 87-1. This is not a project that I was involved with per se. I was responsible for reviewing it when it came up to the GASB for approval, so I do know a little bit of the politics of the issue.

SOP 87-1 was issued in March of '87, titled, accounting for asserted and unasserted medical malpractice claims. It also will be encompassed in a new audit and accounting guide for health care entities that will be issued probably in December of this year. A draft of that Guide is at both the FASB and GASB for approval for final issuance now.

I understand there is some hope that the language of SOP 87-1 will be modified a bit in the audit Guide, and I'll talk a little bit about that in a minute.

SOP 87-1 requires hospitals to accrue the ultimate costs of medical malpractice claims. That includes costs associated with settling or litigating. Reporting takes place when the incidents occur if the liability is probable and reasonably estimable. Again, this is based on FASB Statement 5 -- probable and estimable. We're looking at historic events. It also includes amounts for what they call unasserted claims, which is the term it uses for IBNR.

The SOP breaks the liability calculation into two parts. The first is for asserted and unasserted claims for reported incidents. It requires, like GASB Statement 10, that they be accrued individually or on a group basis using historical and industry experience. The difference here is that the SOP talks about industry experience unlike our own Statement.

The second part is for unreported incidents, and this is the second part of our IBNR amount. The SOP requires hospitals to estimate the number of incidents that are unreported as well as the amount of the claims. To do this, the SOP says hospitals can use either historical and industry experience -- I shouldn't say either -- you need to use both. It requires hospitals to look at existing asserted claims and use reported incidents to estimate the number of incidents. The loss, again, must be probable -- FASB Statement 5.

If you use industry experience, the SOP modifies some current thinking, I believe. If you use industry experience, it should be used only to the extent that the data is relevant to developing an estimate specific to the entity. When this document came up to the Financial Accounting Standards Board for approval, it didn't have any of this stuff in here. It said use industry experience.

The FASB members were concerned that there would be a blanket use of that data, that it would not be specific to the entity. As a result, there is quite a bit of language in the SOP that probably looks pretty foreign to actuaries and maybe to some accountants. This has caused a bit of a problem.

The SOP talks about relevance and states that relevance depends principally on comparability. It says if you're going to use industry experience, you need to look at the nature of the operation in the industry experience, compare the size of the industry, compare the geographic location. Then it also says to look at the nature of the incident, the provider's business activity, and here is the final one -compare the risk management systems of the industry data to the specific entity that you're talking about. I think that's probably where a lot of people are having problem applying this SOP or will have problems.

Other provisions in the SOP are like GASB Statement 10. It requires an estimated ultimate for retrospectively rated policies and accrual of liabilities for claims-made policies carried without tail coverage.

The effective date of SOP 87-1 is for fiscal years beginning after June 30th, 1987 with earlier application encouraged. The impetus for the SOP was, I believe, to set up some standard that provided for information on where there were differences between actuaries and accountants on reserving this claims amount. I think the tendency for auditors would be to put a zero in there and the tendency for actuaries would be to put $3 million. This document was meant to sort of resolve this, to say that industry experience is okay to use. But the way it got modified, it may still be difficult to resolve differences between auditors and actuaries.

To wrap it up for my portion, I think it's important to point out that the standards are not picking on governments and hospitals alone. That these just happen to be two applications standards for FASB Statement 5 to those industries. FASB Statement 5, again, currently applies to all self-insured retentions. Again, these really serve as application guidelines.

With that, I think I'll turn it over to Rich and he can tell you what to do with all that.

MR. ZATORSKI: Thanks, Suesan. How many people in the audience are non-actuaries? One or two. I suspect that --

MR. VAN SLYKE: Rich, we do need to use the mike. Do you want me to do your overheads for you so we can get your voice on tape?

MR. ZATORSKI: Oh, I'm sorry. I expected we might have many more practitioners or risk managers, and so forth, from self-insurance pools or from hospitals. Maybe that's good news to the consulting actuaries in the group. I guess maybe that means that these people are going to continue to come to us for advice in this area.

Perhaps, given the level of the crowd that I think we do have here today, perhaps we can quickly turn this over into a more of a discussion group than simply a presentation of some basic principles.

I'd like to start by just showing a case example of how SOP 87-1 might appear to a particular hospital.

(Slide.)

What I've shown here is five years worth of coverage. Let's just assume for ease that the hospital started in the first year that's shown here, which is 1983. In Columns B, C and D I've summarized the coverages that this hospital has purchased over time. In Columns E, F and G, I've given an indication of what their loss run at December of '87 would look like. In Column H I've shown an estimate of their ultimate losses that may have been provided by, let's say, an independent actuarial study at that point in time.

Now, faced with SOP 87-1 the hospital needs to establish an accrual on their books at that point in time.

What I try to do with the clients that I deal with is stress the fact that they, first of all, need to identify the exposure that they have, the exposure as a self-insurer. That can come through in a number of different ways.

Now, for this particular hospital, occurrence coverage was purchased in the first two years that we're looking at here, but you can see that there is a difference between the first and second years to the extent of the limits and liabilities that were purchased.

Given the loss information that we have for the 1983 year, it would seem that the losses that we could reasonably predict -- and that's what I'm using Column H to essentially mean -- this hospital wouldn't need an accrual for that 1983 policy year. Coverage is on an occurrence basis, the losses are contained within the limits, and that should be a zero accrual. Nothing they need to be concerned about.

The second year is a little bit different, and it does point out an area of coverage which I think we as actuaries all need to be aware of. That is that there may be occurrence coverage, but we need to test the limits of liability. For hospitals this does come up time and again. So that in the situation I've described here, while we have occurrence coverage, the estimate of the actual losses or the ultimate losses for this period are above the aggregate limits of liability.

In this case, in the example as I've developed it and explained it in fact in the article that you have a copy of, an accrual of $100,000 would be appropriate for the hospital as of the end of 1987. That's the difference between Column H or $1.6 million and the aggregate limit of liability of $1.5 million shown in Column D.

In 1985 the hospital has gone to a self-insured situation. In this case they haven't purchased any coverage, perhaps, except for maybe some high-level excess. So, in this instance we're talking about the need to accrue for any losses for which payment has not been made as of December of '87.

The estimate as shown in Column H, $1.7 million, minus the paid losses in Column E, or $300,000, would represent the accrual of $1.4 that would be appropriate for this hospital as of the end of 1987.

Starting with 1986 this hospital has now switched back to purchasing claims-made coverage. This is where the distinction between the asserted and the unasserted claims comes into play. What I've shown here in Column H are the estimated losses on a claims-made basis, or a report year basis. So, there is one fact that is not in this chart, and that's the ultimate losses on an occurrence basis that you'd need to know. But here is where the distinction between the asserted and the unasserted arises in terms of the accrual needs.

This is not an atypical example of what a hospital may face. In the ones that I've seen there have been significant changes in the types of policies that they've purchased from year to year.

I think as consulting actuaries one of the things that we have to be very careful of as we update studies are changes in the policies that they may have had from last year. It becomes very easy to simply update some old reports that we might have done and get the new loss runs coming to us.

You need to be aware that certainly within the hospital environment and malpractice environment there can be significant changes in coverage from year to year that the risk managers may not recognize as being important to this kind of calculation. We've seen that a number of times where that hasn't been recognized.

Some thoughts on how this implementation has been viewed from the hospital side, and I think it may parallel what some of the government entities will see when in fact the GASB statement takes effect for them.

For those hospitals on a self-insured basis, we would find that they were paying attention to the actuarial issues from a funding standpoint. But the differences between what you do for funding and what you do for accrual or reserving are the ones that really became significant and are often very difficult for the risk managers to sort out without help as to exactly how to use the actuarial reports that they may have been receiving to meet the specific needs of SOP 87-1.

Have any of you performed actuarial reports in this context where you've had discussions with the auditors in questioning the basis of those? What sort of questions have you guys gotten back? Phil?

MR. ZAKUS: Phil Zakus from Foster Higgins. I guess the two major questions that we usually come up against with our auditors is whether or not reserves should be stated on an expected value basis. That is, whether there should be a contingency load put in the reserves. The second issue is usually discounting of the reserves. We usually wind up giving both discounted and undiscounted reserves.

MR. ZATORSKI: Okay. Any other major issues that people have faced? Questions? Could you go to the microphone. I guess this has to be tape recorded.

MS. TVERBERG: Gail Tverberg, Tillinghast. I think another issue is the limits of liability to be considered when you're setting this reserve. You know, if the insured only has a million dollar policy limit and the $3 million aggregate, but his expected losses are $5 million and it's quite possible that he may have claims over a million dollars and he hasn't bought an excess policy, to what level should you be reserving above their policy limits in addition to the tail part?

MR. ZATORSKI: I've taken an exhibit out of an actuarial report -- perhaps the firm who has prepared this may recognize the format -- I've tried to not make that obvious. This is a report that in fact we've reviewed as assistants on the audit. I think it summarizes a number of the points that I mentioned and that were just mentioned here.

This is the summary page that a risk manager has to work with in trying to deal with this accrual issue. We can see that in Column 2 we have unreported losses. Essentially for this particular report, the way it was done, this would represent -- by summing some of the various years in question -- it would provide us with an accrual amount. But you can see that we have a whole variety of choices to make here.

Choice 1, do we use a million dollar limit? Do we include the $10 million excess of one million in this particular example, which is just the question that you raised. Is a million dollars the right breaking point?

I think that it all comes back to the issues which Suesan raised, the words which Suesan used, of being reasonably estimatable. This is an issue that's somewhat difficult to address. Accountants -- and, in fact, I guess maybe if we look at it from the client's standpoint, from the risk manager's standpoint, from the hospital's financial person standpoint, there may well be an advantage to in fact looking at limits of liability lower than a million dollars in particular situations.

So, where can we reasonably estimate that losses have not been reported? Can we put in a margin for losses above a million dollars if this particular hospital has never had a million dollar loss?

Now, in the applications that I've worked with we've typically from an accounting standpoint been willing to accept lower limits of retention in considering the application of SOP 87-1 for accrual purposes. Okay? So unless there's been a history of claims above a million dollars for this hospital, from the accounting standpoint we wouldn't necessarily be requiring that a reserve be set up to do that.

Obviously, that's different from the funding issue and from the issues of smoothing, and so forth. So, that's an important issue.

You can see that in Columns 2, 3 and 4 we have some expected value numbers and we have some higher level confidence intervals. Is there anybody who doesn't have a good understanding of what the higher confidence levels mean? Okay. I kind of guessed from the audience that we didn't need to spend much time on that.

But the words from the accounting literature, the margin for adverse deviation, that's not a desirable feature from the accounting standpoint. When this adverse experience occurs is when you record it. You don't attempt to smooth that experience over time. That's an issue that we need to separate out, I think, in terms of addressing the particular accounting literature.

A third issue that's clearly shown on this page is the difference between discounted and undiscounted reserves. Which of these do we use and what does it really mean?

The accounting profession has -- I think of it up to this point as kind of taken a pass on whether the discounting or undiscounting is appropriate. Suesan, is that a fair word? We have situations with our audit clients who are both discounting reserves, and others who are holding them at full value.

Since this issue really just came into play in the last year or two for the majority of hospitals and the majority of hospitals are the ones who are purchasing some sort of coverage but not full occurrence coverage, we have seen all kinds of different approaches to the discounting issue. I guess as we move ahead there's going to be differences from year to year in terms of the changes that might be made in these areas.

I guess one aspect of the accounting literature which is interesting is that if the hospital were to move from discounting of loss reserves -- from carrying full value reserves to wanting to carry discounted loss reserves, I mean, we would certainly view that as meaning a reduction in the required balances. If we look at it in terms of an insurance company setting, the insurer will do that and create surplus.

Now, the hospital situation may be different than that to the effect that the change in practice may require the hospital to go back and restate some prior liabilities. That becomes a question -I'm not saying that that's necessarily the end result.

If you are recommending that kind of an approach, given some adverse experience, let's say, in the last 12 months, you need to be aware that at the 11th hour, as the financials are being put together, the accountants may come forward and say, well, that's fine, that may have created a couple of million dollars of income for you in this year or will offset the adverse experience that you've seen, but we're not going to let you take that as an offset to income this year, we're going to make you roll that back.

Are there any questions on any of those particular points? I think you can get the sense that it's going to take some additional assistance from the actuaries to have the users of this information effectively use it for the accounting applications when at the same time they're going to use different numbers from this report perhaps for their funding requirements.

I guess another thing I forgot to point out here is that this is a report that does address the required liabilities as of the middle, or, sometime during 1989, and you can see that there is a line on this exhibit which is a 1989/1990 funding requirement. It is often easy to look at the totals on these particular pages and oftentimes the consulting reports will wrap together the funding for the new year as well as the requirements for the reserves for prior years.

For accounting purposes, obviously, we're not concerned as of the accounting date with that stuff for future claims. Okay?

I use this example because I think it does a great job of summarizing and showing the various actuarial principles that can come to apply here, and I've reviewed, I think, actuarial reports probably from every major consulting firm and I've done a number of our own and I think we see the same sorts of principles and questions and concerns arising throughout them.

Any questions on any of this before I move on? Bob?

MR. MICCOLIS: Bob Miccolis, Tillinghast. On the establishment of the level of limit, or whatever you want to call it, the per-occurrence level, would it be appropriate, if we're looking at past history of a particular hospital, to look at the past losses and hit them with an inflation factor? Because some hospital may have a loss of $300,000 that was eight years ago, but in today's dollars it would be a lot more money. That would affect the selection of the liability level.

MR. ZATORSKI: Bob, in my opinion, yes, it would be. I think that the easiest way for the accountants to look at this is in looking at frequency of loss or frequency of large losses. I've prepared a slide here to address where it would be reasonable to estimate, let's say, claims above $500,000.

(Slide.)

Now, this doesn't build an inflation adjustment into it. But for an average insurer -- in this case I'm using this as an example of, let's say, unreported large losses. So, this counts the number of large losses that we learned about after a particular accounting date.

For the average insurer, as I showed here, we have about three of those every year. We have no non-zero entries and we have some sort of a range. I think we would all agree we could somehow reasonably estimate that column in numbers. Based upon Bob's observation -- it might change as we inflated some of the losses that were below that threshold from prior years.

The experience we tend to see for a hospital, though, might more be like the last column where perhaps they've had one of these in a seven-year period. Now, for funding purposes we might in fact want to include a margin for that type of event. But for

accounting purposes I think that you would tend to find the accountants willing to say that's not something I can reasonably estimate, and until you can, or until that event actually is reported, we're not going to require an accrual item going up on that.

MS. TVERBERG: Gail Tverberg from Tillinghast again. I think my observation is that there are significant differences, though, from accounting firm to accounting firm, and from accountant to accountant on how they're dealing with this situation. I think that there are enough different situations -- we have new hospitals being formed all the time, we have situations where hospitals are dropping their obstetric wings -- they had obstetrics before. You know, there are all kinds of situations.

Of course, coming at it from a perspective as an actuary, you'd look at it and you'd say, well, we know that statistically this hospital is just as likely to have a large claim as that hospital, the fact that this hospital was lucky and hasn't had one over the last six year period and that hospital was unlucky and did have one.

I'm not sure that should really affect our choice of the limit. We should maybe be making our choices of limits based on that state -- you know, what kinds of claims can reasonably be expected, and maybe be making a choice of a limit on a little bit broader basis than what's happened in that particular facility just because of some of these considerations.

MR. ZATORSKI: Well, I think that we want to differentiate again between funding and accrual. I'm using this example to say for an accrual basis what limits should we use.

For a funding basis I absolutely agree with you that we've got to be concerned about the potential for these losses occurring. So, the funding recommendation you may give to a hospital may differ from the number that they would use to accrue.

MS. TVERBERG: I might just mention another thing on the funding situation. If you read 87-1, it says nothing about the funding.

MR. ZATORSKI: Correct.

MS. TVERBERG: I have clients who are sitting there with claims-made coverage and they have their tail liability, they've said, okay, we'll set up this liability for a tail liability. Now, how are we going to fund that? We're not going to fund it in one year. We have several different approaches as to how we're going to fund it. We're going to take it over a three-year period, we're going to fund our increment, we're going to fund this, we're going to fund that.

But that's really a separate issue, completely. You know, they may not feel that they're up to funding the hundred percent.

MR. ZATORSKI: Let's make sure we define funding in this context the right way. From an accounting standpoint how you move money around within the organization, how you move assets around and how you charge different divisions for it, and whatever, certainly is much impacted by the things that you've mentioned here.

However, for establishing the accrual liability -- the liability item -- none of that matters. When the accountants look at that, if you have a deficit you're not going to fund it over five years. I mean, you're not going to fund the liability over five years. You're establishing it today.

MS. TVERBERG: Of course. The liability is an entirely different issue.

MR. ZATORSKI: Absolutely.

MS. TVERBERG: The funding issue comes when you get to reimbursement. There are certain third-party reimbursers who are looking at the funding only. They don't care beans about what you put up for your liability. They want to know what went through on a cash basis. Those cash basis people are the ones that are looking at how much you put through, is it reasonable that you have justification for that.

MR. ZATORSKI: Sure.

MS. MONKS: Well, the GASB standard is unusual in that it does talk about funding through the internal service fund, and that's because our board tends to do things more on a public policy basis or issue standard that might affect public policies for governments. But it's very unusual.

MR. VAN SLYKE: Well, I think too your standards -- let's take an example of an association of publicly owned hospitals that have a cooperative self-insurance program. Then both SOP 87-1 and the GASB risk management pronouncements would come into play and you would have the full kinds of recordkeeping associated with Statement Number 60 for such a pool and yet you'd have exactly the same issues that Rich has been raising about the low frequency of large claims.

If that pool, for example, provided each of its member hospitals with one million per occurrence, three million annual aggregate coverage and you looked at those member hospitals and over the last seven years there had been a total of four claims over $100,000 among all of the members, you'd be hard pressed to accrue a liability, but you'd certainly want to fund -- according to the standards of your pooling thing, you'd want to fund so that the pool itself wouldn't show too great a risk of having been underaccrued or insolvent when the facts become known.

So, I think that you have a different issue for pools, you have a different kind of a funding mandate for a pool than you would have for an individual entity. A privately owned hospital might be required by its reimbursers to actually use a trustee account or something like that in order to document that the funds have been set aside, while the publicly owned hospital might be able to just have an account in the internal service fund. I don't know, that might be very vague.

MR. LINDEN: I'm Oren Linden of Coopers & Lybrand. As long as we're talking about funding versus accrual, the number one question that I've run across in hospitals and auditing that meshes the two have to do with discounting. Very simply put, the question is can you accrue discounted liabilities when you don't have the interest earning assets in the funding or any place else on the balance sheet backing up those liabilities?

I've seen several different creative answers to that question, one solution going so far as to say that if the entity has the wherewithal to borrow that amount of funding, that is all that's necessary.

Rich, I'd like to ask you what you've seen happen, knowing you've seen a lot of hospitals, and, Suesan, if you know what GASB really had in mind, perhaps you could share that with us.

MR. ZATORSKI: Oren, I've seen a lot of applications in discounting and nowhere did I see the accountants considering that relationship.

MR. LINDEN: Does that mean that they just say book the discounted liability in all those cases regardless of whether or not the funds were available to earn the discount, the advertised discount?

MR. ZATORSKI: Yes.

MS. MONKS: That's right. The GASB statement, of course, is waiting until the FASB completes its project and just says it's neither mandated nor prohibited. But I think the position of at least three of our board members was that there needed to be assets sitting there in order to discount. If we were going to require discounting, that probably would have been what the Statement would have said.

MR. LINDEN: Does it not make a difference that you not require any -- you're just allowing it? Is that an out that lets the hospital bulk the discount amounts -- slightly affected on the interest earning?

MS. MONKS: What we did was just to continue current practice. We didn't believe that we should modify current practice when there was a project in process by the FASB. So, yes, it does.

MR. ZATORSKI: I have prepared a chart showing some of the differences that I saw between insurance and self-insurance reserving. Again, thinking that there were going to be more non-actuaries in the audience, I kind of wanted to point out that what they might hear in the sessions the rest of today and tomorrow, they might need to hear with a bit of a filter. Although all of the techniques may have application to what they're doing, they might get applied in a different way.

I think this audience is more aware of some of these differences so I won't spend a lot of time on each, but there are a couple here that I think applied specifically to some of the things we have been talking about.

Item 3 in particular, the cash flow needs, that's really a significant item that we can tend to not look as hard at because our jobs typically are to estimate reserve needs. Now, the hospitals do have to establish both current and non-current liabilities. The current liabilities representing those amounts of the reserve that would need to be paid out over the next 12-month period, and the remaining balance going into the non-current.

I've seen a number of situations where that's becoming an important item in terms of this accrual. If you're in a self-insured situation and you've been in that situation for a period of time, you're pretty much reached a steady state, if you will. So that the estimated payments from year to year might not be expected to vary very much and it's not going to be as big an issue there.

But wherever you have significant coverage changes from year to year a different situation might apply. Let me give you one example.

Take a hospital that purchases claims-made coverage on a retrospectively rated basis. In that instance we've got to accrue from asserted claims but we've also got to be concerned with the reported claims or the asserted claims in terms of the retro parameters. Just as you would establish reserves for these types of things in an

insurance company setting, we need to evaluate whether it's reasonably expected that this hospital might have to make extra payments in the future based upon what we can reasonably estimate their experience to be today.

Now, it's interesting in that context to look at the retrospective rating date as the day when these payments become due, something very different than a loss payout curve which tends to be slow and steadier.

I'll take this example one step further and put it in the context of a real situation that sort of magnifies this. Take that retrospectively rated policy and make it a three-year plan. In addition to making it a three-year plan, let's say that for cash flow purposes the insurer has allowed the hospital to pay in a deposit premium which would be less than, what the standard premium under that account might be.

Let's just use an example and say that the deposit premium is 75 percent of the standard. You've got a three-year plan. So now you're talking for cash flow purposes 75 percent worth of a one-year standard premium hasn't flowed. There is a retro date when that kind of kicks in, and that may be well off into the future sometime depending upon when the retro calculations are done.

It can result in a very quick turnaround from the non-current liabilities to the current liabilities. We just started to talk about this situation in one area because it's becoming a 1991 event because of one particular insurance program that follows the lines that I've described. We're talking about a lot of dollars relative to hospital's budgets.

I've had comments from some of the accounting people that the dollars are large enough that the hospitals may not have the money to pay it. I guess that surprised me to an extent. It surprised me because I tend to think of the insurance situation where we recognize reserve problems before we recognize cash problems. We've always got the new premiums coming in for the insurance company and a big part of assets at least sitting there in terms of a runoff situation.

So, that's an area I think that's perhaps somewhat different but where our calculations as actuaries may impact how the hospital, how the client, needs to look at our numbers and it's one where perhaps we can help them anticipate problems before they get surprised by this at the end.

Has anybody else seen that kind of situation? Yes? You have? Okay.

I just want to mention one more item and then we'll open it up for questions or close our session down, either way. We need to stress with the self-insureds that they need to reserve, even when they do buy insurance coverage. A lot of the risk managers may feel that they have an insurance policy and that's really all they need to know about it.

These are just a couple of the situations where we have seen real errors on the part of what the hospital has intended to do. Deductibles under either occurrence or claims-made policies, they tend to forget about those and tend to treat those on a cash basis. Specially in med mal those deductibles can be fairly significant.

Obviously the claims-made policies, that's pretty clearly addressed. However, I think it's important to note that before this SOP 87-1 document was issued I don't think any hospitals were making an accrual for this.

We may find similar situations in other areas of business. I think Suesan made a very important point that shouldn't be missed in that these different pronouncements, the GASB pronouncements, the SOP 87-1, all have their foundation in the accounting literature that exists. It's there. I mean, if they follow that, they should be doing these things before these implementation dates anyway, but part of the reason for the specific pronouncements is the recognition that people weren't doing that.

I mentioned this retro policy setting the reserve for the future adjustments, and in particular looking at when those adjustments might need to be paid. It could be important.

With that, I'll be happy to answer any questions you might have.

MR. VAN SLYKE: I might play moderator and field questions to all of us.

If I could, let me share a couple of things that haven't come up or haven't been really highlighted that I think are important with respect to self-insurance reserving.

One is that we so often -- and Rich touched on this -- we so often deal with a very low frequency of self-insured claims. The accounting community is undecided. They are on the fence about whether we should interpret FAS 5 case-by-case or in the aggregate. Whether we should look at the claims department's idea of what these liabilities are or apply some actuarial concept.

The hospital example Rich gave where the question is given that there are a very few large claims, what threshold do we use to determine the accrual of liability? Do we say, well, let's just set a reserve for the first hundred thousand dollars of every loss because it's pretty unlikely there isn't one more than $100,000 and according to FAS 5 if it's unlikely, we don't accrue a liability for it. Or do we use $10 million because it could be a loss as big as $10 million and so we ought to sweep that in?

The difference, quite frankly, could be 30, 40, 50, you know, a huge percent change in what accrual a hospital would have to keep.

We've been involved in our practice in actually helping our self-insured clients -- I'm not talking hospitals, now, but self-insured risks that have a small number of claims, maybe the total number of uninsured or not fully insured claims is 10 or 15 or 20. We'll go in there with our claims people and set case reserves and the actuaries aren't invited in because the accountants have decided to interpret it case by case by case.

Secondly, confidence intervals. We have some clients that think that actuaries live and die by confidence intervals, and we have other clients who regard the whole thing as a bunch of mumbo-jumbo and they want just one number from us which is what they're going to put to the bottom line.

The second group of clients includes most of the audit partners I work with. The audit partners want us to come up with one number that they can rely on.

I think that there's an awful lot of mumbo-jumbo in confidence intervals. One of my previous employers used to routinely publish confidence intervals but they didn't take into account in computing those, in estimating those, the uncertainty of any of their forecasts. They merely said, here's our best guess about the number of claims, here's our best guess about the claims size distribution, and from that we will use collective risk

theory to really come up with an estimate of the chance that losses will be greater than the mean. They just completely ignored the fact that they didn't really know how many claims there were going to be or what the claims size distribution was.

I think there's a lot of mumbo-jumbo. I think the clients are right in thinking that about confidence intervals.

The other thing that was touched on is bad data. I think a lot of you, obviously, have been working some in this field and you know how terrible the data is that you often get in setting self-insurance reserves. Again, does a poverty of data give us the right, then, to set reserves based on industry data? Does the fact that the client's own data which ought to be there isn't there and therefore isn't credible mean that we then give a hundred percent credibility to the industry data even though it's not terribly relevant?

You know what I'm saying. There is a difference between the actuarial concept of we've got to use the industry data as the most credible when the client data isn't there, and the accounting concept that says if you don't know what you're doing, don't book a number, put a footnote in.

On the last, exclusions -- I don't think it's too big an issue for hospital professional liability. I think the policy forms and exclusions are relatively standard. But in general in self-insurance accounting I think it is important to review the policies that have been in place and see what kinds of exclusions there are.

We, for example, have been asked to set reserves in the course of audit support for an asbestos abatement firm. The typical asbestos abatement policy excludes any claims reported after the abatement contractor finishes the abatement job. Okay? So, it's really only -- you know, you have some kind of a catastrophic falldown of the barriers that keep the asbestos controlled that's going to lead to a claim. All the long-term stuff isn't even covered. So, where is the actuary's job with that kind of policy coverage? It's certainly to look outside of the policy but not to consider that the policy really grants much relief from the actuarial reserves.

With those remarks, I had a couple of questions but we've got about 15 minutes. The coffee break starts at ten after. Let me see if we have questions from the audience. If not, I've got a couple for the panelists.

Yes. Please come up to the microphone.

MR. MONTGOMERY: Dale Montgomery, Robert Hughes Associates. One of the things that when I've talked with auditors on hospitals and working with actuarial estimates and the application of SOP 87-1 I really haven't had too much problem in discussing the discounting or confidence levels because the statement is at least reasonably clear on that.

Where I've had problems was when I was dealing with some auditors that I felt were particularly sophisticated and very interested in applying SOP 87-1 as it was supposed to be. They attached right on to the use of industry data. This is something that, Rich, I'd like your comments on how you've handled it before. Suesan, you alluded to some possible changes in the wording, and particularly the troublesome wording has been comparable risk management systems and use of incident reporting relative to the industry data. So, I would like for you to comment on those particular aspects and perhaps how you've handled them in situations that you've worked on.

You've hit on an important practical issue because those words are used in the SOP language. I mean, if we think about the process itself, I think the one thing we need to recognize is that self-insurance reserving, especially when the hospital is doing their own reserving, may follow very different case development than the typical specialty carriers would.

So, there is a real concern in terms of just simply using the St. Paul's loss development factors against some hospital that is doing their own reserving. I think that that's a valid question when somebody throws it back to you.

One way that I've responded to those kinds of situations is that even if you don't feel that the loss development data for the hospital is credible and you wouldn't be willing to develop or calculate development factors on their own data alone, that doesn't mean you can't use that as information which would at least support or very much contradict the use of the industry factors.

I think by taking that one additional step -- put the triangle together, show what the developments have looked like -- you're going to satisfy the audit people.

If what you're saying is that the 12 to 24 month development factor that you want to use from an industry basis is two, and if you have six years of data from the hospital and no number has been lower than four -- maybe they've ranged from four to 87 so you don't feel that you can get a credible average from them. I mean, that still brings into question the fact of why you're using two when it's never been there. Okay?

So, that would be the one practical suggestion. Put the data together, obviously if it exists, and at least make some of those comparisons and you can provide them with some basic information. This is what's happened to the hospital in the past and it makes sense in terms of what I'm using for industry statistics. I think it will work.

MS. MONKS: As I mentioned, the hospital audit guide is going to be reviewed by the FASB and the GASB shortly and I think the hope is that they'll at least get a few generalities in there and that sort of thing. But they really can't modify the language that much since the language originated with the FASB staff. So I think they'll have a difficult time and maybe the best hope you have is to work in setting up your own opinion on it, on how to handle particularly the risk management function -- whether that would be to look at your emergence pattern or something like that would be a standard that you could issue.

But I really don't hold out a whole lot of hope for what will happen in the audit guide, but there will be a little bit of modification.

MR. BEER: Al Beer, Scandia. In a prior lifetime I've experienced a lot of what you had discussed. I think we should probably take some credit for the fact that we've done a great job educating a lot of these clients. I think they are much more aware.

Perhaps the best example I've come across was that I had a client that every time I gave a 75th to 90th confidence level they demanded a 10 and 25 percent confidence level.

(Laughter.)

MR. BEER: I guess the question I'm interested in -- and this is somewhat tangential as a topic because I realize self-insurance reserving can apply to many lines of business -- but there's a tremendous amount of discussion now about perhaps an overreaction in the

medical malpractice area with regard to at least frequency if not severity. I was curious whether or not the client base that you're working with is aware of that and is aggressively pursuing it in their arguments.

MR. ZATORSKI: Al, I think, if I understand your question, what you're relating to is the fact that there are many people who are starting to see a downturn in frequency, or think we're seeing a downturn in frequency from '87 to current, and is that being reflected in the forecast being put forth. Is that at least part of it?

I haven't seen anything where that has come in. I think we're being very conservative in terms of addressing that item. I think we probably all come from the history of always assuming that there's double digit inflation on medical malpractice and I guess in relation to some of Jim Wood's presentations can take us back to 1920 demonstrating that that in fact is the case.

It's happening both in the self-insurance situation and obviously in a bigger way for the specialty carriers. I mean, how do they reflect it? Yes, we are seeing the downturn in frequency, but, no, we're not seeing hospitals attempting to take an aggressive approach and push that forward. At least I haven't at this point.

MS. TVERBERG: Gail Tverberg. I was just going to mention that I'm giving a tort reform in reserving session -- the next session at 10:30 -- and one of the things I'm talking about is specifically this issue which has to do with the dip in frequency we've seen in the last couple of years.

One of the things we've noticed the last six months, at least on a few clients, is that the dip is a dip and it's going back up again.

MR. VAN SLYKE: It seems to me that what happens as much as anything with what appear to be cycles in costs is not that they're cycles but that they're shifts from one kind of aggressive tort theory to another.

When medical malpractice becomes profitable for attorneys to get into, there is a run up in claims frequency for medical malpractice for a bunch of years until that isn't profitable. Then, all of the sudden, litigating workers' comp becomes all the rage and those litigation frequencies run up. Then that becomes unprofitable and then they start suing cities for something.

I mean, it just seems that it's more shifts in what the plaintiff's bar is doing than any pattern of cyclicality.

MR. VICER: Steve Vicer, Product Streams. My understanding is that for funding purposes a self-insured can pretty much do whatever they want. They can set up funding at the 99th confidence level if they want. But for reserving or accrual purposes, FASB 5 would only let them really take the low end of a reasonable range.

Now, for a client that might want to be conservative and not take money into earnings if they weren't absolutely sure, can you people give any words of wisdom of how to convince the auditors to perhaps set up a higher reserve than expected?

MR. VAN SLYKE: Two things. First of all, there are times, as Gail pointed out, when the funding makes an enormous difference because it's the funding that determines the source of income to the entity. A hospital with Medicaid reimbursements might be a

good example. A defense contractor with its workers' compensation self-insurance program might be another.

So sometimes the level of funding is really what they do care about because it's what determines the income or the cost recoveries for your client.

Does anybody want to field the second part?

MS. MONKS: I might say that we're not talking about just looking at the low end of the range. You should not be looking just to the accountant's conservatism here. If there is a range, you need to look for the most probable amount. You're not just booking the least amount.

So I think that's something that you need to stress -- and that is in the standard -- that we're looking for the probable amount.

MR. VICER: Well, let me rephrase the question. Would an auditor allow a self-insured to book anything higher than the expected level that the actuary claims in his report?

MR. ZATORSKI: Yes, absolutely. I mean, the accountants obviously are working with a preference for conservatism. So, I mean, it's going to make their job a lot easier if they feel that there is some sort of a cushion. You're not going to have a problem with that.

But if there is a large amount of conservatism built in, if you were talking about a 99 percent confidence level type of situation one suggestion I might make is that you could talk about that conservatism differently for the more recent periods than for the prior periods.

I've seen a number of situations where what the funding reports actually do is treat the self-insurance fund or trust as in a sense a profit-making venture and roll forward the retained earnings into a reserve estimate. You know, if you've got years that are five, six, seven years old and you have large margins for deviation in those old years just so you can balance back to what the funding suggestions were at that point, that's a little bit more difficult to swallow than a margin in the more recent years.

MR. VAN SLYKE: Following that train of thought, let me see if I can set a trap for you, Rich. First of all, would you and Suesan chime in if you think you want to get into this too -- would you expect an auditor to treat a change in the confidence interval as a change of method? If one of your clients went from the 90th percentile to the 70th, would that seem to me -- assume we're talking a big amount of money here -- would that be a change in method or would that be just part of the discretion that you would expect the client to have?

MR. ZATORSKI: Well, I think I'll defer to Suesan in terms of the topic itself. I think that certainly the question will be raised in terms of rolling that back, a restatement to the prior years.

I certainly think it would get a hard look by the auditor because there are other areas and precedent where there is a change in estimate that is tantamount to an accounting change, as we call it, something that needs to be retroactively restated maybe even. I would certainly give a hard look at it. I don't know any precedent, though, for it.

MR. VAN SLYKE: The trap comes about when you suddenly have very good experience in your self-insurance program and it's now crystal clear that the funds that have accumulated or the reserves you were carrying last year need to be taken down and so all of the sudden instead of being 70 percent confident that you need $2 million, you're 90 percent confident that a half a million would be enough.

Then you're in the odd position of requesting your client to identify that he has a change in his accounting methods while he's taking down a million and a half in reserves, and he doesn't want to do that. He wants to simply take it to income.

MS. MONKS: I think that the auditor would probably be more concerned if the reserve went up because you've switched from 75 to 90 than a change like you discussed.

MR. VAN SLYKE: Tell me whether or not the AICPA standards -- back to that -- would allow any kind of year to year smoothing if that's the goal -- varying your confidence interval to smooth the year to year results.

MS. MONKS: I don't know. I think it would depend on how much smoothing was going on. Looking at all the debits and not the credits. I don't know.

MR. VAN SLYKE: Any other questions?

QUESTION: I have one more question for Rich and that is about the collectibility of insurance. How do you handle questions of collectibility of insurance in health care providers?

MR. ZATORSKI: Oh, I think you tend to handle them in the same way we do for insurance companies. I mean, I think that's a question that is infrequently raised as to whether the reinsurance or their insurance coverages, the excess coverages in particular, are going to respond. I've raised that issue in a number of cases.

I think what is important is that the auditors do have some new guidance that tells them they need to talk to audit committees about risk. In the areas where the hospital may think they have purchased excess coverage and we have a nonperforming insurer for some reason, that's an item that does need to be discussed. That's an important issue.

I also tend to look at this when there is large claim experience. I think it is also important to look at it on the particular reported claims that are up in those limits. Obviously the payments might not happen for a period of time but it's important to quickly respond to those layers.

QUESTION: Suppose a client even purchased insurance on their occurrence basis, to make this fairly simple, and he had a million dollars per occurrence, $4 million in the aggregate. You looked at his expected losses and they were $3.5 million when you limit losses to one million. Are you looking at recommending to reserve for losses excess of aggregate coverage because there are indeed expected losses there?

MR. ZATORSKI: Absolutely. If they're reasonably estimatable, your -- your example of the $3.5 million is less than the $4. So if that's our best estimate, we don't see anything penetrating that --

QUESTION: Even though the expected loss is limited to $1 million per occurrence, or $3.5 million, which is less than the aggregate, there are expected losses excess of the aggregate --

MR. ZATORSKI: Oh, okay. If that's the situation, sure.

MR. VAN SLYKE: In the case that you're citing we're saying that there is an expectation -- there is a number we can calculate that is the expected value of the losses in excess of the per occurrence and the annual aggregate.

But I don't think that means that we have met the test of Statement Number 5. That Statement Number 5 requires that there must be reason to believe that the incidence leading to the eventual payment has already taken place and that data will be forthcoming sometime to show that in fact those amounts must be paid.

I think by that test these expected value kinds of calculations that you're raising are not proper accruals. They are issues for funding decisions perhaps, or for other kinds of excess insurance decisions that are important in deciding what limits to buy. But I don't think they generate necessarily accruals unless it is clear that there is evidence there that there is going to be a payment arising out of the incidence to date.

Any other questions? Well, thank you very much. Coffee break should be starting now.

(Applause.)

EXHIBIT 2: EXAMPLE HOSPITAL MEDICAL MALPRACTICE EXPOSURE

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
		Limits of liability			Actual losses reported at 12/31/87		
Policy year	Type of coverage	Per claim	Aggregate	Paid	Reserve	Incurred	Estimate of ultimate loss
(1) 1983	Occurrence[a]	$1	$3	$0.5	$0.9	$1.4	$1.5
(2) 1984	Occurrence[a]	0.75	1.5	0.4	0.8	1.2	1.6
(3) 1985	Self insured[a]	—	—	0.3	0.7	1.0	1.7
(4) 1986	Claims made-Year 1[a]	1	3	0.2	0.2	0.2	0.9
(5) 1987	Claims made-Year 2[a]	1	3	0.1	0.1	0.4	1.2

a. In millions

Differences Between

Insurance and Self Insurance Reserving

	For Insurer	For Self Insurer
1. Business or Business Expense	A. Custodian $ B. High Ratio of Reserves to Assets	A. Your $ B. Low Ratio of Reserves to Assets
2. Effects of Under-reserving	A. Insolvency B. Limit Writings C. Financial Ratings (e.g. Bests)	A. Charge to Earnings B. Limit Investment C. Debt Ratings
3. Cash Flow Needs	A. Use of funds in hand B. Offset by new premiums	A. Borrowing from other operations B. Current v. Long Term Liabilities

Differences Between

Insurance and Self Insurance Reserving

	For Insurer	For Self Insurer
4. Regulation	A. Solvency Tests B. Reporting requirements	A. Bond requirements
5. Size of Data Base	A. Law of Large Numbers	A. Reaction to Changing Conditions
6. Exposure	A. Coverages Sold	A. Coverages Not Purchased
7. Other Responsibilities	A. Premium Rating B. Global Coverage Shifts C. LOB Profitability	A. Product Pricing B. "OFF Balance Sheet" C. Cost Allocations

Special Situations

1. Start-up Scenario

   A. Payment and Reserve Growth
   B. Effect on Annual Budget

2. Case Reserving

   A. Information Curve
   B. IBNR

3. Large Losses

   A. Reasonable Estimation

Self Insurance Start Up

Years of Self Ins.	Budgeted Annual Losses	Calendar Year Payments	Reserve Needed
1	500K	150K	350K
2	500K	250K	650K
3	500K	350K	750K
4	500K	400K	850K
5	500K	425K	925K
6	500K	450K	975K
7	500K	475K	1,000K
SUBTOTAL	3.5M	2.5M	1.0M

Payout Curve: 30/20/20/10/5/5/5/5

Self Insurance Start Up

Years of Self Insurance	Ratio of Payments to Budgeted Loss	20% Reserve Error to Budgeted Loss
1	30%	14%
2	50	26
3	70	30
4	80	34
5	85	37
6	90	39
7	95	40

Case Reserving v. Full Reserving

Year	Total Losses	Case Reserve	Full Reserve	Shortfall
1	500K	100K	350K	250K
2	500K	250K	650K	400K
3	500K	250K	750K	500K
4	500K	300K	850K	550K
5	500K	350K	925K	575K

IBNR as % of Total Losses
50/30/20/10/5

Number of Claims > 500,000

Year	Average Insurer	Average Self Insurer
1	2	0
2	4	0
3	2	1
4	3	0
5	6	0
6	5	0
7	2	0
Total	24	1
Average	3.43	.14

If You Do It Yourself

1. Contruct an appropriate data base

   A. Collect the right stuff
   B. Triangulation
   C. Discontinued Operations

2. Reflect changes unique to your situation

3. "Case Reserves are Enough"

4. Compute with Percentages
   Evaluate in Dollars

5. Avoid self-fulfilling prophecies

6. Recognize ALAE

If You Use An Independent Actuary

1. Contruct an appropriate data base

   A. Collect the right stuff
   B. Triangulation
   C. Discontinued Operations

2. Document changes specific to your situation

   A. New product lines
   B. You know your operations best

3. Document changes in case reserving practices

4. Range or Point Estimates

   A. Best estimate
   B. Double Ranges

5. Contingency margins and Confidence Levels

6. Discounting

7. Smoothing

8. Honesty v. Advocacy

Reserving Even When You Buy Insurance

1. Deductibles

   A. If low, reserve for amount not paid
   B. If high, reserve for estimated loss

2. Claims Made Policies

   A. Reserve for Unasserted Claims

3. Retro Policies

   A. Reserve for future adjustments on current policies

Professional Liability Funding Study

Indicated Funding Levels

Occurrence Basis

Loss Period	Unreported Losses at / /89	Unreported Losses at Confidence Level 75%	Unreported Losses at Confidence Level 90%	Discounted Unreported Losses at Confidence Level 75%	Discounted Unreported Losses at Confidence Level 90%
(1)	(2)	(3)	(4)	(5)	(6)
$1,000,000 Limits					
1985 / 86	$180,589	$236,572	$292,554	$203,688	$251,889
1986 / 87	328,863	430,811	532,758	364,897	451,246
1987 / 88	520,445	681,783	843,121	563,835	697,261
1988 / 89	934,483	1,224,173	1,513,862	974,442	1,205,034
1989 / 90	1,566,308	2,051,863	2,537,419	1,547,105	1,913,214
Total	$3,530,688	$4,625,202	$5,719,714	$3,653,967	$4,518,644
$10,000,000 Excess of $1,000,000 Limits					
1985 / 86	$58,268	$87,402	$145,670	$75,253	$125,422
1986 / 87	117,412	176,118	293,530	149,172	248,620
1987 / 88	216,310	324,465	540,775	268,333	447,221
1988 / 89	434,957	652,436	1,087,393	519,339	865,565
1989 / 90	797,621	1,196,432	1,994,053	902,110	1,503,516
Total	$1,624,568	$2,436,853	$4,061,421	$1,914,207	$3,190,344

Providers must plan for accrual of medical malpractice claims

BY RICHARD ZATORSKI

RISK MANAGEMENT

Because of the change in accounting regulations that requires accrual for certain medical malpractice claims, healthcare providers could soon be experiencing significant effects on their financial results. AICPA Statement Position 87-1, "Accounting for Asserted and Unasserted Medical Malpractice Claims of Health Care Providers and Related Issues," states that if healthcare providers have not transferred all risk for medical malpractice claims arising out of occurrences prior to the financial statement date to a third party, some accrual will be required.

Providers need to prepare themselves for the financial problems that could arise from these reporting guidelines. Estimating the potential accrual amounts with advanced planning and extensive data gathering and analysis could lower a healthcare provider's financial risk.

Healthcare providers will soon begin to feel the effects of accounting regulations requiring accrual for certain medical malpractice exposures.

For some, this will have little or no effect on financial statements, either because of the type of insurance coverage purchased or because these liabilities have previously been accrued. For others, there will be a significant, and perhaps unexpected, impact on financial results.

The source of this change is the AICPA's Statement of Position 87-1, "Accounting for Asserted and Unasserted Medical Malpractice Claims of Health Care Providers and Related Issues" (SOP 87-1).

SOP 87-1 applies to:

- Healthcare providers, including "hospitals, nursing homes, and practices of physicians, dentists, or other healthcare specialists;"
- Captive insurance companies wholly owned by a healthcare provider;
- Captive insurance companies owned by two or more healthcare providers;
- Medical malpractice liability for loss and loss expense; and
- Fiscal years beginning after June 30, 1987.

WHEN IS ACCRUAL NECESSARY?

The keys to understanding the effects of SOP 87-1 are two of the basic concepts of insurance: transfer of risk and occurrence (or accident) date. Simply stated, if the provider has not transferred to a third party *all* risk for medical malpractice claims arising out of occurrences prior to the financial statement date, then some accrual will be required.

There are only two circumstances where coverage conditions alone would indicate that no accrual is needed:

- The provider has historically purchased only guaranteed cost occurrence policies with sufficiently high limits of liability; and
- The provider has historically purchased both occurrence and claims-made policies (on a guaranteed cost basis) with "sufficiently high" limits of liability; and the provider has purchased tail coverage for all prior claims-made policies at a date coincident with the financial statement date.

All other coverage situations require an estimation of an accrual amount (see Exhibit 1).

SELF-INSURANCE. The most obvious circumstance requiring accrual is full self-insurance (that is, the provider has not transferred any of its medical malpractice exposure to a third party). In this case, the provider must accrue for the estimated value of any claims *occurring* during the self-insured period, whether those claims have been asserted yet or not. This estimation should include: The total amount reserved for known claims as deter-

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mined from the facts available on a case-by-case basis (case reserves); estimates of future development (either plus or minus) on known case reserves; and estimates of the number and amount of claims occurring prior to the financial statement date that have not yet been reported (incurred but not reported (IBNR) reserves).

EXHIBIT 1: WHEN IS ACCRUAL NECESSARY?

	Self insurance	Retrospective policy	Claims made	Full occurrence
Case reserves (known claims)	yes	maybe	no	no
Future development (known claims)	yes	yes	no	no
IBNR	yes	yes	yes	no

RETROSPECTIVELY RATED POLICIES. Certain providers may have purchased occurrence policies with a retrospective rating feature. SOP 87-1 has also identified this type of coverage as requiring accrual considerations. Under a typical retrospective policy, the premium will vary over time with actual reported losses, and a recalculation of the policy premium will be computed at regular intervals (for example, every 12 months starting six months after policy expiration).

While specifics of the retrospective rating features should be reviewed for each policy, the provider having a typical policy will need to set up an accrual for: case reserves not included in the latest retrospective rating adjustment; estimates of future development on known claims; and IBNR reserves.

These accruals will also be subject to any maximum or minimum premium limitations of the policy.

It should be noted that accruals based upon SOP 87-1 relate to loss and loss expense only, while retrospective rating formulas generally include loadings for various company expenses and charges. Hence, it is not entirely accurate to use the difference between the retrospective premium based on ultimate losses and the retrospective premium based on reported losses as the accrual amount.

Care should also be taken to ensure that the dates or retrospective adjustments are properly coordinated with the accrual dates for financial statement purposes. For example, for a policy effective from Jan. 1, 1985, to Jan. 1, 1986, retrospective adjustments could be promulgated based on losses valued at June 30, 1986, and June 30, 1987.

For a financial statement date of July 1, 1987, however, the actual retrospective adjustment based on a June 30, 1987, loss valuation may not be prepared in time for accounting purposes. In this case, the accrual may need to consider any losses in addition to those valued at June 30, 1986 (that is, the valuation date associated with the latest available retrospective adjustment).

CLAIMS-MADE POLICIES. Somewhat less obvious is the situation where the provider has purchased continuous claims-made coverage for a number of years. Because claims-made policies usually have a guaranteed tail purchase associated with them, it could be argued that the guaranteed availability of tail coverage is equivalent to having full occurrence coverage.

However, the SOP 87-1 states that, "this policy does not represent a transfer of risk for claims and incidents not reported to the insurance carrier," and an accrual should be made "unless the healthcare provider has bought tail coverage and included the cost of the premium as expense in the financial statements for that period."

As compared to other coverage types, the accrual relating to claims-made coverage will be limited to an estimate of IBNR reserves.

However, it is not sufficient to use the tail premium as the accrual estimates. Paragraphs 22 through 27 of the SOP 87-1 require that this be based on loss estimates considering all relevant data. The tail premium alone will generally not meet this requirement for several reasons:

- It normally includes an element for company expenses (for example, administration and taxes) and profit;
- It may include loadings for catastrophe potential, which is specifically excluded for accrual purposes by FASB 5;
- It will be based on general industry experience, whereas the SOP 87-1 requires direct consideration of the provider's own experience; and
- The premium charged by an insurance carrier may not directly relate to current loss experience due to allowance for investment income, competitive and regulatory constraints, or recoupment of past losses.

In fact, for many hospitals, use of the tail premium could result in an over-accrual for purposes of SOP 87-1 compliance.

SUFFICIENTLY HIGH LIMITS OF LIABILITY. Medical malpractice policies generally include a per claim limit as well as aggregate policy limit. Thus, even in the case of occurrence policies, the provider retains the risk of loss above its policy limits. If actual claim experience has exceeded or can reasonably be expected to exceed those limits, then an accrual is required. Estimates of case reserves, development on known claims, and IBNR reserves may all be relevant, as these relate to losses above the policy limits.

A COMPLICATED EXAMPLE

Consider a hospital that has been

in operation since Jan. 1, 1983, which has insured its medical malpractice exposure seen in Exhibit 2.

The reported losses in columns (E), (F), and (G) are based on known claims, and the ultimate losses are estimates of the final settlement value of all claims for the type of coverage shown in column (B).

Before proceeding, enter the estimate of the accrual amount required under SOP 87-1 for each year in the table below. Assume that ultimate losses on an occurrence basis for years 1986 and 1987 will be $1.8 million and $1.9 million, respectively.

Policy year	Accrual amount at 12/31/87
1983	
1984	
1985	
1986	
1987	

What follows is a discussion of how accruals at Jan. 31, 1987, could be determined from the above information:

In row 1 in Exhibit 2, policy year 1983 will require further accrual only if there is an individual claim exceeding the per claim limit of $1 million.

Points that should be considered further include the ultimate loss, which is below aggregate limit, and the occurrence policy that covers unasserted claims.

In row 2, policy year 1984 will require an accrual of at least $100,000 because ultimate losses exceed the aggregate policy limit. This is an example of an occurrence policy where the limits are not sufficiently high to represent a full transfer of risk.

Other areas that should be checked are the need for an accrual even though reported losses are below policy limits, and an examination of individual claims to see if any exceed the per-claim limit.

In row 3, policy year 1985 is totally self insured and so accrual should be made for case reserves, development on known claims, and IBNR claims. This can be estimated at $1.4 million or the differences between ultimate losses of $1.7 million and the amount already paid of $300,000.

In rows 4 and 5, the two claims-made policies can be considered together. Under these policies, the provider is covered for claims occurring in 1986 and reported in either 1986 or 1987; and claims occurring in 1987 and reported in 1987.

However, an accrual is required for claims occurring in 1986 and 1987 that are reported after Dec. 31, 1987. This can be determined as the difference between ultimate losses on a full occurrence basis for the two policy years and the corresponding ultimate losses for the claims-made policies. On this basis the accrual should be $1.6 million or the difference between ultimate occurrence losses (1.8 + 1.9) and ultimate losses covered by the claims made policy (0.9 + 1.2).

In summary, subject to consideration of individual loss limits and assuming that ultimate losses have been reasonably estimated, the following accrual amounts should satisfy SOP 87-1:

1983	$ 0
1984	100,000
1985	1,400,000
1986	1,600,000
1987	
Total	$3,100,000

ULTIMATE LOSS ESTIMATES

The example assumed that estimates of ultimate losses were available for each policy period. In fact, this situation is the most difficult aspect of the accrual process. Certain interesting loss estimation techniques have been directly addressed by SOP 87-1.

One technique is the "use of industry experience" in estimating losses. Paragraph 27 of SOP 87-1 states that the "relevance of industry data depends principally on the comparability of the healthcare provider with the entities whose experiences are used in developing that data." The statement goes on to suggest that if such comparisons cannot be made, then the industry data should not be used.

In practical terms, this can provide a dilemma for many healthcare providers. On the one hand, the provider's data will generally not be fully credible on its own. On the other hand, general industry data may not be obtainable, and where it

EXHIBIT 2: EXAMPLE HOSPITAL MEDICAL MALPRACTICE EXPOSURE

(A) Policy year	(B) Type of coverage	(C) Limits of liability Per claim	(D) Limits of liability Aggregate	(E) Paid	(F) Actual losses reported at 12/31/87 Reserve	(G) Incurred	(H) Estimate of ultimate loss
(1) 1983	Occurrence[a]	$1	$3	$0.5	$0.9	$1.4	$1.5
(2) 1984	Occurrence[a]	0.75	1.5	0.4	0.8	1.2	1.6
(3) 1985	Self insured[a]	—	—	0.3	0.7	1.0	1.7
(4) 1986	Claims made-Year 1[a]	1	3	0.2	0.2	0.2	0.9
(5) 1987	Claims made-Year 2[a]	1	3	0.1	0.1	0.4	1.2

a. In millions

is available, comparability of the industry group to a specific provider may be difficult to ascertain.

While each provider must consider its own situation, the following suggestions may prove helpful:

- Maintain a comprehensive historical record of individual malpractice claims (including date of occurrence, date of report, and paid and reserved values) at various dates. Larger providers may find that these data are sufficient to make estimates without reference to other sources. Smaller providers will find the data important in validating the use of data from other sources.
- Identify the source of any data labelled as "industry averages" and make sure that such data has been recently updated.
- For providers with claims-made coverage, request data on claims emergences patterns and average severities from the current insurance carrier, preferably on a state-specific basis.
- Compare any factors received from the insurance carrier with factors developed from inhouse data.
- After selecting an estimation technique, perform retrospective tests to see how this method would have performed had it been used at the end of prior years. This presumes the availability of the historical claims data suggested earlier.

DISCOUNTING

Medical malpractice claims typically have a reporting and settlement process that can extend for many years beyond the date of occurrence. Considering the time value of money, a dollar reserved and invested today can pay for more than a dollar of claim payments in future years.

By estimating the expected payment pattern associated with current loss reserves, the discounted value of those loss reserves can be determined. It is not uncommon for the discounted value of medical malpractice reserves to be 30 percent or more below their full value.

SOP 87-1 does not take a position on whether full value or discounted reserves are more appropriate, although it does say that the matter is currently being studied. In the meantime, a provider contemplating the use of discounted reserves should consider the following:

- In the short term, discounting will result in a reduced liability on the balance sheet.
- In the long term, discounting has no effect on actual claim payments, so that the reduced liability in year one will result in charges to income in later years.
- Discounting assumes that loss reserves are invested. Funds in a deficit position generally will not satisfy this assumption.

If loss reserves are discounted, the SOP 87-1 does require that this be disclosed in the financial statements.

CONCLUSION

The SOP 87-1 provides a comprehensive treatment of the levels of risk transfer included in today's medical malpractice insurance products, and it requires accrual for all occurrences where such risk transfer has not taken place. While the circumstances requiring accrual are well defined, the process of estimating the amount of such accruals will require both data gathering and analysis. Healthcare providers are advised to plan in advance for the work required in the estimation process and for the financial effects of the accrual amounts. □

1989 CASUALTY LOSS RESERVE SEMINAR

1C/2D: INTERMEDIATE TECHNIQUES I

Moderator

C. Gary Dean
American States Insurance Companies

Panel

Susan E. Witcraft
Milliman & Robertson, Inc.

MR. DEAN: Welcome to Intermediate Techniques I. I have a list of announcements I'm supposed to make here. The entire session is going to be recorded, and then there will be a transcript published and sent to you later.

If you ask any questions, please speak into the microphone in the center. As we're going through our talks, you can just raise questions at your seat, if you have questions about some numbers. If you ask some kind of general question at the end, please go to the microphone so it can be recorded.

One last thing, please evaluate this session and turn it in at the end of all the meetings.

First, I would like to introduce Susan Witcraft. Susan and I will be leading this session today. Susan is a Consulting Actuary with Milliman & Robertson, Inc. She started with M&R in their Pasadena office. From there, she moved to San Francisco. Now she provides actuarial services out of their Minneapolis office. Susan graduated with distinction from Stanford University and became a Fellow of the CAS in 1986.

My name is Gary Dean. I'm with American States Insurance in Indianapolis, Indiana. I've been with American States my entire actuarial career. During my time there, I've worked in reserving and both personal and commercial lines pricing. I have a masters degree in math from the University of Wisconsin, and became a Fellow at CAS in 1981.

As we go through our presentations, please feel free to speak up and make comments about the slides we're showing. At the end, we'll probably have plenty of time for a general question session.

(Slide)

In this session, we're going to show you three well-known reserve models. These are the Average Hindsight Reserve method, the Fisher-Lange Report Year method, and the Bornhuetter-Ferguson method. Susan is going to do the first and the third models; I'm going to do the one in the middle.

The handouts that we have provided will exactly match the overheads. We've tried to make the handouts detailed enough so that you can take them back to your office and use them as a reference source if you try to apply these methods. Additional descriptions of what we're doing can be found in the actuarial literature. These are all very well-known techniques.

(Slide)

By now, you've probably seen several reserve models. You may have noted some of the similarities and differences in these models. This slide shows one way of categorizing these differences.

Different models have different data requirements. For example, the Fisher-Lange model, the one we'll do second today, works on the number of reported claims, the dollars of paid loss, and the number of closed claims.

Two of the methods that will be presented, both of those that Susan will do, are accident year methods; you group your data by accident year. Whereas, the Fisher-Lang model is a report year method.

Two of the models, the Average Hindsight Reserve model and the Fisher-Lange model, use exponential trending to forecast loss costs.

In terms of what are they estimating, the Fisher-Lange model just estimates the reserves and incurreds for known claims. IBNR is not included in the estimate. You have to have a separate model to do that. Whereas, the methods that Susan is going to show estimate the IBNR along with case reserves.

Susan is going to start with the first method now.

MS. WITCRAFT: Good morning. In the average hindsight reserve method, you look at what the average per outstanding and IBNR claim would have been for the more mature accident years and use that information to project averages for the more recent accident years.

You take your ultimate loss estimates as of today for the most mature accident years and compare them with what was actually paid at some less mature date and use that to get estimates for the more recent years. I'll explain that in more detail.

This method is generally done as an iterative process, getting the projection for one year and then using that projection to calculate an estimate for the next subsequent year. One of the pieces of information that you need for this method that's different from any other methods is ultimate loss estimates for the more mature accident years.

These can be derived from other methods, particularly the incurred loss development method or the paid loss development method, which were described in the basic track. In our discussion today, we're assuming that most of you have either been through the basic track or are familiar with the concepts discussed there, such as development factors and exponential curve fits.

The data needed for the average hindsight reserve method include a cumulative paid loss triangle and a triangle of cumulative closed or paid claim counts. You also need to have your estimates of the ultimate number of claims. Again, this can be projected from a reported claim count projection or a paid claim count projection. Lastly, you need the estimated ultimate losses for a few of the more mature accident years.

(Slide)

On the next slide, we have an example of a cumulative paid-loss triangle. This particular example is made up -- the data are as of December 31, 1988. We'll assume for our example that we're going to do an analysis for our year-end annual statement or our year-end reserve work.

For this example, let's assume that for 1982 to 1984 we've done the incurred loss development method and some other methods, and we've come up with those ultimate loss estimates shown on the far right-hand side of the slide.

In addition, let's say we've been through this whole process once and we've already selected the ultimate loss estimate for 1985. At this point, we're looking to find the ultimate losses for 1986.

(Slide)

On the next slide, I show the data that will be used for the cumulative closed claim counts as well as our ultimate claim counts. You might want to keep these two pages of your handout handy for reference when we go on to the next few exhibits because I'll refer you back to them.

(Slide)

The next slide shows the guts of the calculations for this method. In the first column, we show our ultimate loss projections. These are the same numbers that were shown on the far right-hand side of the slide, two slides ago.

The next column, we show the paid losses. These are the paid losses at 36 months of development. You'll notice that that's one of the columns in the exhibit in the paid loss triangle.

In many of the methods that you've seen before, we focused on the last diagonal. It's important to note that in this particular method, we're looking at the paid losses for each accident year as of 36 months of development. The reason we've chosen 36 months of development here is that we're trying to find the estimate for 1986, and the 1986 losses are currently at 36 months of development.

In the third column, labeled outstanding losses, we're actually showing what we think the outstanding and IBNR losses should have been at 36 months of development for each of those four accident years. Those are calculated by taking the ultimate loss estimate that we have today and subtracting the paid losses as of 36 months for each year.

We do the same thing for the claim counts. We have our ultimate claim count estimate in column 4, our closed claim counts as of 36 months, which again, is in the column labeled 36 months -- they're shown in column 5 -- and the outstanding claims which include IBNR claims are shown in column 6.

In column 7, we simply divide the outstanding and IBNR losses by the outstanding and IBNR claims to get an average. You can think of this as this is what the average per outstanding and IBNR claim should have been at 36 months for each of these accident years. We're determining should have been based on what we think the ultimate loss costs will be today.

Now we want to make a projection for 1986. What we'll do is trend down the column from each of the four prior accident years to get a projected average for 1986. In this particular example, I've done an exponential curve fit. The R squared is shown, and it's a reasonably good fit. That's not by coincidence. It was set up to be a good fit. You'll find that you won't get nice fits like this is in your real data, but that's part of being an actuary, knowing how to apply the judgment.

The trend factor in this particular example is 1.093 or 9.3 percent annual trend. That's within the range of reasonableness for this particular line of business, which I've chosen to be automobile liability. The fitted average is $2,551.

If the curve fit is not very good or the trend factor is not within your expectations, you can judgmentally apply a trend factor to each one of those averages and trend it to the current year's level and then pick an average from that. It's a flexible method in that you can easily test the sensitivity of the results to your trend factor assumption.

(Slide)

On the next slide, we'll take that $2,550, which I've rounded to the nearest $10. That, again, is our average per outstanding and IBNR claim at 36 months for accident year 1986.

We will then calculate the number of outstanding and IBNR claims for 1986 by taking our 1986 ultimate claim count projection and subtracting the closed claims to date. As you can see, we have 19 of them. We multiply the average by the 19 claims to get our estimated outstanding and IBNR losses. That's shown in row 3.

In row 4, we show our paid losses to date, which we add to the outstanding and IBNR to get an estimate of the ultimate losses in row 5 of approximately $275,000. You can take either this estimate or you can take this estimate and review it in light of your other projections from your other methods for 1986.

You can go back one slide and add 1986 and do the same thing for 1987, replacing the information at 36 months with that as of 24 months so you can get an appropriate projection for 1987 and so on for 1988.

Lastly, I'll briefly discuss a few of the advantages and disadvantages of this method. I think that one my favorite situations for using this method is if a company has had a change in case reserving philosophy or there's been significant changes in personnel, either in the management or in the claims adjusters. In his situation we aren't sure how good the case reserves are or how consistent they have been over time. Therefore, methods based on case reserves tend to have distortions in them. So, since this method does not rely on case reserves, it can overcome that problem.

As I mentioned before, you can easily adjust the trend assumption. Also, if you perceive that the trend has changed over time, you can do a manual calculation. For example, if you think that the trend was, say, 15 percent through 1985 and it's come down to 12 percent now, you could use that in your calculations and adjust your projections for that.

The disadvantages include the fact that it's sensitive to payment pattern shifts. That's typical of any method that relies primarily on paid losses. For example, if your data tends to follow the general assumption that the small claims are likely to close quickly and the large claims are likely to stay open, then if you've slowed down your payment pattern, then, say, at 36 months of development, you're going to have more claims that are smaller that are still open.

That means that your average should be lower than your historical data would indicate. So if you think that there's been a change in the rate that claims have closed, or if your paid claim count data indicates that, you should keep that in mind in selecting your average in the projection method.

Lastly, the averages can be very volatile when there's only a few claims. For example, if there are only three or four claims and you expect their average to be $10,000, and then all of a sudden there's one year that has a $100,000 claim, you'll find that the averages jump all over the place, and you have to apply some judgment in selecting what the average will be for the future year.

Gary?

MR. DEAN: A good reference for the Fisher-Lange method is a paper by Wayne Fisher and Jeffrey Lange titled, "Loss Reserve Testing: A Report Year Approach." This paper was published in the 1973 proceedings of the Casualty Actuarial Society. So this method has been around for a while.

I'm going to try to go through this method slowly with a made-up example showing you all the details of the method. The Fisher-Lange model forecasts incurreds and reserves on known claims. You can use it to estimate the accuracy of your company's reserves, that is case reserves.

IBNR, like I said at the beginning, is not forecasted in this model. You would have to have a totally separate model to take care of that piece if you were to use this report year method.

Accident year is, by far, more common than report year. I guess there are a lot of reasons for that. Accident year methods can readily be incorporated into your ratemaking models. You also need accident year reserves for the annual statement.

Claim counts and paid dollars are used in this model. These are concrete numbers. They're not estimates from your adjusters. These are things that actually occurred. The changing levels of reserve adequacy have no bearing at all, no effect at all on your forecast that you will make with this model. So the claim department can set the reserves however they want. It's just the payments and when things are paid that allows you to forecast using this method.

Now here's the starting point for this method. We show the number of claims reported for each year. This number if fixed. It doesn't change through time. We had 432 claims reported in 1983. That 432 will be 432 forever.

Report year is not like accident year, where you can continually have development. With accident year, you can have claims 10 or 15 years later, for example, for 1983 that you didn't know about. In the report year model, you don't have that happening. Everything is fixed at the end of the year.

Now, we want to forecast two different things on these reported claim counts. We want to forecast when these claims will be settled and how much they will be settled for. Then once we forecast those two pieces, we just put them together to get our reserve and incurred estimates.

(Slide)

This next slide shows how our reported claims have been settled so far. For example, if we look at report year 1983, going down the column, those all add up to the 432 reported claims for 1983. I'm assuming that everything will be settled within five years for simplicity here. So the 1983 column adds down to the total reported claims. In 1984, we're still missing that last section, the 49 to 60 months, and so on. Later, we're going to fill in the bottom right-hand part of this rectangle.

On page 4, we show the dollars that correspond to the paid claims. Recalling the 1983 column from the prior page, in the last period, the 49 to 60 months interval, we had 10 claims shown up there. Well, those 10 claims were paid off at $55,000. That's an average of $5,500 per claim.

We have all of the data that we need to do our model. We have the number of claims reported by report year. We have our payment pattern. We know when the paid claims were paid. We know the dollars paid on those claims. That's all the data we need to do our forecasting. So we're going to start filling in the bottom triangles.

(Slide)

Our first calculation on the data is to determine the average severity for each of the paid claims. We just take the paid dollars from page 4 and divide by the number of paid claims. We do this for each period within the report years.

As you go down a column like 1983, you notice that the claims get bigger, the average severity gets bigger the longer it takes to settle. I think, in general, this happens in the real world. Some people might disagree with that, but from what I've seen, the longer it takes to settle, the bigger the claims get. This is made-up data, like I said before, and I made it look that way.

From this severity triangle, we want to forecast the lower right-hand triangle. You don't have to use the method that I've used here, but it is the method that Fisher-Lang used. I think it's a pretty good method.

(Slide)

What we do is fit each row by an exponential curve, a least- squares exponential fit. Once we fit the rows, then we can fill in the bottom right-hand part of the triangle, the bold-faced numbers, by reading the values from our exponential curve fit.

For example, in the 25- to 36-month row, we had the three known values, 3700, 3788, and 4375. I fit those using a hand-held calculator with an exponential curve. Then my next two points on the fit, the forecasted points, the 4663 and the 5070, I just read off the calculator.

When we do this, we can also get an estimation of the inflation. That's the right-hand column. You can also get this right off of the calculator when you do your fit or from the computer, whatever. We show the inflation on our severities at each settlement period.

For the last period, the 49 to 60 months, I had only one point, the 5500. You can't fit a curve to that. I just went ahead and assumed that my inflation rate was six percent. Then I used the six percent to produce the four values following that.

That's one advantage of this method. I don't have to stick with what the calculator told me the inflation rate was. I could have judgmentally changed that myself if I wanted to put some conservatism in the method; or if I thought the environment had changed and inflation was higher, I could have adjusted those inflation numbers in the right-hand column and then adjusted my projected severities accordingly. So it's one advantage of this method.

(Slide)

We've finished one part of the model. We've forecasted what our future severities will be on our claims yet to be settled. Now we want to turn our attention to the claim counts themselves. When will the claims still open be settled in the future? Well, that's what we're going to work on on the next few slides.

This overhead shows what portion of reported claims were settled in each settlement period. Look at the 1983 report year column. If you add those numbers down, it comes out to be 1. What I did was take the paid counts on page 3 and divide by the reported counts on page 2. Since everything was settled for report year '83, everything adds down to one.

The other columns are all less than one because there are some claims that haven't been settled yet. Now our job is to fill in the lower right-hand triangle.

(Slide)

On page 8, I show two entries from the prior page for report year 1986. We have the .551. That's the portion of reported claims which are settled in the first period, 55.1 percent. Then the .259, that's the portion settled in the second period for this report year.

If I subtract the .551 from 1, then I get the portion of claims open at the beginning of the 13- to 24- month period. We paid .551, therefore we have 1 minus .551 still open. If I divide the .259 by the 1 minus .551, that tells me the proportion of open claims which get settled in the 13- to 24- month period. Do you see that? It's pretty straightforward. You just take the percentage settled, 25.9, and divide that by the percentage open. It just shows you your settlement rate in the second period.

(Slide)

So we use that concept to fill in our lower right-hand triangle. Let's look at the .249 in the right-hand column, the second one down with the asterisk by it. At the bottom of the slide, I show the way we calculated this. One minus .568 is the proportion of open claims at the beginning of the 13- to 24month period. The right-hand term, the .259 divided by 1 minus .551, is what I was talking about on the prior slide. That comes from the 1986 column. Those are known numbers. That was our settlement rate for the open claims in 1986. We assume that that same pattern will follow in 1987.

We can go on down to the next one, the .091, under 1987, and we do the same kind of process. Now we have two terms we have to subtract from one. We have the .568 and the .249. The .249 is our estimate. That's okay; we go ahead and use it. So that first term represents the open claims sitting out there at the beginning of the 25- to 36-month period. Then we multiply that times a term that we get from 1985. In 1985, .070 claims were settled in that 25- to 36-month period. Then we divide that by the portion of open claims, 1 minus the .586 and then minus the .273.

Are there any questions on this point?

(No response.)

MR. DEAN: What you do is start at the top of each column and fill it in going down each column. It's fairly easy once you see how the formula works. So we've filled in the bottom right triangle. We're really done now. We've projected our average severities and we've projected when the claims will be settled. On the next slides, we go back and put the pieces together.

(Slide.)

Here we show how you put the pieces together. I used report year 1987, our latest one, for the demonstration. We have our .568, which is a known number, then the .249, .091, .058, .034, which are all projections that we just did on the prior page.

Then in the next column we have our average cost for each of these settled claims. All you do now is take the product of the two and then add them down. That gives you the overall average severity for report year '87, regardless of when the claim is settled.

QUESTION: Is that the weighted average?

MR. DEAN: That's right, just the weighted average. That first column, portion of reported/settled, you could go back and turn that into actual claim numbers if you wanted. Just take your reported claims for 1987 and multiply it times each one of those ratios. That would tell you the number of reported claims.

So you take your reported times your severity and then you get a product of the two and add those down. It's the same either way. It's a weighted average, but it's the one you ought to use because you can put your actual claim count numbers back in here.

(Slide.)

In this slide, let's look at 1987. On the prior page, we came up with $2,796 as being the average severity for claims reported in 1987. Back at the beginning, I told you we had 511 claims. So you take the product of those two and that tells you your total incurred for 1987.

I've done that for each report year. So we have our estimated incurred for each report year in the right-hand column. I've added those down to get the total incurred of $5,858,000. We subtract the paid-to-date from our paid triangle from that, and then we get our estimated reserve.

Our indicated reserve is the $1,690,000. If you like, you could compute that estimated reserve for each of the report years also, but I just did it here in the aggregate.

(Slide)

Reviewing what data we needed in this method, we needed the number of claims by report year, then we needed the number of paid claims by report year and settlement period, and then the dollars paid on the settled claims at each period.

This is a report year method. To do our projections, we use two different techniques. We did exponential trending to forecast our severities. Then we looked at our historic ratios of the settlement rates to project our future settlement rates. Last, we are estimating the case incurred and the case reserves, because there's no IBNR in here. Everything is reported. It's for claims that are known.

QUESTION: When selecting an increase factor back on page 6 for the average cost of claims settled, isn't this extremely sensitive to that factor that's selected? Looking at previous year's factoring, you've got a low of 3.7 and a high of 8.7, a 5-point swing. So that selection there seemed to cause a considerable amount of swing in the model for that last year.

MR. DEAN: That's right. Like all models, you have to use some judgment. Is the 6 percent that I chose reasonable? You might want to choose something bigger if you think that claims that take longer to settle have a higher inflation rate in them because of social inflation or some other impact. You'd have to incorporate that.

QUESTION: How would you judge what type of inflation rate to use for that type of claim?

MR. DEAN: I guess one thing you could do is to get more report years. Perhaps I could have gone back to '82, '81, or '80 and see what kind of inflation rate I was getting historically.

I can't think of any good industry sources where you could get that number. Does anybody know any sources of information where you could find out what your inflation rate might be for claims that take longer to settle?

(No response.)

MR. DEAN: I don't really know. I think you have to use some good educated guesses and maybe put additional years in there.

(Slide)

A primary advantage of this method is that you can look at the payment patterns and the inflation rates. This is not a blackbox method like the age-to-age factor method that seems to be so common.

You can actually see the pieces; your paid claims and the average severity on each of those paid claims. With this kind of approach, you can make subjective modifications if you want. Like the question just before, what if you don't like the inflation rates? Well, you would have the option of changing those.

If you want to get some kind of confidence interval on your projection, then maybe you could choose a high and a low inflation rate. I had chosen six percent for that last report year period. Maybe you believe it might be somewhere between four and eight percent. So you could put both of those in there and see what kind of range you would then get on your reserve forecast. You could do that for each of your report periods, just adjust your inflation rate.

You can also change your payment patters if you like. If you think claims are being settled more slowly now, you don't have to use those historic ratios. You might adjust those downward by five percent and, again, do some kind of range of reasonability. I think that is a big advantage of this method.

Like I said before, a great deal is hidden in that common ageto-age factor method. I personally don't like it. I don't like black boxes giving me answers to things. I like to see all the pieces.

Another advantage of this model is we're using known data to project from. We're not using anybody's estimate of a case reserve or IBNR. Bulk reserves are not in here either. Everything is based on reported claims, paid claims, paid dollars, very concrete numbers. Changing levels of reserve adequacy won't affect your projections.

One advantage of this model is that IBNR can be handled separately. I think IBNR might require different projection techniques. You might want to base it upon earned premium or number of policies or some estimate of exposure, not use a traditional reserve method that you would use on case reserves. You can split the pieces into what you know and what you don't know.

This is also a disadvantage because once you've gone through the report-year method, you've still got more work to do. You've got to figure out what your IBNR is, too. Another disadvantage of this method is that quite often rate making uses accident year. So you can't incorporate this method in your ratemaking very easily. Also, in the annual statement, Schedule P and Schedule O are on an accident-year basis. So you can't use this there either.

Susan is going to present the last method. Did you have a question?

QUESTION: Could we have separate inflation assumptions by report year and settlement period?

MR. DEAN: Yes. You could do something more sophisticated here. You could assume two inflation rates. We have an inflation for report year, '83, '84, '85, '86, '87, an inflation rate I(1). Then have an inflation rate I(2) going down each column.

So then you could project any point, perhaps, based on I(1) plus I(2). You don't have to do a simple straight-across- the-matrix fit. You can also incorporate information going down each column, too, if you like. That could be an improvement.
I don't know. You'd have to test that.

MS. WITCRAFT: The last method that we're going to discuss this morning is the Bornhuetter-Ferguson method. In this method, the result that's calculated will be the incurred but not reported reserves. I'll get into that in a minute.

This method calculates these reserves as a function of earned premium or exposures, so you need some measure of the amount of business that is being earned in each period. For those of you who aren't familiar with the term "exposure," it's a measure of the risk.

An easy example is in private passenger automobile; exposure is usually counted as the number of cars or earned cars in each year. For general liability, sales and receipts are sometimes used, and there's a variety of other exposure bases that are used for each line of business.

The key assumption going into this method will either be a loss ratio assumption or a pure premium assumption. Pure premiums are usually defined as the loss cost per unit of exposure.

The applications of this method are usually for either a new company, where very little historical data is available; a line of business with very low exposure, where the results are subject to wide variability in the losses to date; and also other highly volatile data.

Before getting into the method, I'm going to go through the different definitions of incurred but not reported reserves. True incurred but not reported reserves are often defined as losses on unreported claims.

Another definition includes claims in transit; that would be claims that the company actually knows about, but they aren't on the data processing system yet.

A third definition includes true IBNR plus claims in transit plus development on known claims. Or, instead of adding development on known claims, you can add the reserve for reopened claims.

The last definition shown is all of the above. This is what is often calculated in most accident year methods. For example, in the incurred loss development method, we refer to the difference between ultimate losses and incurred losses to date as IBNR.

That IBNR number includes true IBNR, claims in transit, development on known claims as well as a reserve for reopened claims. In the Bornhuetter-Ferguson method, we will also calculate that same type of IBNR.

There are two basic formulas underlying this method. The first is that the IBNR reserve is equal to an IBNR factor, which we will calculate shortly, times the expected losses. The IBNR reserve is added to your incurred losses to date to get your estimate of ultimate losses.

This method could also be applied using paid loss data and a paid loss development factor which I'll mention shortly. You would get a total reserve which would be added to your paid losses to date. That will tend to be more volatile. I don't recommend using it except in extremely rare situations; for example, if you have no case reserve data.

The expected losses will be calculated either as a loss ratio times your earned premium or as your pure premium times your exposure. It's very important to set your loss ratio or pure premium assumptions carefully, as the results are highly dependent on these assumptions.

(Slide)

On the next slide, I'll show the calculation of the IBNR factor and its derivation. If we just rearrange the formula on the previous page, we can see that our IBNR factor is equal to our IBNR reserve divided by our ultimate or expected losses.

If we restate the IBNR reserve as our ultimate losses minus our incurred losses to date, then we get what's shown in the second line. If we rearrange the terms so that we get ultimate divided by ultimate minus incurred to date divided by ultimate, and then cancel out the ultimate terms, we get the formula in the next line which is that the IBNR factor will be equal to one minus the ratio of incurred to date to ultimate losses.

In the next line, we've again restated the ultimate losses this time as our incurred losses to date times our incurred loss development factor to ultimate. In this case, I've used LDF to represent our incurred loss development factor to ultimate.

Cancelling the incurred losses to date terms in that second half of the equation, we end up with our final formula that our IBNR factor is equal to 1 minus 1 over our incurred loss development factor to ultimate.

Again, if we were going to calculate total outstanding losses instead of just the IBNR reserve, we would use the paid loss development factor in the denominator rather than the incurred loss development factor.

The next slide shows the calculations in this method. In this particular example, I'm going to use earned premium and a loss ratio assumption. The earned premium is shown in the first line. The expected loss ratio is shown in the second line.

In this particular example, I've assumed that we have reason to believe that the loss ratio will be increasing over time. This can generally be determined based on what you think your pricing has done.

In this particular example, we'll say that we think that the market is softening and that we have not increased rates as fast as losses have increased in the past two to three years, so therefore, we'll increase our expected loss ratio assumption.
The expected losses are then calculated as our earned premium times the expected loss ratio, and they're shown in line 3.

We've selected a development factor for each accident year. The development factor can be selected from other data that you have available that you think is relevant or from industry data.

Sources of industry data that we frequently use include data from Best's Loss Development Reports, for primary business as well as -- the Reinsurance Association of America each year publishes information about development on reinsured losses.

You have to be very careful in selecting the development assumptions because you have to be either certain that what applies to the industry applies for you or try to, at least judgmentally, recognize any differences.

Our IBNR factor is shown in line 5 and it's calculated as described on the previous exhibit as 1 minus the inverse of the development factor shown in row 4. The IBNR reserve, then, is just the IBNR factor shown in row 5 times the expected losses in row 3. Adding the incurred to date, which is shown in row 7, we get our estimate of ultimate losses for each accident year.

QUESTION: In row 4, are those periods or commas?

MS. WITCRAFT: They should be periods. They look like commas to me, too. They should be periods.

As I mentioned, the results of this method are very sensitive to the expected loss ratio or pure premium assumptions. In selecting your expected loss ratio, you have to be careful to reflect the premium adequacy and the underlying pricing of the book of business.

In selecting the changes in the loss ratio over time, you have to determine or estimate whether or not the trend in average rate has matched the trends in the underlying loss business.

In selecting the pure premium, as well as the loss ratio, you need to make sure you have identified and reflected any changes in operations. Examples of these changes could be in the reinsurance area. In the pure premium methods, you need to determine whether your pure premium is gross or net of reinsurance, depending on whether you're trying to calculate a gross or net reserve.

In the loss ratio assumption, if you're calculating a net reserve, you need to make sure that your loss ratio assumption reflects whether or not the reinsurance cost is as expected. For example, if you're gross loss ratio is expected to be, say, 80 percent, but

the loss ratio on the ceded business is much lower than that, then the remaining piece should have a higher loss ratio. You need to be sure to reflect that in your loss ratio assumption.

In the pure premium methods, you need to make sure you're correctly reflecting underlying limits and deductibles as well as making sure that you've identified any changes from an occurrence book of business to a claims-made book of business.

Lastly, as with any method, if there's been changes in the mix of business, you need to determine the impact of these on the loss ratio or pure premium assumption.

(Slide)

On the next slide, I've shown some of the advantages and disadvantages of the Bornhuetter-Ferguson method. I think its greatest advantage is that it's very easy to use. It's fairly simple arithmetic. You don't need exponential curve fits. You don't need any of these fancy techniques, so it's fairly straightforward to explain.

Second, it produces a compromise between a loss development method and an expected loss ratio method. I'm going to illustrate this.

(Slide)

What's shown here is our example for 1988 from a couple of slides ago. The earned premium and expected loss ratio are the same. However, on the incurred losses to date, I've shown two different ones. The first is $750,000. In the second column, I've said let's say that we have one more large claim than in the earlier examples, so the incurred losses to date are $900,000.

So if we simply apply the development factor to the incurred losses to date, you can see in row 6 that the loss development projection ranges from $1,500 to $1,800; whereas, in row 3, our expected loss method, which is ignoring the incurred losses to date, will produce the same result regardless of what's incurred to date.

In rows 7 and 8, I've shown the Bornhuetter-Ferguson projection. The Bornhuetter-Ferguson projection shows the $1,500 in the expected column. It goes to $1,650 if we have one large claim. As you can see, that result falls between the development factor method projection and the expected loss projection.

So in that sense, it tempers the effect of any additional large claims, but it reflects them to a lesser extent than the development method.

(Slide)

This also illustrates that it avoids overreaction to unexpected incurred losses to date. As I mentioned earlier, it's suitable for new or volatile lines of business. It can be used where there's no internal loss history.

There's many clients that I've worked with that they have very little information other than the incurred losses to date or in the paid losses to date. In that situation, there aren't that many techniques that can be used other than this one.

The disadvantages are the uncertainty of the relevance of the loss ratio or pure premium selection and the selected development factors. As I mentioned before, what applies to the industry may not apply to the particular book of business that you're reviewing.

It also, to a limited extent, ignores the incurred losses to date. That large claim that was reported in our example may be a precursor of things to come, and maybe your reserve estimates should reflect that you've got a lot of losses reported to date. You need to consider that when you're setting the reserve based on this method.

Last, it assumes that the case reserve development is unrelated to reported losses. If a company has a very consistent reserving philosophy, and let's say that every single year reserves are going to increase, say, 10 percent between 12 months and ultimate, then that's an important piece of information that does not get reflected in this method. You need to also consider that.

Now we're open to any questions for either of us.

QUESTION: Susan, I have a question. How do you go about picking that expected loss ratio?

MS. WITCRAFT: For a brand new book of business, oftentimes an expected loss ratio can be picked based on what was assumed in your pricing. If you assumed a 70 percent loss ratio in your pricing, then you might start with that.

Another thing is, if you're pricing was selected or you know how your pricing relates to a larger industry group, say, ISO, if ISO's loss ratio was 100 percent and you think your rates are 10 percent over ISO, then you can take the ISO loss ratio and divide by 1.1.

Or you can just look at what the industry is using for a loss ratio or is indicating for a loss ratio. Again, you need to reflect any differences between that book of business you're reviewing and how the industry is doing.

QUESTION: The selected loss ratio is not a concrete fact.

MS. WITCRAFT: That's correct. Also, you can test the sensitivity of your results to the going-in loss ratio. In this particular example, you could put different loss ratios in and see what the range of results are. So the loss ratio assumption can easily be changed.

QUESTION: Going back to the screen where you have the example, line 3 has the expected loss ratio.

MS. WITCRAFT: Two has the loss ratio. Line 3 has losses.

QUESTION: Line 3 is expected losses. Line 7 has the estimated ultimate losses. So really this method doesn't work with a use of this development factor.

MS. WITCRAFT: Yes.

QUESTION: This method can be though of as a way of tempering loss ratios with actual experience. So if management is asked to give a loss ratio, you don't end up with the same loss ratio at the end of the method.

MS. WITCRAFT: Right. If I can use the term, it's a priori loss ratio. It's what I think the loss ratio should be going in. Then I add this additional information, and I come out with a revised loss ratio.

QUESTION: Based upon --

MS. WITCRAFT: Based on our judgment, yes.

QUESTION: Is this method less sensitive to the development factor assumptions?

MS. WITCRAFT: No. I think that it has the same problems with selecting the loss development factors as any other method. I think that it tempers the impact of incurred losses to date, but I think that the results are just as sensitive to your development factor assumptions as the incurred loss development method is.

In fact, I think that that's one of the drawbacks of the method, especially if you're drawing your development factors from an industry source. You probably don't have any real idea as to how well those development factors relate to your book of business because every company has different reserving practices and payment practices and so on.

So I think that in most situations, the parameter risk is probably greater with this method than in a situation where you have sufficient data to do an incurred loss development method.

QUESTION: I am thinking in terms of the less mature years, where usually you have a large loss development factor to ultimate.

MS. WITCRAFT: Right.

QUESTION: Here, what you are doing is (Inaudible) 20 percent (Inaudible) let's take the complement and say 80 percent and apply it to the effective loss ratio. Basically, what you are doing there is (Inaudible) year the loss development factor.

(Inaudible) I mean, it is small, but whether it's five or whether it's six, the percent of losses unreported (Inaudible).

MS. WITCRAFT: I still think that it's a matter of the sensitivity to the incurred losses to date rather than the sensitivity to the development factor.

QUESTION: One more question on this. If you've got a loss ratio for '88, the 82.5 percent. So that factor has changed your expected loss ratio by almost 10 percent. Don't you want to go back and try to figure out why?

MS. WITCRAFT: Yes. Not only do you want to figure out why, you want to figure out well, is this an aberration or do I want to go back and fix my '86 to '88 loss ratios. Going in, I thought my '88 loss ratio should be higher than my '85 loss ratio. Did you say the '85 year is the one that's --

QUESTION: The '88.

MS. WITCRAFT: Oh, '88, okay. Yes, you'd want to know why. Is it a large claim? Is it more claims? Do I think that this is something that's indicating there's going to be even more later? Do I think that it's just random variability?

QUESTION: One source of your expected loss ratio might be the president's expectation?

MS. WITCRAFT: That's right.

QUESTION: If he finds out that you've got 82.5 percent, that's (Inaudible) might want to know the difference.

MS. WITCRAFT: That's right. Not only does the president want to know why, but you probably ought to find out, too. What I was going to say is that if you're 85 year comes out and you've gone in with a 65 percent loss ratio -- and in this example it's not going to make a whole lot of difference -- but let's say line 8 was 700 instead of 630,000, then our loss ratio coming out is 70 percent.

If the older years are consistently higher than your loss ratio assumption was, then you need to consider whether or not you want to also increase your future years loss ratios. For example, you think that '87 should be worse than '86, and if '86 is coming out in the 70 percent range, should you increase '87? That's something else you need to think about.

QUESTION: The first method, hindsight, could that be used on incurred losses?

MS. WITCRAFT: Yes. If it's used on incurred losses, you'll get an average IBNR per IBNR claim. In that case, then, you're relying on the case reserves to be consistent over time as well as the payment pattern. You're also working with a larger volume of real data. So there's advantages and drawbacks to doing it that way.

Any other questions?

QUESTION: Let's say you didn't have any information on any expected loss ratio, couldn't you like estimate one, assuming that you estimate it based on the data?

MS. WITCRAFT: Yes, in fact, we do that on occasion. What he is suggesting is that if you have an estimate of the percent reported, and you think that the rate adequacy has been the same over time or you know what the relative rate adequacy is or you can estimate it, then you can come up with an estimate of how much you think you expect to be reported and then compare that to your actual reported. You can use that to revise or to determine a going-in loss ratio.

That method seems to work fairly well if you have some data but not a whole lot. If you have very little data, then you're loss ratio assumption comes out all over the place. In fact, I happen to have tried to test it out on a book of business one day and it said that my long term loss ratio for an umbrella book of business should have been under 20 percent.

I looked at that and said this method is not working. Maybe we ought to come up with a different loss ratio. Again, if you do something like that, you need to look at the reasonableness of the assumption that comes out and make sure that you agree that it makes sense.

QUESTION: With the hindsight method, you seem to be using a loss development method for getting claim counts?

MS. WITCRAFT: That's one way, yes.

QUESTION: So you would use loss development method to fill out your ultimate claim counts, but then you want to use a hindsight method when you're talking about your average claim cost.

MS. WITCRAFT: Right.

QUESTION: Then how do you determine -- my question there is, why? How do you determine how far down -- how many accident years you would use an LDF method and then where you start that hindsight method.

MS. WITCRAFT: The ultimate claim counts can be determined using any method you choose. They're just a going-in piece of information that you need for this method. How you determine them is not particularly relevant as long as it's reasonable.

Then how many years would I select the ultimate losses for -- it generally depends, first of all, on how many claims are still open and how consistent my development pattern is out in the tail.

(Slide)

If you look on the third slide for the average hindsight method, it's the one that says "cumulative paid losses," you'll see that for 1982, we think that all of the claims are closed. So there's no point in going back and figuring out what the average hindsight is.

(Slide)

As you can see for 1982, the paid losses to date are equal to our ultimate loss estimate. For 1983 and 1984, there just aren't that many losses or dollars of loss that we anticipate to be still outstanding.

Another consideration is how many claims are open? I generally find that this method doesn't work very well if you have less than, say, twenty or thirty claims open at that stage of development because you're averages tend to reflect more the nature of the claims that happened to be opened for that accident year than some long term average.

So a lot of it is just looking over your data and determining where do you have enough claims that are still going to be open and IBNR to start applying these methods. That will depend a lot on your line of business, too.

QUESTION: In your example, how did you forecast the ultimate?

MS. WITCRAFT: In my example? I would say that I probably picked those ultimates for the first three years based on the paid and incurred loss projections. Then for 1985, I did a paid and incurred loss projection and also did the average hindsight method and selected an ultimate from those three methods. That's what's shown up there.

Do we have any other questions?

QUESTION: On the Fisher method, isn't it true that when you fix your report year claim count, that you might have a problem with claims that are really nonclaims, claims that are set up that are closed without payment and that you've got another parameter in there which are claims that are closing without payment and you just want to assume that they're about the same every year, and that they're going to be closing out at a certain rate?

MR. DEAN: Yes, I think that is a problem with this method. It's kind of up to you to decide how you would like to handle it. You could just leave it in, and as they're settled, well, there's a claim that's settled for zero. It brings down your average severity. It took three years to settle it. It's settled for zero. So my three year average is a little smaller.

In general, you keep the number of reported claims constant. So I think you probably want to keep it in there somehow. I can't remember how Lang and Fisher handled that question.

Another question in the same vein is reopened claims. You think something closed and now it reopens on you; how do you handle that? You will have to make some adjustments to the model. You'll have to have a method of handling those. I don't know what the best way to do it is.

MS. WITCRAFT: Any other questions?

(No response.)

MS. WITCRAFT: In that case, we thank you for coming. Don't forget to turn your comment form in, particularly if you liked us.

RESERVE MODELS

Average Hindsight Reserve Method

Fisher–Lange Report Year Method

Bornhuetter–Ferguson Method

CHARACTERISTICS OF MODELS

DATA: $Incurred, $Paid, # Open Claims ...?

PERIOD: Calendar Year, Accident Year, Report Year, Policy Year ...?

PROJECTION METHOD: Age–to–age Factors, Exponential Fits, Ratios ...?

ESTIMATING: Case Reserves, IBNR, Incurred ...?

AVERAGE HINDSIGHT RESERVE METHOD

- Calculate What Average Per O/S And IBNR Claim Would Have Been
- Iterative Process
- Uses Ultimate Losses For Mature Accident Years

DATA NEEDED

- Cumulative Paid Loss Triangle
- Cumulative Closed (Paid) Claim Triangle
- Estimated Ultimate Number Of Claims
- Estimated Ultimate Losses For A Few Of The Most Mature Accident Years

XYZ AUTO INSURANCE COMPANY

Cumulative Paid Losses

Accident Year	Months of Development							
	12	24	36	48	60	72	84	Ultimate
1982	50.0	80.0	98.2	107.8	113.2	117.2	119.7	119.7
1983	60.2	97.0	118.5	130.7	136.6	141.0		143.8
1984	75.5	120.1	147.0	162.4	171.0			178.7
1985	91.9	147.1	180.2	197.0				220.1
1986	115.0	184.1	226.4					
1987	146.5	233.4						
1988	181.1							

Note: 1. Amounts are in thousands of dollars.

XYZ AUTO INSURANCE COMPANY

CUMULATIVE CLOSED CLAIMS

Accident Year	Months of Development							
	12	24	36	48	60	72	84	Ultimate
1982	50	75	88	94	97	99	100	100
1983	55	83	97	104	107	109		110
1984	63	94	110	118	122			125
1985	70	105	123	131				140
1986	80	120	141					160
1987	93	139						185
1988	105							210

XYZ AUTO INSURANCE COMPANY

Calculation of Average Outstanding Losses

Accident Year	(1) Estimated Ultimate Losses	(2) Paid Losses	(3) O/S Losses (1)−(2)	(4) Estimated Ultimate Claims	(5) Closed Claims	(6) O/S Claims (4)−(5)	(7) Average O/S (3)/(6)
1982	$119,700	$ 98,200	$ 21,500	100	88	12	$1,792
1983	143,800	118,479	25,321	110	97	13	1,948
1984	178,700	147,010	31,690	125	110	15	2,113
1985	220,100	180,172	39,928	140	123	17	2,349

Exponential Curve: R-squared = 0.996

Trend Factor = 1.093

Fitted = $2,551

Note: O/S is "outstanding and includes IBNR. H/S in "hindsight."

XYZ AUTO INSURANCE COMPANY

ESTIMATED ULTIMATE LOSSES – ACCIDENT YEAR 1986

(1) Selected Average Per O/S and IBNR Claim	=	$2,550
(2) Number of O/S and IBNR Claims	=	19
(3) Estimated O/S and IBNR Losses (1) x (2)	=	$48,450
(4) Paid Losses to Date	=	$226,374
(5) Estimated Ultimate Losses	=	$274,824

AVERAGE HINDSIGHT RESERVE METHOD

ADVANTAGES

- Does Not Use Case Reserve Data
- Can Easily Adjust Trend Assumption

DISADVANTAGES

- Sensitive To Payment Pattern Shifts
- Averages Highly Variable When Only A Few O/S And IBNR Claims

INTERMEDIATE TECHNIQUES I

Fisher–Lange Reserve Model:

A Report Year Technique

FISHER–LANGE REPORT YEAR RESERVE MODEL

- Test of reserves on known claims.
- Does not consider IBNR.
- Estimates reserves and incurreds by report year.
- Uses claim counts and paid $.

NUMBER OF CLAIMS REPORTED BY YEAR

Report Year	Claim Counts
1983	432
1984	444
1985	454
1986	532
1987	511

REPORT YEAR = Year in which the claim was reported to the company.

NUMBER OF CLAIMS SETTLED BY REPORT YEAR AGE

Time Since Beginning of Report Year	Report Years 1983	1984	1985	1986	1987
0-12 Months	260	261	266	293	290
13-24 Months	115	120	124	138	
25-36 Months	30	33	32		
37-48 Months	17	19			
49-60 Months	10				

PAID SETTLEMENTS BY REPORT YEAR AGE
(Amounts in $000's)

Time Since Beginning of Report Year	Report Years				
	1983	1984	1985	1986	1987
0-12 Months	$355	359	380	440	479
13-24 Months	345	371	397	462	
25-36 Months	111	125	140		
37-48 Months	68	81			
49-60 Months	55				

AVERAGE COST OF CLAIMS SETTLED
BY REPORT YEAR AGE

Time Since Beginning of Report Year	Report Years				
	1983	1984	1985	1986	1987
0-12 Months	$1,365	1,375	1,429	1,502	1,652
13-24 Months	3,000	3,092	3,202	3,348	
25-36 Months	3,700	3,788	4,375		
37-48 Months	4,000	4,263			
49-60 Months	5,500				

AVERAGE COST = [$ PAID (page 4)]
/ [NUMBER OF CLAIMS (page 3)]

AVERAGE COST OF CLAIMS SETTLED
BY REPORT YEAR AGE

Time Since Beginning of Report Year	Report Years					Average % Increase
	1983	1984	1985	1986	1987	
0-12 Months	$1,365	1,375	1,429	1,502	1,652	4.8%
13-24 Months	3,000	3,092	3,202	3,348	3,459	3.7%
25-36 Months	3,700	3,788	4,375	4,663	5,070	8.7%
37-48 Months	4,000	4,263	4,543	4,842	5,160	6.6%
49-60 Months	5,500	5,830	6,180	6,551	6,944	6.0%*

Projections were made using an exponential fit of prior values.

* This % was judgmentally selected.

PORTION OF REPORT YEAR CLAIMS SETTLED
BY REPORT YEAR AGE

Time Since Beginning of Report Year	Report Years				
	1983	1984	1985	1986	1987
0-12 Months	.603	.588	.586	.551	.568
13-24 Months	.266	.270	.273	.259	
25-36 Months	.069	.074	.070		
37-48 Months	.039	.043			
49-60 Months	.023				

RATIO = [NUMBER OF CLAIMS SETTLED (page 3)]
/ [NUMBER OF CLAIMS REPORTED (page 2)]

ESTIMATING FUTURE SETTLEMENT RATES

From page 7

	1986
0-12 Months	.551
13-24 Months	.259

1.000-.551 = Portion of claims open at beginning of 13-24 Month period

.259 = Portion of claims settled in 13-24 Month period

.259/(1.000-.551) = Proportion of open claims settled in 13-24 month period

PORTION OF REPORT YEAR CLAIMS SETTLED
BY REPORT YEAR AGE

Time Since Beginning of Report Year	Report Years				
	1983	1984	1985	1986	1987
0-12 Months	.603	.588	.586	.551	.568
13-24 Months	.266	.270	.273	.259	.249*
25-36 Months	.069	.074	.070	.094	.091**
37-48 Months	.039	.043	.045	.061	.058
49-60 Months	.023	.025	.026	.035	.034

Fill in each column from the top down.

* .249 = (1.000-.568) x [.259/(1.000-.551)]

** .091 = (1.000-.568-.249) x [.070/(1.000-.586-.273)]

CALCULATION OF AVERAGE INCURRED LOSS
BY REPORT YEAR AGE

REPORT YEAR 1987

Time Since Beginning of Report Year	Portion of Reported Settled		Average Cost		
0-12 Months	.568	x	$1,652	=	$938.34
13-24 Months	.249	x	3,459	=	861.29
25-36 Months	.091	x	5,070	=	461.37
37-48 Months	.058	x	5,160	=	299.28
49-60 Months	.034	x	6,944	=	236.10
			Overall Average	=	$2,796

ESTIMATED INCURRED LOSSES
ON REPORTED CLAIMS

Report Year	Average Incurred Loss		Number of Reported Claims		Estimated Incurred (000)
1983	$2,159	x	432	=	$ 933
1984	2,253	x	444	=	1,000
1985	2,383	x	454	=	1,082
1986	2,658	x	532	=	1,414
1987	2,796	x	511	=	1,429
				Total =	$5,858
				Paid-to-Date =	$4,168
				Indicated Reserve =	$1,690

SUMMARY OF METHOD

Data: (1) Number of Claims by Report Year

(2) Number of Claims Settled by Report Year and Age

(3) Paid Claim $ by Report Year and Age

Project: (1) Portions of Reported Claim Counts Settled in Future Periods

(2) Average Severities of Paid Claims

Estimating: Incurred Losses and Reserves for Reported Claims

ADVANTAGES OF FISHER-LANGE REPORT YEAR RESERVE MODEL

- More revealing than age-to-age factor methods.
  a. Payment patterns
  b. Inflation

- Relies on known data.

- Can be used to monitor claims department case reserving.

- IBNR can be modeled separately.

BORNHUETTER–FERGUSON METHOD

- Result is "Incurred–but–not–Reported" Reserves
- Calculated as a Function of Earned Premium or Exposure
- Uses Loss Ratio or Pure Premium Assumptions
- Applications:
    - New Company
    - Low Exposure
    - Highly Volatile Data

IBNR RESERVES

1. "True" IBNR = Unreported Losses
2. "True" IBNR + Claims in Transit
3. (2) + Development on Known Claims
4. (2) + Reopened Claims Reserve
5. (2) + Development + Reopened

BORNHUETTER–FERGUSON AND MOST ACCIDENT YEAR METHODS PRODUCE IBNR AS DEFINED IN (5).

BASIC FORMULAS

IBNR Reserve = IBNR Factor X Expected Losses

Expected Losses = Loss Ratio X Earned Premium

or

Expected Losses = Pure Premium X Exposure

IBNR FACTOR DERIVATION

IBNR Factor = IBNR / Ultimate Losses

= (Ultimate - Incurred To Date) / Ultimate

= 1 - (Incurred To Date / Ultimate)

= 1 - (Incurred To Date /
Incurred To Date X LDF To Ultimate)

= 1 - (1 / LDF To Ultimate)

BORNHUETTER–FERGUSON EXAMPLE

Accident Year	1985	1986	1987	1988
(1) Earned Premium	$1,000	$1,250	$1,600	$2,000
(2) Expected Loss Ratio	0.65	0.65	0.70	0.75
(3) Expected Losses (1) x (2)	$ 650	$ 813	$1,120	$1,500
(4) Development Factor	1.250	1.350	1.650	2.000
(5) IBNR Factor 1 - [1 / (4)]	20%	26%	39%	50%
(6) IBNR Reserve (3) x (5)	130	211	437	750
(7) Incurred To Date	500	500	600	900
(8) Estimated Ultimate (6) + (7)	630	711	1,037	1,650

CONSIDERATIONS IN ESTABLISHING EXPECTED LOSS RATIO OR PURE PREMIUM

- Premium Adequacy
- Underlying Pricing
- Changes in Operations, e.g.
  - Reinsurance
  - Underlying Limits, Deductibles
  - Claims Made vs Occurrence
- Changes in Mix of Business

BORNHUETTER–FERGUSON METHOD

ADVANTAGES

- Easy To Use
- Compromises Between Loss Development And Expected Loss Ratio Methods
- Avoids Overreaction To Unexpected Incurred Losses To Date
- Suitable For New or Volatile Lines of Business
- Can Be Used With No Internal Loss History

DISADVANTAGES

- Uncertainty of Projected Ultimate Loss Ratio or Pure Premium
- Ignores Losses Incurred to Date
- Assumes That Case Reserve Development is Unrelated To Reported Losses

ILLUSTRATION OF "TEMPERING" EFFECT

	Expected	One Extra Large Claim
(1) Earned Premium	$2,000	$2,000
(2) Expected Loss Ratio	0.75	0.75
(3) Expected Losses (1) x (2)	$1,500	$1,500
(4) Incurred To Date	$ 750	$ 900
(5) Development Factor	2.00	2.00
(6) Loss Development Projection (4) x (5)	$1,500	$1,800
(7) IBNR Factor 1 - [1 / (5)]	50%	50%
(8) Bornhuetter-Ferguson Ultimate (4) + (3) x (7)	$1,500	$1,650

1989 CASUALTY LOSS RESERVE SEMINAR

1D: CHANGES TO SCHEDULES O AND P

Moderator

Richard J. Roth, Jr.
California Department of Insurance

Panel

Dean R. Anderson
Tillinghast/Towers Perrin

David Koegel
Gill and Roeser, Inc.

MR. ROTH: My name is Richard Roth. I am the Assistant Commissioner of Insurance for the State of California, and the chief property casualty actuary.

I was one of the people who was instrumental in changing Schedule P. I want to hasten to say I wasn't the only person. It was a team effort and the regulators could not have done it without the cooperation of a number of actuaries in the insurance profession. They deserve credit for that also.

Now, the heading is a little bit wrong. It should read, actually, Changes to Schedules F and P since there is no longer a Schedule O. The format will be that we're going to have a 15 minute presentation on the changes to Schedule F. Now, this actually ties in with P because the changes to F -- reinsurance is now an important part of Schedule P, as you will soon see.

To give that presentation will be David Koegel who is Assistant Vice President of Gill and Roeser, Inc. David is an actuary with that firm. David.

MR. KOEGEL: Thanks very much, Dick. Good morning everybody. As Dick mentioned, I'm going to make about a 15 minute presentation -- probably running to 17 minutes -- on the changes to Schedule F. So bear with me as I'll be speaking fairly quickly. I'm presuming some knowledge of Schedule F in the audience which may be a bad assumption.

Feel free to flip through the pages of the handout as I go through the slides.

Just out of curiosity, by a show of hands, how many people here work for reinsurance companies? Don't be shy. Oh, okay. It's actually less than half the audience.

(Slide.)

Basically what I'm going to be speaking about is the new provision for overdue authorized reinsurance. I would like to start off with an old quote on the subject of debt: "if you want time to pass quickly, just give your note for 90 days."

This thought has taken on new meaning for the reinsurance market. The NAIC's new provision for overdue authorized reinsurance will affect so-called "slow-paying" reinsurers in that they will be forced to alter their payment habits unless they are willing to give up market share. Some ceding companies are going to be very frustrated with their reinsurers who are sow payers as they're forced to take a hit to surplus as a result.

(Slide.)

My talk will be broken down into three sections: first, the applicability and the intent of the provision; second, the two-tiered nature of the hit to surplus and, finally, the applicable changes to the 1989 annual statement blank.

(Slide.)

The provision applies to -- simply stated -- reinsurance recoverables which are more than 90 days overdue, which are not in dispute -- I'll talk a little bit more about disputes in a moment -- and, which are from authorized reinsurers. The NAIC's intent of this provision is for companies to recognize, or write off, if you will, potential uncollectibility of a portion of such overdue recoverables.

There's a lot on this next slide, and I'm going to go through it fairly quickly.

(Slide.)

I look at the provision as if it's being broken down into two tiers. Tier one, which is the less severe tier, is equal to 20 percent of paid loss recoverables more than 90 days overdue according to the terms of the treaty. Sometimes though, the payment date may not be specified in the reinsurance treaty. If that's the case, then the aging will begin 30 days after a bill is presented to the reinsurer or its intermediary requesting payment.

Tier two, which is more severe, is also 20 percent not only of the paid recoverables, but of all recoverables including unearned premium, paid and unpaid losses, IBNR and paid and unpaid allocated loss adjustment expenses. But only to the extent that those recoverables are not secured. Those of you familiar with Schedule F know that there is a section for unauthorized reinsurers where a surplus penalty may be avoided if you have adequate security in the form of funds held, a letter of credit, a trust agreement, or some other form of security.

Whether a reinsurer is subject to tier one or tier two is determined in the new Schedule F, Part 2B, Section 1, which I'll talk about further after the next two slides.

To quickly go over real the changes to the NAIC convention blank in 1989, there's three areas of change. The major one is Schedule F. The next one would be the balance sheet. The third is the capital and surplus account.

Schedule F, Part 1A, Section 1 has been amended to separate paid loss recoverables into four categories: current, 30 to 90 days overdue, 91 to 180 days, and over 180 days. Also, there has been a column added to that exhibit, column 4 to show reinsurance premium ceded. That total should reconcile with the underwriting and investment exhibit, Part 2B, Column 3, Line 32 on page 8.

There is an amendment in caption only of Part 2 to read Part 2A and that's for unauthorized reinsurers. Then there is the new Part 2B, Sections 1 and 2 in which the surplus penalty for overdue recoverables is determined.

After I talk about the balance sheet changes and the capital and surplus account, we'll go back to Schedule F in a little more detail.

With respect to the balance sheet there are two changes. Add a new line 13(C) on page 3. It's going to say, "Provision for Overdue Authorized Reinsurance." This is referred to on slide number 6 that is up on the screen now.

(Slide.)

So, there is a new liability line for overdue authorized reinsurance. Line 14 which used to read "Provision for Unauthorized Reinsurance" is now going to say "Provision for Reinsurance" so as to include the unauthorized hits to surplus as well as the overdue authorized hits to surplus.

Finally, with respect to the capital and surplus account on page 4, line 21 will now read "Change in Liability for Reinsurance" to reflect the change during the year in the gain or loss to surplus due to the provision as shown on page 3, line 14.

Now we'll slow down a little bit and talk about Schedule F, Part 2B because that's really the crux of the matter.

(Slide.)

There are going to be five columns of information for each applicable reinsurer. You're going to have to list in Column 1 the amount of "90 days overdue" and that comes from Part 1A, Section 1, Columns 1(c) and 1(d).

Column 2 is going to be the total recoverable on paid losses from each reinsurer from Part 1A, Section 1, Column 1(e). If you'll notice, there is a footnote on this slide which says, "Amounts in dispute are excluded." Let's just digress a minute to the subject of disputes.

Under the old annual statement, there was a definition on the bottom of the page that explained what constituted a dispute. Either the ceding company or the assuming company had to have initiated arbitration or other legal action concerning the recoverable. From the regulators I've spoken to -- and I guess it would depend on what state you're dealing in -it appears that the definition is now a bit broader and the reinsurer's written denial of payment could be sufficient to establish a dispute.

For more on the subject of disputes, there is an interesting article in this month's Best Review called "When Reinsurers Refuse to Pay." You may want to reference that if you're interested in learning more about the subject.

Now, back to the schedule. Column 3 shows amounts received during the prior 90 days. So, for 1989 that would be the amounts received in the fourth quarter of 1989.

In Column 4 -- I've given this a name -- it doesn't technically have a name, but for the purpose of illustration let's to call it the Overdue Ratio. The way the Overdue Ratio is calculated, is Column 1, 90 days overdue, divided by Column 2 plus Column 3, which is total recoverable unpaid plus the amounts received during the prior 90 days.

Amounts received during the prior 90 days was an important addition to the denominator of the Overdue Ratio. The reason was so that companies would not have incentive to purposely delay the collection of on-time recoverables in the last quarter of the year to inflate the denominator thereby lowering the overdue ratio.

The NAIC included amounts received during the last 90 days so as not to create a disincentive to collect. They would have defeated the major purpose of the rule if they omitted these amounts from the Overdue Ratio calculation.

Finally, in Column 5 of Section 1 you list the amount of 90 days overdue if the Overdue Ratio is less than 20 percent. You can see on the bottom of this slide the footnote which says, "the total of this column is carried to line (1) appearing beneath Section 2 for calculation of the provision of overdue authorized reinsurance where 20 percent of these amounts are a direct hit to surplus."

(Slide.)

Now we move on to Section 2. You can refer to the old schedule for unauthorized reinsurance because it's identical in format to this schedule but for unauthorized companies. If the Overdue Ratio for a given reinsurer is 20 percent or greater --

meaning they didn't appear in that last column of Section 1 -- that reinsurer is designated a slow payer -- and all recoverables from that reinsurer are listed in this section.

Columns 1 and 2, the sum of which is in Column 3, represent total recoverables, including IBNR, unpaid loss expense, et cetera, from slow-paying reinsurers. Compare that to Columns 4 and 5, the sum of which is in Column 6, representing the security that you have against those recoverables.

The difference, or the excess, of the slow-pay recoverables over the security against those recoverables is subject to a 20 percent penalty.

Finally, on the very bottom of Section 2 you will notice there are five lines under the caption "Calculation of the Provision for Overdue Authorized Reinsurance." This, in a capsule, is a review of what I've just spoken about.

(Slide)

Basically the provision is equal to 20 percent of the quantity A plus B minus C. A represents the overdue paid recoverables from non-slow pay reinsurers -- that's where the Overdue Ratio is less than 20 percent -- plus the difference of B minus C -- which, again, is the total recoverables from slow payers -- less the security against those recoverables, 20 percent of which is a direct hit to surplus. As you can see, lines 4 and 5 at the bottom of Section 2, is where that calculation is precisely done.

Now, this provision is pulled from Schedule F and recorded as a liability on page 3, line 13(e), "provision for overdue authorized reinsurance." It's included in line 14 on the balance sheet in the provision for reinsurance. The change in this liability during the year is recorded in the capital and surplus account on page 4, line 21, as the "change in liability for reinsurance." It represents a direct gain or loss to surplus.

I should point out here that the overdue authorized piece in 1989 is going to be a loss, it can't be a gain. The reason the footnote reads "gain or (loss)" here is because in future years line 21 could be a gain if the provision decreases during the year. So in future years, a gain or loss could be realized depending on whether the provision decreases or increases. Many companies will, however, be facing a very large surplus penalty in 1989.

I'd say in the next month or two there may be some preliminary estimates of the impact these penalties are going to have. But right now companies are just scrambling around. I don't know how many of you here work on Schedule F, but traditionally it is the last schedule to be prepared. I think it's incumbent upon companies to start a bit earlier, perhaps at the beginning of the fourth quarter, instead of waiting until the end of the year.

That's basically it. I apologize if I rambled a bit. I guess we can take questions at the end. Now I'll pass on to Dick. Thank you.

(Applause.)

MR. ROTH: We had arranged to have copies of the little Schedule P for 1989 available to you. As of yet they haven't come in. When they come in, we're going to put them outside in the hallway.

I would also like to say that this session is being tape recorded and it will be transcribed and put in with the final book. I will make a presentation going through Schedule P and

then Dean Anderson will follow with additional comments. Then, at the end, we'll have the session open for questions.

On Schedule P, first of all, let me start off by going through what was wrong with the old Schedule P. What was wrong with the old Schedule P is that we in regulation thought it was a pile of garbage. We almost declared it useless, and it was even more serious than that. We were finding that investment analysts on Wall Street were using Schedule P -- they'd put the data into their PCs and run off an analysis and say that such and such a company was insolvent, sell. This was causing severe problems. Even our own examiners were being misled by Schedule P.

But changing it was not easy. It took me over three years of trying before I was able to work with the industry and work with the other insurance departments to put together a package that we think is a step forward.

One of the problems, first of all, is the Schedule P combined lines of insurance that were not homogeneous. An obvious example is private passenger auto and commercial auto. Commercial auto is basically the long-haul truckers, and that is quite different from the ordinary private passenger. Also, commercial peril and homeowners was combined together.

You can't really actuarially examine both together and when a company was under examination what we did was have the company give us special runs of each one of the individual lines so that we could perform an actuarial analysis on each one of the lines. Well, this meant essentially that we were taking Schedule P and putting it aside and not using it at all.

Another problem was that there was no separation of the allocated and the unallocated loss adjustment expense reserves even though the paid amounts were broken out. Now, this is a problem because the allocated loss adjustment expenses are quite different from the unallocated, and also we were finding that some companies did not even have an unallocated.

So, one of the main reasons that I wanted the unallocated set out separately was because I wanted to know if the company had one. Also, having the unallocated in Parts 2 and 3 was not necessary.

Another problem, and this was becoming more severe with loss portfolio transfers, was reinsurance. Reinsurance was paying a greater and greater role in Schedule P. So, the regulators were concerned about Schedule P and also we were working on changes to Schedule F. The problem of non-proportional reinsurance where you have a bulk transfer in or out was causing difficulties.

Now, what has happened is that all non-proportional reinsurance is now treated as if it were a separate line. So, if you have assumed non-proportional reinsurance, that's treated as a separate line and taken out. The only assumed reinsurance that's in Schedule P is assumed proportional.

Another problem is that Part 2 and Part 3 with the incurred triangles -- the incurred was only for six years and the paid was only four years. This isn't really quite enough for the liability lines. We wanted to expand those lines.

Also, the Internal Revenue Service was going back ten years and the Securities and Exchange Commission was getting more and more involved in this. For those reasons, and out of actuarial necessity, we felt that we needed more years portrayed on Schedule P.

Another problem was the IBNR. Technically IBNR means strictly those losses which were incurred but not reported. Some companies meticulously put down incurred but not reported in Schedule P, Part 1. Other companies included in that the bulk actuarial reserve. In other words, the development of the case reserves and a reserve for reopened cases. So we never really knew which was in there.

Another problem was that it only gave it for one year, namely the current year. To get the IBNR for past years, like the past five years, we had to retrieve five annual statements in order to put five years of IBNR in our computer in order to run an actuarial analysis. I'll get more involved in this later. Schedule P, Part 1(f) was unsatisfactory because of the ambiguity of the definition of IBNR.

I first started in the insurance industry about 1974. One of my goals in life has been to destroy Schedule O. I succeeded. Schedule O I always felt to be a complicated and not very useful schedule. You have to read the headings practically twice just to understand it. From an actuarial standpoint it really has no use.

If you want to make a test of any kind, the only thing you can do is test all of Schedule O lines together. If you look in the 1988 blank, they have an IBNR and so forth for all of the lines. Well, the lines are such a hodgepodge. You've got surety, you've got fidelity, you've got international, and you've got reinsurance.

The reinsurance line is usually the dominant line as far as adverse runoff. Taking all these diverse lines together, some of which are not necessarily property -- reinsurance does not necessarily have to be property. It often is casualty.

From a regulatory standpoint you couldn't analyze it and come up with anything. It did give the one year and two year development which was useful for the IRIS test, but that was it. I wanted to be able to analyze things like automobile physical damage and even fidelity insurety.

What was needed was to take the Schedule O lines and integrate them into a format for Schedule P. Also, Schedule P was covered with ratios, percentages, and so forth, which were not particularly useful and could also be recreated by a computer very easily. So, in order to create additional space it was felt it was desirable to eliminate all these ratios and just try to put in raw data.

Another problem we had in regulation was this. When we examined the company we always tried to get direct data -- direct means that this was directly written -- and then make a loss reserve analysis of the direct data to determine what the reserves should be on a direct basis. Then subtract off the reinsurance and compare then the net with what the company reported.

Schedule P was strictly on a net basis and we didn't have the direct. One of the interesting fallouts of analyzing the direct and then going to the net is that you find out what the ceded loss ratio is. You have two loss ratios you ultimately get, the direct, the net, and the ceded.

Well, the ceded is a very interesting regulation because that tells you what the profitability is of the business that's being ceded to the reinsurers. Surprisingly, very few -- particularly small companies -- have any idea how profitable or whether they are making money or whether the business being ceded is profitable or not profitable. Once they pay that reinsurance premium they don't care, it's just gone.

Well, what happens is if the business that is being ceded is consistently unprofitable, we know that two or three years down the line they're not going to have any reinsurance. Also, it says that the business that they're writing is probably underpriced and that they will soon have problems.

Lastly, there was a growing towards claims-made policies, namely policies written on a report year basis. The strict reading of the instructions require that Schedule P be only on an accident year basis. Now, it's possible to report claims-made policies on an accident year basis but most companies just ignored the heading and wrote in on a report year basis. Anyway, it was necessary to clean up that ambiguity so the reporting would be on the basis on which the policy was written.

So, putting all these together, we were getting more and more horrified at what was happening, particularly with respect to reinsurance. The increased utilization, the reinsurance, was really destroying Schedule P. We felt, as regulators, that the reporting information should have as much integrity as possible.

Substantial changes in the annual statement are not easy. It's easy to change headings but it's very difficult to make a substantive change. One of the areas that underwent a change are the reinsurers. In the '70s and early '80s they were resistant to requiring new information and reporting information. They felt that they were responsible in the segment of the industry and that the main regulatory interest should be the primary company.

Then along came the Mission Insurance Company in California and we discovered a new concept. It's called uncollectable reinsurance. When that occurred, suddenly the reinsurance industry also became interested in financial reporting. I told the reinsurance industry, you're in the same business I am, you need to know what the primary companies are doing, what they are writing, what the profitability is of their business. One of your main tools is Schedule P. They agreed. With their cooperation, Schedule P was changed also.

Now, what I would like to do with that background is point out some of the things that were done. I have some slides of Schedule P as I had put together a final draft for the printer. The printer then rearranged the tables to accommodate the problems of printing. But the content is identical to what Schedule P will look like in the new annual statement.

Unfortunately, it's a little bit difficult to read but I'll try and go through it if I can. My problem is that if stray from the microphone, I'll also stray from the recording mechanism.

(Slide.)

At the top here, instead of just net, we have premiums earned, direct assumed and ceded. What we are starting here is a breakdown of the business into direct assumed, ceded, and net.

Now, the term direct and assumed has a special meaning. One of the roadblocks that we had in terms of splitting things out like this was what to do with companies which operate on a pooling basis. The companies that operate on a pooling basis did not want to report as direct business the business that was written directly, but then ceded into the company pool and then retroceded back.

If a company is operating on a pooling business -- incidentally, the pooling gets rather complex -- what we are doing is that the NAIC will be issuing special instructions and these may have gone out already. If not, you should communicate with the NAIC central office and ask for a set of supplementary instructions to Schedule P. The supplementary instructions answers all the question that we have received so far, plus it goes into great detail on the pooling.

Let me summarize, though, what the pooling concept is. Under the pooling concept, a company does not report as direct business, business written directly. This Schedule P assumes that all of the business was written by the pool regardless of what subsidiary it was written under. It was written by the pool, and then a percentage is ceded back to, say, one of the pulp companies.

Well, the business ceded back to the pulp companies is treated as assumed business so that assumed means assumed business from a pool on a company that has a pooling business. It also has the standard meaning of assumed reinsurance, assumed proportional reinsurance regardless of whether there is a pool or not.

Ceded -- and the instructions go into this -- means in general ceded to a non-affiliate. If there is a pooling agreement, it does not mean ceded to the pool.

Now, you can have a pulp company that's ceded out to a non-affiliate. If a pulp company cedes out to a non-affiliate, that's included in ceded. If there is no pooling agreement and you cede to an affiliate, that's also included in ceded. But generally speaking ceded means ceded to a non-affiliate.

What we want to look at here is the profitability of the business that was retained plus the profitability of the business that was ceded outside the group or corporate entity.

Then, going across, many of the columns are repeated. You have loss payments. You have allocated loss payments, and you have unallocated loss payments. One column that is added is salvage and subrogation.

Salvage and subrogation previously was only a Schedule O item. It is now an item for all lines, including Schedule P. So, we'd like to know for the liability lines what the amount of subrogation is.

Under losses unpaid, we have it split into a case basis, direct and ceded. Then, we've introduced a new concept called bulk plus IBNR. What I did here is I wanted to try to remove all ambiguity in the term IBNR. What we want under the term bulk and IBNR is the actuarially determined reserve, the large reserve that is not connected to any specific case. The reserves in the file that are with respect to a given case are called case reserves. Anything other is called under the term bulk and IBNR.

So, you no longer have to actually calculate this true IBNR, you know, the incurred but not reported. You don't have to calculate that any more. All we want to know is what is that large reserve that you're setting up that's other than an individual case reserve.

The same thing goes for allocated loss adjustment expenses unpaid. You have a case basis or a bulk and IBNR. Under the case basis many companies actually have a reserve for that in their claim files. Other companies may use a formula or whatever.

Then we have the unallocated loss adjustment expense reserve. Then, going down to the bottom of the page what you do is you calculate the loss and expense ratios for the direct assumed, ceded, and net.

Another item which is a new item here is called a discount. Now, Schedule P must be reported on an undiscounted basis except for the tabular reserves in workers' comp. Other than that, all of Schedule P must be on an undiscounted basis.

However, if the insurance department to which you are reporting has agreed to allow you to report on a discounted basis, and you do so on page 3 or on other parts of the annual statement, then there is a reconciliation. In other words, in the very last box you report that discount so that you can reconcile between Schedule P and the other schedules. But since this Schedule P is an actuarial content, we can't use standard actuarial techniques to a discounted loss reserve.

What you see here happens to be the summary. So, all lines have to be added up to the summary. In each one of the lines you have to report all of this detailed information for each one of the lines, and the number of lines defined has been greatly expanded.

Talking about the lines, homeowners and farm owners is one line. Private passenger auto liability is a line. Commercial liability is a line. Workers' comp, commercial multi-peril. Those are the main differences. International is a separate line. Then we have, for the lines which we do not care too much about in regulation -- for instance, ocean, marine and aircraft and boiler machinery -- those are combined into one line.

We also have a property line which is combined into one line. Then we have fire lines and then marine, earthquake and glass. That's not particularly critical from a regulatory standpoint. So, in fact, in that line we only have two years. You don't have to report ten years; only two years.

Let me clarify another thing. Even though the original draft of this had ten years for all lines and then the NAIC committee wanted a federal income tax -- you might call it like an environmental impact study -- we wanted a federal tax impact study.

The Internal Revenue Service treats the old Schedule P lines differently. They have a different formula and it turns out on the property lines that if I had gone back ten years, according to the IRS rules, this would have triggered a different provision in the IRS and the companies would have had to discount ten years. So, if I went back five, I had to discount five. However many years I went back, that's the number of years that you'd have to discount.

Well, some companies made a calculation and found that even for property lines this would have substantially increased their taxes because it would have increased the discount. There are two reasons why the property lines are only two lines. One is not to upset the IRS rules, and, two, I don't need more than two years anyway for a property line. Two years is fine for fire lines. Auto physical damage -- I don't need two years. You'd get a very good idea with two years, plus prior, on what the indications are.

Again, this is the summary line, and each individual line also has this. Part 2 is the standard actuarial triangle of the incurred losses and allocated expenses only, no unallocated in there.

What is done is that the top portion is filled in with numbers and what we have here is a one and two year runoff. That one and two year runoff -- the regulators look at the runoff to see how well the company is doing in reserving. Also, that will provide an input for the IRIS test or the NAIC IRIS test.

Now, I've changed the line prior and this has caused quite a bit of confusion and a number of questions. On the line prior, for 1980 -- if you can see a little asterisk here --the only thing I want in that column is the outstanding reserves for accident years 1979 and prior. In the current annual statement what they've been doing is on the prior accumulating all the incurred amounts since the beginning of the company.

Well, if you do that, the numbers in some companies are getting huge and they couldn't even fit them in the box, and all of the paid amounts for prior years is of absolutely no usefulness from an analytical standpoint. So I'm saying to the companies to take all the paid amounts which you have made for 1979 and prior and just don't bother to tell us about it. I don't need it and a I don't want it. Just give me the outstanding loss reserves.

Then I treat that as an incurred amount and what I want going horizontally across is the development of those open claims or unreported claims going across so that I have a prior line which then can be analyzed. So it's actually identical to the current prior line except that it doesn't have all the old payments in it.

The middle box is Part 3 which are paid amounts. In this case the paid amounts have been only four years, but now I'm going back ten years. The paid amounts, again, are only for the losses and unallocated loss adjustment expenses. On the prior, you only indicate the amounts paid in 1981 and subsequent.

A number of analysts and people like to take the paid triangle and use that as a projection. They say they like to do it because in paid amounts companies can't manipulate quite as much. I don't buy that argument. But, anyway, I have a paid triangle for those who would like to see the development of the paid. Also, it gives you a table upon which you can base a discount calculation. Discount is based on the payment stream. That will give you a ten-year payment stream upon which to calculate a discount if you would like to do that.

The last two columns -- they happen to have x's in them in this case but for the individual lines they don't have x's -- this gives claim count information. The New York Insurance Department wanted a claim count information in there. Many people use claim count information in order to calculate an average reserve. That's fine and the claim count information will be available in there.

I will hasten to add that everybody is somewhat cautious about using claim count because claim count can vary significantly by company to company. You can have one car with five people in it and some companies call that a claim count of one; some people call it a claim count of five. Not only that, some companies will open a claim file immediately; some companies will wait six months to open a claim file, depending on just the way they choose to handle the claims.

So, a claim count can vary dramatically from company to company. Hopefully, though, within one company there should be some consistency. In any event, it can and sometimes is a useful item, a useful bit of information for the analyst.

Pat 6 is a new schedule which is a triangle of the bulk and IBNR reserve. Here, this gives you in one table a history of the bulk and IBNR reserve so you don't have to pull past annual statements.

We have completed our intent to have in one annual statement -- namely, the latest annual statement -- all of the basic information needed to analyze the annual statement. See, as you go through, all the slides represent a complete Schedule P. So what you're running through here are the various lines. You can see towards the bottom there where you have only two accident years, those are property lines. All the rest would be liability lines.

I rushed to get to the end here. If you haven't seen it before, this is what the new Schedule P looks like. It just goes on with all these tables and tables of data for each individual line. You can then read off from these tables directly into a PC. This is what it is designed to do.

One thing that's added here is the Schedule P interrogatory. The footnotes in Schedule P were becoming cumbersome. What I did is that all the footnotes are still operative but they have been moved to an interrogatory.

Another thing that I eliminated was Schedules G and K having to do with fidelity insurety. I moved some of that information over to this schedule. Up on top here is the calculation of the excess statutory reserve. That calculation is still identically the same from past years, subject to the additions of -- well, the excess statutory reserve is the same.

The second thing under the Schedule P interrogatory, if you do have a substantial amount of claims-made policies, there is an interrogatory with respect to claims-made policies. If you have a substantial amount of claims-made policies, you still have to put together Part 5.

I still have the definition of loss expense and the formula for distributing unallocated loss adjustment expenses is still the same.

Then you have to report net premiums in force because of a requirement on the fidelity insurety. I have one last question on there, and I'll read it because it's important. It says, "The information provided in Schedule P will be used by many persons to estimate the adequacy of the current loss and expense reserves, among other things. Are there any especially significant events, coverage, retention, or accounting changes, which have occurred which must be considered when making such an analysis?"

Also, the individual who was responsible for the earthquake questionnaire sent out -- all licensed companies in California must submit an earthquake questionnaire. In that questionnaire I included a question similar to this. I've been getting back some extremely useful and interesting commentary on the market and so forth on that questionnaire, so I decided to add this.

Also, this question is designed to cut down the number of telephone calls. When they get a Schedule P in and it looks strange, the analyst will call up the company and start asking questions. The company say, "Oh, yeah, we know," and they start listing off two or three

reasons, you know, "we merged a company," or, "we had a loss portfolio transfer," or "we had a shortage in the reserves," or "we had a dramatic reserve strengthening," and so forth. Sometimes they will follow-up with a letter.

So, in order to start putting into the statement some of these dramatic changes, I left an opportunity for the company to say, okay, if you had a dramatic reserve strengthening or you had a merger or you had some significant reinsurance transactions, or whatever, you can put it in here. This will alert strangers who pick up your annual statement to make an analysis, they are forewarned that there are significant changes. So, if they get dramatic or unusual results, they won't run to Wall Street and issue a sellout or something like that.

That's Schedule P. I'd like to introduce Dean Anderson of Tillinghast, who is also an actuary. He will follow-up with additional comments.

If there is time and interest, I will go over a quick loss reserve methodology which can be used. Basically it's an incurred triangle and a paid triangle. But I'd just as soon let Dean Anderson speak right now. Thank you very much.

(Applause.)

MR. ANDERSON: Thank you, Dick. My talk is going to be from the perspective of a consulting actuary or outside analyst who has to evaluate a company's loss reserves using only publicly available information, which is primarily the Schedules O and P from past annual statements and the new Schedule P.

First, I will talk about what, in my opinion, were some of the limitations of the old schedules and what are some of the benefits from the new schedules, as well as the types of reserving techniques that can be used with the new schedules.

I would like to emphasize that my viewpoint will be from somebody outside the company who is using these statements. Therefore, I see many benefits from the new Schedule P. I recognize that this viewpoint may not be shared by many people who have the responsibility of compiling all this new data and information.

The old schedules had a number of limitations. One major limitation to both Schedules O and P was the fact that they were only on a net basis. Over the last decade there have been many reinsurance transactions dreamed up that have had very distorting effects on individual company Schedules O and P. We are no longer dealing with primarily straightforward excess of loss and quota share reinsurance treaties.

Unfortunately, these programs have not been limited to the larger companies or specialty companies. Many companies that in the past had "vanilla" type reinsurance programs now have these distorting effects in their Schedules O and P.

For example. We were doing a reserve study for a workers' compensation company a few years ago. This company tended to reassume their first layer of excess of loss reinsurance about four years after the beginning of the accident year. For a given accident year, the first three or four years of evaluations was at one retention level, say $100,000, and then for all subsequent evaluation points the retention was $250,000. They took back the case reserves and the IBNR that were related to that first reinsurance layer at that evaluation point. So, they showed a big increase, or what would be perceived as adverse development, in their loss triangle.

In the year that they reassumed this first layer reinsurance they also reassumed the premium that was associated with those losses. But the premium was assigned to the calendar year in which the transaction was performed. So, that year's premium was overstated and, therefore, the loss ratio was understated. While the accident year three or four years previous to that has an overstated loss ratio because have the premium relating to the exposure they picked up when they reassumed the losses.

The old Schedules O and P had very limited data to perform actuarial analysis. This was especially true if you only had one annual statement. You could perform some additional techniques if you went back and picked up three, four or five annual statements. But if you only had one statement, you were limited to doing a runoff review or using a prospective test.

Part 2 of the old Schedule P provided a runoff review but it did not provide the data necessary to perform an independent analysis of where the current reserves stood. Part 3, which showed the current evaluations and a limited amount of paid loss runoff, allowed you to perform a prospective test by comparing the current paid-to-incurred ratios to what actually happened to the older years.

In Schedule O, Parts 1 and 2 showed only a two-year runoff which, as Dick Roth indicated, for many of the lines was insufficient. For the property lines it was probably sufficient, but over the last number of years some additional lines have been added. The reinsurance and international lines have gone into Schedule O. Those lines had a great deal of casualty exposure and two years of runoff was totally insufficient.

If you went to the trouble and gathered up multiple years of annual statements, you could do some limited actuarial analysis. It was possible, using Part 1 of Schedule P, to develop paid loss triangles, incurred loss triangles, paid allocated loss adjustment expense triangles, paid total loss adjustment expense triangles, and incurred total loss adjustment expense triangles.

You had somewhat of a problem in backing out IBNR especially in the loss adjustment expense triangles, in order to get a reported (paid plus case reserve estimate) triangle. But you could do, what I would characterize as, dollar development techniques if you had access to more than just the current annual statement.

In Schedule O you were limited to only a two-year runoff period. In Schedule P you were limited to a five-year runoff period if you used only one annual statement. If you were able to get multiple annual statements, you could get as much as an 11 year runoff for Schedule P, and you could get a similar runoff period for Schedule O if you were only interested in reviewing all the Schedule O lines combined. On an individual line basis you were limited to only a two-year runoff whether or not you used one annual statement or a number of annual statements.

The definition of IBNR was a problem because there was not a consistent definition from company to company. Some companies would define IBNR as being all of their statistical actuarial reserves -- meaning pure IBNR as well as the bulk amount for case supplement -- while other companies used the strict definition of IBNR and only included in that reserve an amount for unreported claims.

Now, it would be good to have a consistent definition from company to company because one of the things we like to do is combine annual statements from a number of companies, which you can either gather yourself or you can gather from Best's or some other outside source information, and develop industry benchmarks for paid development

and incurred development. We use these to supplement the company's own data when we do a reserve study.

This is especially appropriate for new companies, companies where the line of business is new to them even though they have been writing other lines for a number of years, and for small companies where their own information is not 100% credible.

Many of these issues have been addressed and in our opinion corrected, or at least improved upon, with the new Schedule P. First of all, it is on both net and direct bases so that you can do a reserve study on the direct business as well as a study on a net basis.

One of the interesting outcomes of this, in addition to the one that Dick Roth mentioned regarding seeing the profitability of the ceded business, is to see how the ceded reserve amount that you come up with compares to the amount the company is reporting in the annual statement. This is especially useful for a company that has a great deal of reinsurance through companies that would normally be unauthorized except for the fact that they are maintaining a fund balance with the company or a letter of credit.

If in your analysis of reserves on both direct and net bases you come up with a ceded reserve amount significantly higher than what the company is showing in Schedule F, you may come to the conclusion that the letters of credit or the fund balance amounts are insufficient. Of course, it could work the other way too if your estimate is lower, then you can feel much more comfortable that the company has sufficient backing for their reinsurance.

The new Schedule P for the liability lines will show a ten-year runoff period, which is a welcome improvement for many of the lines of business, especially the unusual lines that were previously included in Schedule O for lack of a better place to put them.

The data base includes a great deal of additional information. Claim count information is now available, which was not available in the past except on an open count basis. On a current evaluation basis you can get claims closed with payment and claims closed without payment. You also can get the reported claims and the open claims. So, if you do get multiple statements, you can develop count triangles to supplement your dollar triangles.

The ten years of data from one annual statement will allow you to develop dollar triangles on a combined loss and allocated basis using paid losses or incurred losses; the incurred losses can both include or exclude IBNR. I prefer looking at it excluding IBNR, but I recognize there are some people who do like to do an analysis including IBNR. Both methods can be used with the current annual statement.

If you want to develop separate loss and allocated triangles, that is possible too. But you have to use multiple annual statements and use Part 1. By using multiple annual statements you can develop count triangles on a reported basis; closed basis, both with and without payment; open counts, for loss and allocated individually or combined. You can develop trianges for paid losses and incurred losses. By using the counts and the loss dollars, you can derive severity amounts so many more types of actuarial techniques available to you.

You can use straight loss development techniques, both paid and incurred. You can use counts times averages techniques. By having counts and dollar amounts, you can investigate whether or not there has been a change in the case reserve adequacy level.

Most of these techniques, other than just the straight paid and incurred loss development techniques, were not available under the old Schedules O and P even if you had multiple annual statements.

On the claim counts I should probably point out that they are available for the casualty lines only. They are not recorded for the property lines, reinsurance categories, or the international category.

There is a new definition of IBNR. IBNR is defined to mean bulk reserves plus IBNR. This is an improvement because it now creates more consistently from company to company. So it is possible to develop better industry benchmarks for loss payment patterns and loss improved patterns.

You still have a problem on the allocated side in this area in that many companies do not set allocated reserves on a case basis but strictly on a statistical basis. So, all of their allocated reserve would get thrown into the bulk reserve and there would be nothing on the case side. Any benchmark you come up with on an industry standpoint would have to take that into consideration. Perhaps you could come up with two benchmarks, one for companies that do case basis allocated reserves, and one for those that do not set up case allocated reserves.

Splitting up some of the lines of business has been a great improvement. As Dick Roth mentioned earlier, there is significant difference in the patterns between private passenger automobile and commercial automobile. The old multiple peril line of business for Schedule P is now split three ways: commercial multiple peril; homeowners and farmowners; and the remainder which is primarily ocean marine, aircraft, and boiler and machinery.

The splitting of the reinsurance into several categories is especially important. Also, the split between the claims made and the occurrence policies is important.

I would recommend perhaps an additional split that has not been accomplished yet. That is to separate excess type policies from primary policies. I think the patterns, especially for general liability umbrella and excess policies, are probably just as different from the underlying policies as claims made and occurrence are different from each other. I'd like to see data split between the primary policies and the excess policies.

The separation of allocated and unallocated loss adjustment expense has been very important. Now you have basically the same information on allocated as you do on losses. You can p erform the same types of actuarial techniques to both categories. This was not possible in the past. The old Schedule P gave you paid allocated, but the reserve had allocated and unallocated combined and had case and bulk reserves combined. The new detail on allocated loss adjustment expense is a big improvement.

Perhaps one of the major ramifications and, I think, benefits from this change to Schedule P is that it has forced many companies to start compiling data that they probably should have been compiling in the past. This type of detail really was necessary to do a good actuarial analysis a company's reserves.

But, unfortunately, I have found in dealing with many companies that the reserving data base, which I feel the Schedule P information is at the minimum level of needed detail, is developed by considering Schedule P as being the maximum that they have to maintain.

What has happened by requiring this greater detail in Schedule P, is that it has required many companies to now maintain the data that is necessary to perform an adequate actuarial analysis.

Thank you.

(Applause.)

MR. ROTH: I'm going to take a brief minute to go back to the slides, the last ones I had, so I don't leave you hanging as to what their content is, and then I'm open for questions.

(Slide.)

MR. ROTH: I need to explain this because I received some questions as to why there is a Part 6 -- why do you have this bulk and IBNR in there and what use is it?

The intent is this. On Part 2 you have an incurred triangle. Incurred was the case plus the bulk and IBNR plus the paid amounts. What normally we do is we take the information from Part 6, which is the bulk and IBNR, and subtract it item by item, and that leaves a triangle of case reserves plus the amounts paid to date.

What we've done is eliminated, in a sense, the major judgmental factor from the analysis and using only the triangle of the case plus paid to date, we get a gradually increasing triangle. Then, you get numbers that dramatically increase. This is 338,000 up to 918 -- actually, it's up to 918,000. You get this dramatic increase. So the objective is to find the pattern, the factors that will take you from 318,000 to 918,000 and say, okay, if this is the pattern here, then this should be the pattern down here for 1988, and this number here should grow at approximately the same rate.

So, these numbers down here are the ratios of successive numbers so that means for you to project these amounts for 1988, 1987, 1986, on up to what their ultimate amounts would be. Once you get the ultimate amounts, then you can subtract the ultimate amount from the case plus paid and that will give you a test of what the IBNR and bulk should be.

This is an internal way of testing that, and this is the most common method used by the California Insurance Department.

The other way to do it -- the common way to do it -- is to take the paid table, which is Table 3, and that has strictly the amounts paid to date. There are no reserves in that at all. Looking at that pattern, you also go horizontally and project what the ultimate paid amount would be. Once you have the ultimate paid amount, you can compare that ultimate projection with the projection that you had from Table 2 and then you can also compare that with what the company says is the ultimate. So that gives you the common techniques.

You can also just look at Table 2, which is the incurred amount, and look across to see how well the development is. But the basis technique we use in regulation -- or, at least, the California Insurance Department -- for testing is to take the incurred amounts, subtract the bulk and IBNR, leaving the case in paid, and then project on that. We do that for even property lines.

Now, the part I enjoy most is usually questions. If you have any questions for any one of us, we'd be happy to entertain them. Yes?

QUESTION: Are you saying that the property line appeared (Inaudible.)

MR. ROTH: They will stay that way. No, it won't grow. It will stay at two years. Yes?

QUESTION: (Inaudible.) separate reserves allocated (Inaudible) -- a company doesn't have to reserve -- the Schedule P?

MR. ROTH: Are you talking about the allocated?

QUESTION: Yes.

MR. ROTH: The company does not have to have, although I think it should, an allocated loss adjustment expense reserve by a case. In that case you're going to have to have a bulk reserve. I won't give in on that. You do have to have a bulk reserve in that case for the allocated loss adjustment expense, and that can be calculated in a number of ways. But you at least have to have a bulk reserve. In that case, the case column would be blank.

QUESTION: Your Schedule O lines which have your three-year development on the new schedule -- on your Schedule P lines you have the ten. But in your summary you have a ten-year. Are you not going to have to develop your Schedule P lines somewhere for ten years so that when you summarize it you in fact pick up the ten year summary across the board for all those years?

MR. ROTH: Yes. This is also a question that has been asked. All the summary tables are for ten years. So the question is: on the old Schedule O lines if there are only two years, what do they do with the summary?

The answer is that you have to have in your work papers ten years, even for the property lines, the old Schedule O lines. You have to have ten years in your work papers so that the summary is the sum of ten years for all lines, including the two-year.

I mentioned that one of the initial versions of it had ten years for the property lines and that's why I did -- but this dispute about our interest in the Internal Revenue Service came up and we decided to yield to that and report explicitly only two years even thought the companies are required to have ten years within their internal work papers.

Does that answer your question?

QUESTION: Yes. Thank you.

MR. ROTH: Yes?

QUESTION: I have a question for David. On the Schedule F if I understood correctly, it's possible to avoid a tier two penalty in its entirety if you have offsets.

MR. KOEGEL: To the best of my knowledge that's correct, yes.

QUESTION: Is it possible to avoid a tier 1 penalty?

MR. KOEGEL: I don't believe so, because of the way the calculation works. Security against recoverables from a reinsurer with an Overdue Ratio not greater than 20 percent cannot be used to offset the penalty.

I think what companies feel is that the tier one penalty will not be that serious because you're taking one-fifth of a number which probably won't be that great. But when you get to the tier two, it's a bit more of a concern.

I don't know if anybody here is aware of what Gill and Roeser does. We are reinsurance intermediaries specializing in financially-oriented or finite risk type reinsurance. Companies have been inquiring as to whether there are bonafide ways to lessen the surplus penalty.

I believe that the spirit of the rule is to guard against bad debt from companies which are really in trouble, the reinsurers that in all likelihood are going to go insolvent. There are, however, a number of very reputable and solvent reinsurers out there which for one reason or another are slow in reimbursing their reinsureds. Let's face it, 90 days is really not that long of a period of time. There is a lot of administration. Sometimes there are disagreements that are not officially in dispute which undoubtedly cause delays.

Perhaps on an individual case-by-case basis, to answer your question, if it's a tier one penalty relating to a quality reinsurer, I imagine that the particular jurisdiction may listen to any arguments that you have in terms of security, and so forth. There is nothing in the rule that evidences that you can get around a tier one penalty, but, again, it has to be taken on an individual case-by-case basis.

MR. ROTH: Yes?

QUESTION: I'm not quite sure how you use the lines (Inaudible.)

MR. ROTH: Okay. I wanted to break it down as much as I could without defining a new line. All of the lines, even though there are quite a few lines, are all previously defined lines mainly on page 14, the state page. So, no new lines are created.

The criteria is -- well, for instance, the separating of private passenger auto from commercial auto. The loss development patterns are substantially different. The average loss is substantially different. The number of death claims is substantially different.

When you use the development patterns and when you take a triangle like this and go to project and you've got a mixture of these two, you sometimes will get distortion. The same thing with homeowners and commercial multi-peril, they are substantially different.

What I'm trying to do is to get lines that are -- you know, break it down to try to get the same character in loss pattern.

QUESTION: I have a question regarding the prior. For the new columns the salvage and subrogation can be bulk and IBNR. (Inaudible.) -- to go back to the beginning of the (Inaudible.)

MR. ROTH: The salvage and sub?

QUESTION: Yes. Prior to the last? In other words, you must state it in that prior run.

MR. ROTH: Okay. The answer is this. On the prior on Part 1 there is a prior under salvage and subrogation. However, for that role you only are asked to put the salvage and subrogation received immediately in the current calendar year, not historical. Like the years 1980 through '89, you've got those ten years. You have to record the salvage and subrogation that's relevant to each one of those absent years. Then, for prior you only put in the current calendar year.

I don't know if it seems strange to you or not, but that's all the information I need. Then, the reason I only want that current calendar year is for reconciliation purposes, to reconcile the total with the other exhibits in the annual statement.

In fact, the prior line -- there is a footnote which answers the question. For prior report amounts paid or received in current year only, and then report cumulative amounts paid or received in the specific years.

All loss payments are reported net or salvage and subrogation received. There is an oddity here, but it's okay. In the triangles, you report the triangles net or salvage or subrogation received even though you cannot anticipate in loss reserving any salvage and subrogation. That rule still holds. You cannot anticipate salvage and subrogation. However, you can report it. So, it would seem like there would be a distortion. There is, but it turns out not to bother us.

QUESTION: David, have you tried to make any estimates on what the potential hit to surplus will be for the industry on the Schedule F requirements?

MR. KOEGEL: No, not at this point. We don't regularly make such estimates, although we've talked with several companies we believe will be affected in a major way by the new provision. I think that toward the end of October or November, when companies will be doing pro formas on their Schedule F we'll have a better feel as to the potential impact on the industry.

1989 CASUALTY LOSS RESERVE SEMINAR
HYATT REGENCY O'HARE - CHICAGO, ILLINOIS
SEPTEMBER 18, 1989

1D - CHANGES TO SCHEDULES F, O AND P

PROVISION FOR OVERDUE AUTHORIZED REINSURANCE

DAVID KOEGEL, ACAS
ASSISTANT VICE PRESIDENT
GILL AND ROESER, INC.
NEW YORK, NEW YORK

"IF YOU WANT TIME TO PASS QUICKLY,

JUST GIVE YOUR NOTE FOR 90 DAYS"

-- R.B. THOMAS
FARMER'S ALMANAC

2

PROVISION FOR OVERDUE AUTHORIZED REINSURANCE

-- APPLICABILITY AND INTENT

-- TWO TIERS OF ASSESSMENT

-- CONVENTION BLANK CHANGES

PROVISION FOR OVERDUE AUTHORIZED REINSURANCE

APPLICABILITY

REINSURANCE RECOVERABLES WHICH ARE:

- MORE THAN 90 DAYS OVERDUE;
- NOT IN DISPUTE; AND
- FROM AUTHORIZED REINSURERS.

INTENT

TO RECOGNIZE POTENTIAL UNCOLLECTIBILTY OF A PORTION OF SUCH OVERDUE RECOVERABLES.

PROVISION FOR OVERDUE AUTHORIZED REINSURANCE

TWO TIERED PENALTY:

TIER 1: 20% OF PAID LOSS RECOVERABLES MORE THAN 90 DAYS OVERDUE ACCORDING TO THE TERMS OF THE TREATY.

TIER 2: 20% OF ALL RECOVERABLES (INCLUDING UNEARNED PREMIUMS, PAID AND UNPAID LOSSES, IBNR, AND PAID AND UNPAID ALAE) TO THE EXTENT THAT SUCH RECOVERABLES ARE NOT SECURED BY LETTERS OF CREDIT, TRUST AGREEMENTS OR FUNDS DEPOSITED BY AND WITHHELD FROM REINSURERS.

NOTE: WHETHER A REINSURER IS SUBJECT TO A TIER 1 OR TIER 2 PENALTY IS DETERMINED IN SCHEDULE F - PART 2B -SECTION 1.

PROVISION FOR OVERDUE AUTHORIZED REINSURANCE

1989 CHANGES TO THE NAIC CONVENTION BLANK

SCHEDULE F

- Amend Part 1A - Section 1 to separate paid loss recoverables into four categories:

  (a) Current;

  (b) 30-90 Days Overdue;

  (c) 91-180 Days Overdue;

  (d) Over 180 Days Overdue.

- Add Reinsurance Premiums Ceded (Column 4) to Part 1A - Section 1.

- Amend caption of Part 2 to read Part 2A.

- Add the new Part 2B - Sections 1 and 2.

PROVISION FOR OVERDUE AUTHORIZED REINSURANCE

1989 CHANGES TO THE NAIC CONVENTION BLANK (cont.)

BALANCE SHEET (Page 3)

- Add a new Line 13e - "Provision for overdue authorized reinsurance as per Schedule F, Part 2B , Section 2".

- Amend Line 14 to read "Provision for reinsurance", which shall include provisions for both unauthorized and overdue authorized reinsurance.

CAPITAL AND SURPLUS ACCOUNT (Page 4)

- Amend Line 21 to read "Change in liability for reinsurance", to reflect the change during the year in Page 3, Line 14.

PROVISION FOR OVERDUE AUTHORIZED REINSURANCE

SCHEDULE F - PART 2B - SECTION 1

5 COLUMNS OF INFORMATION FOR EACH APPLICABLE REINSURER:

* COLUMN 1: Amounts "90 Days Overdue";

* COLUMN 2: Reinsurance Recoverable on Paid Losses;

COLUMN 3: Amounts Received Prior 90 Days;

COLUMN 4: Col. 1 / (Col. 2 + Col. 3)
[the Overdue Ratio];

\# COLUMN 5: Col. 1 amount if corresponding Col. 4 is less than 20%.

* Amounts in dispute are excluded.

\# Total of this column is carried to Line (1) appearing beneath Section 2 for calculation of provision for Overdue Authorized Reinsurance, where 20% of these amounts becomes a direct hit to surplus.

PROVISION FOR OVERDUE AUTHORIZED REINSURANCE

SCHEDULE F - PART 2B - SECTION 2

- IDENTICAL IN FORMAT TO THAT OF SCHEDULE F - PART 2A FOR UNAUTHORIZED COMPANIES.

- IF THE OVERDUE RATIO (COL. 4, SEC. 1) FOR A GIVEN REINSURER IS 20% OR GREATER, THEN SUCH REINSURER IS DESIGNATED A "SLOW PAYER" AND ALL RECOVERABLES FROM THAT REINSURER ARE LISTED IN THIS SECTION AS FOLLOWS:

  COLUMN 1: Unearned Premiums;

  COLUMN 2: (a) Paid and Unpaid Losses Recoverable;

  (b) IBNR Losses Recoverable;

  (c) Paid and Unpaid ALAE Recoverable;

  COLUMN 3: Total of 1 + 2a + 2b + 2c;

* COLUMN 4: Deposits by and Funds Withheld from Reinsurers;

  COLUMN 5: Miscellaneous Balances;

  COLUMN 6: Sum of 4 + 5 but not in excess of 3.

* Amounts should be identified separately as letters of credit (L), trust agreements (T), funds deposited by and withheld from reinsurer (F), or other (O).

PROVISION FOR OVERDUE AUTHORIZED REINSURANCE

SCHEDULE F - PART 2B - SECTION 2

CALCULATION OF PROVISION FOR OVERDUE AUTHORIZED REINSURANCE

- PROVISION (OR SURPLUS PENALTY) IS EQUAL TO 20% OF THE QUANTITY (a) + (b) - (c) WHERE:

  (a) equals overdue paid recoverables from non-"slow payers" as set forth in the total of Column 5, Section 1;

  (b) equals all recoverables from "slow payers" as set forth in in the total of Column 3, Section 2;

  (c) equals all amounts which secure recoverables from "slow payers" as set forth in the total of Column 6, Section 2.

- THIS PROVISION IS RECORDED AS A LIABILITY ON PAGE 3, LINE 13E AND INCLUDED IN LINE 14 OF THE BALANCE SHEET. THE CHANGE IN SUCH LIABILITY DURING THE YEAR IS RECORDED IN THE CAPITAL AND SURPLUS ACCOUNT ON PAGE 4, LINE 21 AND REPRESENTS A DIRECT GAIN OR (LOSS) TO SURPLUS.

1989 CASUALTY LOSS RESERVE SEMINAR

1E: INTRODUCTION TO REINSURANCE RESERVING

Moderator

Jane C. Taylor
Reliance Reinsurance Management, Inc.

Panel

Michael D. Covney
Re Capital Reinsurance Corporation

John M. MacDonald
Coopers & Lybrand

MS. TAYLOR: This is Reinsurance Reserving -- I'll call it Reinsurance Reserving 101. It's Introduction to Reinsurance Reserving. If that's not where you're supposed to be, you need to move, you need to go someplace else.

The materials that are in the handouts are in the back of the room. Please pick those up. They will give you an indication of where we're going and what we're going to talk about.

We're not intending this morning to make everyone experts. The people sitting at the front of this room, are not experts. We'd like to think that we know at least some of the questions to ask.

What I'm going to do is a brief introduction and then we will have our speakers. We have two very interesting people this morning.

John MacDonald is a CPA and he's going to give us a slightly different outlook on the situation. He's with Coopers & Lybrand in Kansas City. He does a lot of insurance work and a lot of reinsurance work as a consequence of that. He's going to give us reinsurance reserving from the perspective of an auditor or an independent, an accountant.

These are some things that we as actuaries have to plug into and have to know about and have to be able to respond to, but some things we don't necessarily always focus on.

Then, Mike Covney with Re Capital is going to give us some indications about how actuaries really do their job and what kinds of things we have to look for and how difficult or how easy it is. I think it's difficult; he thinks it's easy. We'll go from there.

Let me talk a little bit about what I think about reinsurance reserving.

First of all, if you're working in the primary side and this is your first foray into reinsurance reserving, you'll find out that we have a lot less data to work with. That was a real shock to my system the first time I looked at it. It means that there is more difficulty in doing everything you do since we are driven in general by data.

The data you do have has more variation in it. It would be nice if it were rock-solid and we could predict things with great preciseness, but that's not the case. It has a lot of variation. It think Mike is going to show us some of that a little later on.

We have some other problems. First of all, we have some reporting lags. Some of those are built in to the reinsurance contracts themselves. In general, we don't get data until at least 45 days after the primary company has the data. So we are a month and a half later than the primary company.

Very often that month and a half is three months later. We'll have reporting requirements that they report to us three months after the end of the month in which the data took place. So you have some reporting lags. You're always out of sinc with the primary company unless you've made very, very special considerations to make sure that that timing is closer.

Reinsurance companies or ceding companies do not respond very well to a very tight reporting timeframe. They like to have time to massage their data and look at it and check it for errors before they pass it on to a reinsurer. So there are probably going to be reporting lags as long as we have reinsurance.

Then we have some uncertainties in the legal climate. Now that happens on the primary side. Everybody knows that as the courts make different interpretations of policies, things happen to the coverage you thought you wrote. That's magnified on the reinsurance side because you have a greater leverage effect. We're further out in the tail in general and changes in the legal climate today may mean that things that we have done over the past two, three, five, ten years will be very magnified on the reinsurance side.

The best example of that, of course, is asbestos. We all know what that's going into right now. We also know that the way the courts have interpreted the policies with, for instance, their triple trigger, has created some problems.

It's created extensive problems on the reinsurance side because there are no aggregate caps in many instances on the older policies, because the data may not be there to make any basis for reserving, because the policies may not exist anymore, because you may not even know for certain that you were on the treaty, you just think you were on the treaty --or, if it's a facultative placement, you thought you were on the fact certificate.

So, we have uncertainties in the legal climate.

Reinsurance reserving is also complicated by the fact that there may be changes in terms as you go along. For instance, on the medial and legal side of the situation allocated loss adjustment expenses were not included within the limits initially. With the move to claims-made policies and the further erosion due to the changes in the legal climate, a lot of times now allocated loss adjustment expenses are in the limit.

What that means is that the data that you have from a while ago may not be relevant for today, or you may have to look at it in a different manner.

We also have larger trends in reinsurance, especially if they're on an excess basis. I would refer you to several papers, that demonstrate that that is the case. We all know -- or, at least I think we all know -- that total limits trend is always higher than basic limits trends. Given that that is the case, you know then what the residuals are on the excess policies, and they are even larger trends.

So, it creates some very big difficulties in trying to stay ahead of things on the reserving side.

We have some other issues too, some of these John is going to talk about. One of these is mirror accounting. What is mirror accounting? Well, it's the movement toward requiring that both ceding companies and assuming companies use the same accounting treatment for all transactions.

Currently you can gain some benefit in some of your reinsurance transactions by not doing mirror accounting. The ceding company may treat a portfolio transfer, for instance, in one manner, and the assuming company may treat it in another. To the extent that that gives advantage to one party or the other, we can get various and sundry results. That maybe going away. We may no longer have that privilege.

There is also the issue of surplus release. First of all, the definition of it, what it means. Do you need to carry reserves for it? Is it reinsurance at all? So, we have the whole issue of that kind of situation, what are the implications for reinsurance reserving.

Then, last, but certainly not least, we have increased regulation. Currently reinsurers are not exactly without regulation, but the regulation is a lot more simplified than for primary companies. That's changing. We expect to see some fairly radical movements in the future on the regulation side.

There are elements of antitrust, for instance. There are elements of rate levels, for instance. Of course, there is the mirror accounting and the regulations pertaining thereto. So, we have a lot of difficulty -- or, we are going to have a lot of difficulty with regulation of reinsurance in the future.

Now, those are all kinds of just ideas. I think that reinsurance is fun. It's fun for a lot of reasons. One of the reason is that it's a challenge. You don't have the data. You have no idea where you're going. You've changed the terms. The legal climate is changing and you have to do something. So there's a big challenge in it and I find that exciting.

Also, trying to find out the technical basis so that you can make modifications, so you can see how much damage you can do by changing the assumptions, is also exciting to me.

The other thing is that it's a longer tail line of business and if you're lucky enough, it will be long enough tailed that if you screw up badly, you'll be gone before they find out.

(Laughter.)

MS. TAYLOR: All right. That's all I have to say. Basically we're going to have a half an hour from John and a half an hour from Mike. We'll throw it up open then for questions. If there is something you don't understand immediately, we could possibly do a short clarification if it's just absolutely not clear. Otherwise, I would like to wait until the end to have our questions. All right? John.

MR. MACDONALD: Thanks, Jane. Reinsurance reserving is fun, particularly for accountants. You know, we're trained to look at everything from a historical perspective. In fact, the historical cost accounting concept is sort of a keystone on which a lot of accounting rules are based. So, here is a chance for accountants to venture into some foreign waters actually looking forward into the future.

In fact, one of the common quips that I hear about what I do for a living relates to this historical perspective. I'm typically accused of being one of the guys who comes in after the battle is over and bayoneting the wounded. But we're constantly looking at things after the fact with hindsight. So, this is an opportunity for us to do something a little more creative than we normally do.

What I'd like to accomplish this morning is to give you at least an overview of the rules and regulations and standards, and so on, that I face as a CPA when I'm doing my job. If you're working for a company and preparing loss reserve data and that company's financial statements are going to be audited, or if you're a consulting actuary and you're doing this for a client company, then it's important for you to understand what the CPA is trying to achieve and what framework we're working in so that you can prepare your work to the extent possible to dovetail with what the CPA is going to do.

Basically I think we have an objective in common. That is to get to a point where we're comfortable that reserves are adequate to cover ultimate losses. I wrote in my notes here, preferably with a slight bias towards conservatism. I think that's another basic concept that we share, that actuaries and accountants share. That is the principle of

conservatism. I'll come back to that in a minute because there have been cases where we've tried to take that a little too far.

One difference -- and I think in this case usually a minor difference -- is that our perspective is in the context of the financial statements taken as a whole. So, when we render an opinion, it's typically on the financial statements in total, not just on the reserves.

Now, with reserves typically being far and away the most important single element in the financial statements, that distinction may not be important.

I'll start with a general review of some of the standards that I'm required to deal with in my profession and briefly what they mean. If you picked up a copy of my handout, there is a list of reference material on the last page and most of what I'm going to talk about is listed there.

Our authoritative rule-setting body is the Financial Accounting Standards Standard Board for accounting standards. They issue things that look like this, little brown books called Statements of Financial Accounting Standards. There are a couple that are important in the insurance industry.

The first one is FASB Statement Number 5 which is titled Accounting for Contingencies, but it really is much broader than that. Basically it sets the basic rules under which a liability may or may not be recorded for any entity, not just insurance companies -- to record a liability in its financial statements.

That must meet two criteria. The first is that it must be probable that a liability has been incurred. The second is that it must be measurable or reasonably estimatable.

What this standard was attempting to deal with really was -- a major effect that it had -- was to eliminate broad reserves for contingencies. Again, not just in the insurance industry but in all industries. After this was published, companies were no longer able to set up just a general contingency reserve in their financial statements to protect against things that might come along. That fails to meet the probability criterion.

Moving into the insurance industry, where it did impact was the situation where an insurance company might set up a catastrophe reserve for a single catastrophe. Again, it has to meet the probable and measurable criteria. Let me move into the next statement and we'll come back to that in a minute.

The second statement that the FASB issues -- and that's the one I brought today, it's Number 60 which is titled Accounting and Reporting by Insurance Enterprises -- what this document basically did is it took all the authoritative literature that preceded it in a variety of publications from different standards-setting bodies and codified it into a single document.

There is not too much new here but a little new terminology. They differentiated between short duration and long duration contracts. Long duration is basically a whole life policy, certain endowment and annuity contracts. But all property and casualty contracts fall into the short duration category.

Accounting standards require that premiums be recognized in income in the period of the contract. Most P&C contracts are for a year in duration so the premium gets recognized ratably over that year. It also requires that losses that are covered by that contract get recognized in the same period.

That's the mashing concept that we use. That means that we have to be in a position to predict what the ultimate losses will be -- and this is what actuaries do for a living and this is why we work together so often -- and record that in the year that the contract goes into effect. That's the hard part and that's where I said accountants get an opportunity to look into the future as opposed to our typical framework which is looking back.

There also is a section on reinsurance in this document. It's short and it's badly in need of expansion, and that's in process. Basically the point addressed in here on reinsurance is to draw attention to the fact that we need to differentiate in certain instances between a contract that is in substance an insurance agreement versus one that's in substance a financing agreement regardless of its legal form.

This document says that if you determine that an agreement is a financing agreement, then you do not recognize any income from that contract, as you would with an insurance agreement. You'll record it as a deposit and then recognize interest income over the term of the contract.

Well, that's created a certain amount of consternation because people are now saying, well, how do you know whether it's insurance or a financing agreement? So, there is a task force -- it's a subset of a subset of the American Institute of Certified Public Accountants on reinsurance accounting.

It's just recently published a draft. It's called A Proposed Statement of Position and it's entitled Accounting for Property and Liability Reinsurance Contracts. This is very preliminary and it's not authoritative. But what they've done is tried to define for all of us that issue that I just referred to. I'll quote here, if I can find the right page. Here is what I see as the key language in the draft and I would emphasize this is a draft.

"To be accounted for as providing reinsurance, a contract should provide for indemnification of the ceding company's insurance risk by the assuming company. Contracts that do not provide for such indemnification should not be accounted for as providing reinsurance regardless of their legal form."

Reinsurance risk is defined as having two components. Underwriting risk -- that is, the uncertainty of the amount of any ultimate claim -- and timing risk. It generally must have both elements to be a reinsurance contract.

An exception would be where the underwriting risk is highly probable in terms of what it will ultimately be. If you're dealing in a layer that the entity is almost certain to pass through, then you might conclude that it's highly probable that the underwriting risk is predictable at a certain dollar amount. So you're really only reinsuring timing risk in that situation. That would still qualify.

The other accounting standard that I listed here was the Accounting Principles Board, which was the predecessor organization of the Financial Accounting Standards Board, Opinion Number 20 on accounting changes. The key item there is the differentiation between correction of an error and a change in estimate.

One thing that we do recognize is that even where we believe we have the ability to project ultimate losses from a reinsurance arrangement, we know that it is just an estimate and that it will change. So, the accounting profession acknowledges this. What this standard says is that it requires me, as an auditor, to ensure that the estimate for ultimate losses was based on the best information available at the time it was set.

As long as we're comfortable that that criterion has been met, then when it changes at some date in the future, that's what we call in accounting jargon as a change in estimate, and the effect of that change is recorded in that period when we have that new information.

If we go down a few years and discover with hindsight that we made a mistake, that we did not properly use the information that was available when we initially set the reserves, then we might conclude that we made an error. We would account for that by going back and restating that prior period's financial statements. So, that distinction is very important.

So, it's incumbent on us as accounts, and with support from our friends in the actuarial business, to take a good hard look at how those reserves were set to satisfy ourselves that all the information that was available, all the relevant information that was available, was used and used properly.

I have been dealing in accounting standards under what we call generally accepted accounting principles, or GAP. There are also statutory accounting principles. Those are defined by both the NAIC and the IASA in their publications.

In the area of reinsurance reserves, generally there are few distinctions between statutory and GAP accounting. So that's really not an important topic and I'm not spending any time on it this morning.

The next section is auditing standards. There are a series of documents listed here. The first is a statement of position called Auditing Property and Liability Reinsurance. That's very important. It was somewhat controversial --or, was controversial with some reinsurance companies when it first came out because of what it required of management actually. To my knowledge, it was the only auditing standard or something to come out of my profession that really required management to do certain things.

What it did was formally try to bring an end, if you will, to the good faith handshake approach to reinsurance agreements that had been prevalent in the industry. Particularly in a situation on the assuming company side where we have a lot less information than the direct writer of the ceding company does it's important.

What this standard required was that I go in as an auditor and ask for and expect to receive certain documentation from the reinsurer. I want to come back to that. I'll try to follow my outline here so I don't lose you. So, let's set that aside and I'll come back to it because it's critical to the objective I have for you this morning.

The second item listed is Statement on Auditing Standards Number 11 using the work of a specialist. That simply sets forth certain requirements. If I'm going to rely in the performance of my work on a specialist -- and in this case that would be an actuary -- if I were to go outside and engage the services of an actuary to assist me in reaching my conclusion so I can render an opinion on the financial statements, I have certain things I need to do to make sure I've got a good specialist.

Basically I need to confirm that the actuary is independent with respect to the company. That means if you're the actuary, you can have no financial interest in this company. You must be independent.

Secondly, I have to evaluate your credentials. Generally that means I call one of the actuaries at Coopers & Lybrand and have the independent actuary checked out as a member of the American Academy of Actuaries and so forth. Usually that's done very easily.

Next is an Industry Audit Guide called Audits of Fire and Casualty Insurance Companies. The fourth item is a proposed audit and accounting guide called Audits of Property and Liability Insurance Companies. Somewhere along the line we decided that property and liability insurance was a better term than fire and casualty insurance. I kind of grew up with the term P&C, property and casualty, so there is a lot of jargon floating around but it all means the same thing.

This document is very comprehensive. It's pretty thick. It's an exposure draft. This was issued in July of '87. Its publication has been held up because there are a lot of issues that haven't been resolved. The accounting standards setting process is a pretty dynamic process right now. There are a number of things, accounting for lost portfolio transfers, accounting for fronting arrangements, discounting reserves -- a lot of things that are still up in the air. So, this hasn't been published yet, but it's a good source for auditors in deciding how to proceed.

Most of what's in here, again, exists in previously published documents. But this will supersede what's listed there as Item 3 when it is published.

The last item we don't run into too often -- Statement on Auditing Standards 44 on Special Purpose Reports on Internal Accounting Control at Service Organizations. That would be where I need to obtain a report from an outside organization.

Let's say we have a situation where a small insurance company is using a TPA to process all it's claims and set its reserves. If that TPA has been audited by another CPA firm, then I might request a special report from that CPA attesting to the quality of the systems of control in that entity so that it provides me with a basis of reliance on the information that's being provided to my client insurance company. We don't run into that too often.

Well, that's a real brief overview of the standards that we work with. If you have questions about any particular standard, we'll have some time later and I'll try to answer your questions.

What the auditors are evaluating are certain key things that we're looking for. I don't think any of them will surprise you. We're looking at the accuracy of the data that's provided by the ceding company. We're looking at the completeness of that data, and we're looking at the timeliness of it. This is the infamous time lag that I think both actuaries and accountants struggle with.

We're looking on the assuming company or reinsurer's side at the adequacy of the reserves that are recorded. We're looking that it was accounted for properly. Again, this, for example, may get back to the situation where if we decide that the contract is really a financing agreement, then it needs to be accounted for as such, not as an insurance agreement.

We're looking at consistency. That's important. There is a presumption in financial reporting that the standards used to prepare financial statements are applied consistently from one period to the next. Most companies will present their financial statements in comparative form. So if we're comparing '88 and '87, the reader is entitled to assume that the same principles were used to generate that information. If it wasn't, then there should be a footnote to the financial statements explaining what the change was and then the CPA will reference that in the report that we issue on the financial statements.

So when we get down to the area of reserves it's important that we understand that if there have been any changes whether they were significant so that we can make sure that that's referenced in the financial statement. So, consistency is very important.

The last item is disclosure, adequacy of disclosure. I think that speaks for itself.

What are we looking for when we go into a reinsurance company and look at reserves? We're looking for a functioning effective system of internal procedures and control for assessing the accuracy and reliability of the data provided by the ceding companies or by the intermediaries if we're not working directly with ceding companies.

Now I'm going to get back to that document I promised I would get back to, which was the American Institute of CPA's Statement of Position on Auditing Property and Liability Reinsurance.

What I have to do is form a conclusion that the reinsurer has in place a system for assessing and accumulating and evaluating the data that's coming to it from the intermediary or from the ceding company. That that system is working, that there are controls in place, and that we can all rely on the integrity of the information that it produces.

I need to get to that point because it's not practical for me to go back over the entire year and reperform and do my own evaluation. Chance are I'm probably not qualified to evaluate some of that data anyway. So, I'm really looking at the system and we will test the system. I've listed in the outline some key controls that a good system might include.

Just another way to look at it. We drafted in our firm a questionnaire that we would go through in assessing a system. I think it will give you a feel for what we're looking for. Let me read some of these questions for you.

Does the company have a formal written program outlining all underwriting procedures which need to be performed before entering into a reinsurance contract? Emphasize the word written.

Are the procedures outlined in the underwriting program in Question 1 reviewed and approved by a senior underwriting official?

Does the company maintain a formal underwriting file with information about the business reasons for entering into the reinsurance contract?

Does the company monitor the actual results reported by the ceding company on either a contract by contract or on a company basis?

Does the company investigate and document reasons for and effects of significant deviations from anticipated results?

Does the company have the ability to visit the ceding company for the purpose of reviewing and evaluating the ceding company's underwriting claims processing loss reserving and loss monitoring procedures?

Does the company perform on-site ceding company reviews? Does the company have a formal written review program relating to ceding company reviews which is required to be signed off as evidence of its completion?

If you're listening carefully, there is an underlying theme here. We're looking for documentation. We're looking for written procedures. Again, the old school way of sealing reinsurance agreements, which might have been a handshake on the golf course or an act of faith by a couple of people who have known each other over the years, no longer works from my perspective.

When I got in to audit a reinsurance company, I want to see files, I want to see documentation of procedures. I want to know that the ceding company or the intermediary has been visited and evaluated, that people have been interviewed, that probing questions have been asked.

We need to look for changes in variables that could affect the accuracy or comparability -- consistency was the word I used -- from one period to the next of information coming from that source.

Did the ceding company hire a new vice president of claims and does that person have a different philosophy for how claims should be settled? Do they have a new vice president of underwriting with a new philosophy? Have they changed their system of managing and reporting claims that might affect the timeliness of getting that information up to the reinsurer?

Those kinds of questions need to be probed. When we do find something that has changed, we need to evaluate what the likely effect of that change is so that can be incorporated into the overall assessment of reserve adequacy.

So, those are the kinds of things that I'm required to do when I got into audit a reinsurance company. The controversy when this first came out was there are a lot of companies that didn't document as thoroughly as they might. I know Jane was surprised when I told her last night that there are some out there. I'm sure all of your companies document very thoroughly.

But that's been a change for a lot of reinsurers, to set up files on at least their major ceding companies and to monitor results, to make sure you get a copy of the annual statement when it's published it year and to read it and to look for things that might alert you to changes. If it gets an independent audit, to get a copy of the audit report on the financial statements. If they've gone through an examination by an insurance department, get a copy or at least be allowed to review that. When the Best rating reports come out, to review that.

All of those things need to be done, again, for the major contracts pretty religiously. That's part of the system that we expect to see and to be able to audit when we go in to do our work.

Basically the typical auditing procedures that we would perform, obviously -- and I've said this -- is evaluating that system. We'll do that through inquiry of senior management. We'll ask to see what files and documents and procedures look like and

we'll prepare our own documentation and our own evaluation of how good we think that system is and whether it's likely to produce reliable information so that we can conclude that the information produced by the system is reliable.

We might go in and reperform procedures that were performed during the year to satisfy ourselves that they were performed conscientiously.

If we can't get to that point because the systems and procedures either are not in place or they are but they're not documented so we can't look at documentation to satisfy ourselves that it's working, there are some other things we can do. I've listed them on the -- my pages didn't get numbered so I apologize, but it would be under Item 5 where I've got double bullet points. The first double bullet was reperform selected control procedures. You might draw a little line after that because the next three would typically only be done where we can't get the first one in place.

So, if we can't rely on the system -- or we might choose not to rely on it for some reason -- there are other things we can do to get the level of comfort we need about the integrity of that information coming from the ceding company.

One would be to obtain a report from the ceding company's independent auditor on the internal controls related to ceded reinsurance. That's one of those reports I referred to as the very last auditing standard on that page at the back of the handout. The CPA for the ceding company might issue a report that we could use that basically says the controls in place for processing ceded reinsurance are functioning and are reliable.

The second item we could do would be visit the ceding company's CPA and review those audit work papers and satisfy ourselves as to the nature and extent of auditing procedures performed at that company. Or we could actually go out and visit the ceding company itself and test its records.

Now, those last two are not very practical. They are going to be time-consuming and, therefore, very expensive. So, those are procedures we would typically do pretty much as a last resort.

The second thing that we'll do is determine -- after we've evaluated the system, we want to determine that the assumed reinsurance is properly recorded in the accounts. One of the key steps that we will perform there is we'll read reinsurance contracts, at least the major ones. Again, what we're looking for is an understanding that they are in fact -- the key thing that we're looking for is that they are in fact insurance agreements, regardless of what they're called, and not financing agreements.

Then we might reperform accounting entries that were recorded in the books and records. We'll typically confirm balances due from or to a ceding company through a written confirmation procedure. We might want to confirm certain terms in the reinsurance agreement or our understanding of what those terms mean.

When that's done, then we get into the final step which is evaluating the overall adequacy of the reserves. This is where it's important for us to work very closely with actuaries. We will do some of our own review and testing of the accumulation of loss development data. If the company has an in-house actuary, we'll sit down with that individual and discuss the reserves. If there was an independent report issued by a consulting actuary, we'll read that.

Michael Covney

INTRODUCTION

Good morning.

As the program states we are trying to provide a basic understanding of loss reserving principles, considerations and techniques as applied to reinsurance assumed. My contribution is to describe and examine some of the techniques commonly used and to note the many ways in which they may break down for one reason or another.

Even if your interest in reinsurance reserving is only academic I would recommend that you get the Casualty Actuarial Society's Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves. [Adopted May 8, 1988 by the CAS Board of Directors] The annotated version and the comment section which are included with it are particularly helpful. There are also many helpful definitions.

For those of you unfamiliar with it let me briefly mention that the four principles it contains define by implication "actuarially sound" as the use of reasonable assumptions and appropriate methods. If such assumptions and methods are used to estimate loss and loss adjustment expense reserves, then the reserves are said to be actuarially sound. They also say that because of the inherent uncertainty in the estimation process a range of reserves can be actuarially sound. There does not seem to be much guidance however in determining the "most appropriate reserve" within the range. Rather than describing how it might be determined, they merely say that it depends on the relative liklihood of estimates within the range as well as the financial reporting context in which the reserve will be presented.

It is interesting to note that in defining actuarially sound a line was drawn between loss and loss adjustment expense but not between known and unknown claims or case basis and IBNR reserves nor between reserves on direct business and reinsurance assumed or ceded.

So what is reasonable and appropriate? And more to the point of this session, is what is reasonable and appropriate in insurance reserving reasonable and appropriate in reinsurance reserving? This is not a trivial matter since standards of practice will be based on these principles.

THE LOSS RESERVING PROCESS

To provide a bit of an overview let's quickly review the loss reserving process. [SLIDE 1]

Gaining insight into a company's loss development patterns and how they have changed and might still be changing, for whatever reason, is the motivation and underlying focus of all reserving work. It begins or should begin with a consideration of the so-called "qualitative" factors: the environment, the nature of the business and premium and loss processing procedures. These factors by the way will be addressed tomorrow morning in Session 5F - "Looking Beyond The Numbers."

Any fact or circumstance that has had or is thought will have a material effect on the loss development pattern is important and should be considered in some way in the analysis. The consideration of some will dictate "structural" modifications to the data such as the use of a more refined business classification system to recognize, for example, business transacted in foreign currencies or new sources or lines of business. Others will merely prompt adjustments to the existing data such as the elimination of additional case reserves established by a new reinsurance claim department or the elimination of certain retrocession credits to reflect a recent commutation.

Only after a thorough review of the qualitative factors should you begin the quantitative or "number crunching" stage. It is a mistake to do any number crunching at the first appearance of a loss triangle no matter how tempting it might be. Even if it is done only to uncover areas for further investigation, it can't be relied upon to reveal everything you need to know.

The quantitative stage always proceeds in two or three phases if you count confirming the integrity of the data (i.e. its accuracy and completeness): the estimation of one or more loss development patterns using the traditional loss triangle and the application of those patterns using one or more fundamental reserving techniques.

A word about loss triangles: A loss triangle is a cross tabulation of an arbitrary transaction or set of transactions in a table showing accident year, policy year or underwriting year in one dimension and development year or book entry year in the other. We take them for granted but they are the staple of actuarial analysis serving as both the raw material and essential tool. They can be used not only to discover and estimate patterns of loss development but test reserves as well.

Compared to primary companies, reinsurers have a relatively difficult time trying to estimate loss development patterns. As a rule, the patterns are longer and more volatile and therefore require more statistical sophistication to estimate accurately. Another reason is the relative lack of timely and detailed information generally available to reinsurers.

Reinsurers are further removed from original risk underwriting and therefore they often do not know the specific nature of the risks they are reinsuring. As risks are packaged in treaties, details get lost. As more intermediaries and third parties get involved, information gets distorted and is delayed, even under the best of circumstances.

Thanks to the biennial reinsurance loss development study conducted by the Reinsurance Association of America [RAA], it is now widely known and accepted that reinsurance loss development is more protracted than primary insurance loss development. Why should it be that way? To put it simply, it's the nature of the reinsurance business. More specifically, it's because:

1. the business subject to reinsurance is adversely selected: that's one reason why it's reinsured. The adversely selected subject business generates greater variation in frequency and severity which prolongs the development pattern. This is true for all types of reinsurance, even quota and surplus share.
2. case reserves on subject business are often understated prolonging notice to excess of loss reinsurers.
3. even if reserves on subject business are properly stated, the uncertainty of the reserve estimates combined with the non-proportional nature of some risk transfers will tend to create adverse development on the books of the assuming company. That is, adverse development will tend to be ceded while the offsetting favorable development will tend to be kept net.
4. last but not least are the sometimes significant administrative delays in rendering and booking ac counts.

Since you are presumably inexperienced in these matters let's go through an example of how a loss development pattern is estimated. [SLIDE 2] The steps are:

1. compile an appropriate loss and/or loss adjustment expense triangle.
2. calculate age-to-age LDFs for each exposure period year, which for purposes of this discussion we'll specify as accident year. [These factors are sometimes called "link ratios" and this use of a loss triangle called the "chain ladder."]
3. select appropriate age-to-age LDFs.
4. assume or somehow estimate a "tail" factor (to account for development beyond the end of the triangle).
5. calculate age-to-ultimate LDFs and lag factors.

Let's go through them in a little more detail. [SLIDES 3 4 5]

That's the first phase of the number crunching stage. The next phase is to apply the loss development pattern thus obtained using one or more techniques. [SLIDE 6]

For this discussion, I've classified loss reserving techniques into two simple categories according to the kind of data to which the reserving factors are applied: losses or premiums. The techniques can then be referred to as either "loss-driven" or "premium-driven." A third technique which might be called a hybrid is also possible by averaging results obtained by the other two. That is the technique I prefer.

Further classification of loss driven techniques could be made based on the type of loss data used: counts (frequency) and average claim sizes (severity) or total amounts, and paid or case incurred. We won't go into them other than to say that frequency-severity analyses are generally not used in reinsurance because the effect of changing limits and retentions renders such data almost meaningless.

In the loss-driven technique, age-to-ultimate loss development factors are applied to a base of either paid or case incurred losses (depending upon the data used in their derivation) to produce estimates of ultimate losses from which the base is subtracted to produce estimates of either total reserves (case and IBNR) if the base is paid losses or IBNR reserves if the base is case incurred losses. Let's go through an example. [SLIDE 7]

In the premium-driven technique, estimated ultimate loss ratios (derived separately) are applied to earned premiums to produce estimates of ultimate losses from which EXPECTED paid or incurred losses are subtracted to produce estimates of total or IBNR reserves. You may recognize it as the Bornhuetter-Ferguson technique, named after the reinsurance actuaries who developed it. Let's go through an example. [SLIDE 8]

Each technique brings with it certain advantages and disadvantages. [SLIDE 9] As a matter of principle, loss-driven methods are preferable to premium-driven ones because they are not influenced by rating forces which in reinsurance have been known to be quite dynamic. However, in reinsurance, loss-driven techniques are not always practical because reported losses are highly erratic, especially in the early stages of development. When an accident year is still "green," there could be shock losses or even, just as bad, no losses; in either case multiplying them by a large LDF would only serve to magnify their volatility.

Earned premiums were brought into the picture in order to stabilize the IBNR. The major problem with premium-driven methods as mentioned before is their susceptibility to swings in rate equity. While the resulting IBNR is relatively stable the method essentially begs the reserving question since the ultimate loss ratio is by some method or madness predetermined.

CONSIDERATIONS - PROBLEM AREAS

Now let's go over some of the considerations peculiar to reinsurance. [SLIDE 10]

1. ESTIMATED ACCOUNTS

By way of background it should be understood that assuming companies generally do not get their information from ceding companies in a steady continuous flow but rather in periodic batches called "accounts" or "bordereaux", rendered monthly, quarterly, semi-annually or even annually. Each account generally contains a summary of premiums written, commissions paid, losses paid, salvage received with a net cash balance owed or due figured for the calendar period to which they apply. They sometimes also include information on reserves--unearned premiums, case reserves or even IBNR, but these are not necessarily booked as reported.

So called estimated accounts are accounts booked by an assuming company to reflect ceding company activity--generally premiums written and the consequent commssions and brokerage--not otherwise recognized. They are necessary because actual accounts are rendered in arrears, sometimes many months in arrears, of the period to which they apply.

The question arises: should estimated accounts be included in the reserving analysis? The answer is NOT a simple yes or no but depends on whether losses are estimated along with the premiums. If so, then they should be included. If not, as is generally the case, then it depends upon whether losses are booked with premiums and commissions etc. by account [typically the case for quota and surplus share treaties] or by separate notice of loss usually sent directly to the assuming company's Claim department [typically the case with excess of loss].

The answer is therefore NOT TO include estimated accounts if it creates an "imbalance" in booked premiums and losses as would be the case typically for QS and SS treaties and TO include estimated accounts if it brings the booked premiums and losses into "balance" as would be the case typically for XS treaties.

Notice however that if estimated accounts must be excluded the valuation date is not what it appears but rather the date through which actual accounts have been booked or registered. Loss ratios obtained from an analysis of this slightly outdated but balanced experience can then be applied to the estimated premiums (that were excluded) to figure a corresponding IBNR.

Another important aspect of this topic is the accuracy of the estimated accounts. It is important that Underwriting give Accounting an idea of the size of the treaties they are writing so that estimates are reasonably accurate. It would not do to have Accounting estimate a 4th quarter earned premium of $100,000 if the actual earned premium is closer to $1 million.

2. ACRs

In reinsurance there can be two kinds of case reserves: one kind called a reported case reserve [RCR] is the assuming company's contractual share of a case reserve established by the ceding company and the other kind is an additional case reserve [ACR] established by the assuming company, presumably because it differs with the ceding company about the valuation of a particular claim.

It raises a couple of very interesting questions. Just what is the value of establishing ACRs and how should they be treated in the IBNR estimation process? For that matter, what is the value of the ceding company's RCRs and how should they be treated? Some loss reserve specialists choose to ignore all case reserves, RCRs as well as ACRs, and rely on paid development triangles in order to completely avoid the problems caused by changing case reserve equity margins.

For a reinsurer, whether or not to include ACRs in loss triangles is a knotty problem and deserves serious study. There is no correct answer. Despite the fact that in principle the results should be the same no matter how RCRs or ACRs are treated, in practice, the results are usually not the same. In some cases the results can be significantly different. It all depends on the relative historical consistency of the ACR system relative to the ceding company established RCRs and to the combined total case reserves [TCRs]. If ACRs have not been in use during the entire period covered by the loss triangle (because, for example, the assuming company's Claim department is relatively new), then it might be better to exclude them. If it is felt that ACRs, combined with RCRs, present a more consistent case reserving philosophy (during the period covered by the loss triangle), then it might be better to include them. If in doubt, do it both ways but be prepared to reconcile the different results.

3. REINSURANCE EXPOSURE

Another consideration which can cause serious distortion is the exposure as measured by the participation, limit, retention or other term or condition of an assumed contract. If it changes, it can cause a change in the appropriate loss development pattern, making past patterns of loss development improper.

For example, increased treaty limits or retentions would tend to lengthen the appropriate loss development pattern. Similarly, a shift from miscellaneous casualty lines to third party liability lines or within a line like general liability, from light sublines such as premises/operations to heavier sublines such as products/completed operations would also tend to lengthen the appropriate loss development pattern. Not all changes of course would tend to lengthen the appropriate development pattern. The shift to claims-made forms is a good example of an exposure change which would shorten it.

If the exposure changes in two or more ways at once, the change may be hidden by an apparent stability in the premiums or losses. For example, if participations are declining in combination with increased limits, the premium and loss volume might hold steady in the short term masking the fact that any change had taken place.

The potential for distortion is greatly magnified if any of the changes take place midterm instead of at renewal or as new business is written. Since premiums and losses are usually compiled on a yearly basis for analysis purposes, they may reflect exposure changes that would violate even the most innocuous loss reserving assumptions, such as premiums being earned evenly over the year. For example, if a particular treaty shows an earned premium of $1.5 million in 1988 but the assuming company's participation increased midyear from 10% to 20%, then the earned premium is NOT earned evenly over the year. Relatively more of the premium is earned in the 2nd half of the year and THAT half of the year is not as mature as the 1st half. On average the year is less mature than it would be if the premiums were earned evenly. Clearly, any LDF or lag factor not taking this midyear exposure change into account is biased.

4. RETROSPECTIVELY RATED CONTRACTS

Some reinsurance contracts are retrospectively rated which means the final reinsurance premium depends upon (but within certain bounds) the actual loss and loss expense experience incurred during the term, or a succession of terms, of the contract. In principle any contract could be retrospectively rated but in practice it is generally confined to working layer treaty excess casualty business. Initially, perhaps for the first year or two, a provisional premium is collected. Then, at some point in time and periodically thereafter, the premium is adjusted according to a formula. An adjustment premium, which could be positive or negative depending on the loss experience, is then collected.

Also associated with retrospectively rated contracts and muddying the accounting/actuarial waters are accrued premiums. These are earned premiums booked to reflect expected future development of the retrospective premiums induced by loss development.

How should retrospective adjustment and accrued premiums be handled? Unless the accrued premiums are very accurate (which, by virtue of their dependency on IBNR, is generally not the case) they can distort the proper timing of earned premiums by shifting premiums from periods in which they were actually earned to subsequent periods in which they were booked.

It is important that the rating parameters of these contracts be monitored. Decreasing provisional rates, for example, can give the appearance of decreasing real exposure when it is actually increasing. Maximum premiums may tend to be more reliable measures of exposure, especially in soft markets.

Obviously, this distortion would affect premium-driven techniques. I have no clever suggestions; just this admonition to keep it mind.

5. SPECIAL CLAUSES/SITUATIONS

Some contracts have provisions that would have a direct distorting effect on loss development patterns. These include the index clause and the sunset clause. Index clauses, sometimes found in excess contracts, provide for the upward adjustment of the retention and/or limit as claims DEVELOP, not just or necessarily as losses OCCUR. Clearly this is a direct influence on development patterns.

Sunset clauses serve to limit coverage to claims reported within a certain period of time. When the "sun sets," loss development on new claims stops for purposes of reinsurance coverage. Of course, it doesn't really stop; it merely reverts back to the ceding company. Loss development can continue however for claims that were reported while the "sun was shining." The overall effect of the sunset clause is akin to an aggregate limit which brings up another problem area.

Both sunset clauses and aggregate limits cut off development more or less after some point. For sunset clauses, that point is defined in terms of time; for aggregate limits in terms of money.

Here again I have no clever suggestions; just keep them in mind.

Other related problem areas are aggregate excess contracts which have aggregate retentions and ordinary specific excess contracts which have aggregate deductibles within them, sometimes called "inner aggregates."

In order to handle these situations, it is necessary to first treat them as if they had no aggregate feature (by adjusting the premiums and losses to what they would have been without it), estimate and apply the resulting loss development patterns and THEN take whatever credit is appropriate for the existence of the aggregate feature.

Loss portfolios and commutations should be handled in a similar way if possible. Loss portfolios and commutations are a kind of aggregate excess contract with a variable aggregate retention defined, with respect to losses occurring in a certain period of time, as paid or reported by a certain date. Whether handled separately or included within a larger book of business it is necessary, for analysis purposes, to include the losses that were or will be excluded by the aggregate feature, do the analysis and then to remove the non-contractual experience.

To make these adjustments requires a fair bit of coordination among the Accounting, Claims and Actuarial departments. It often means that you simply can not use the readily available loss triangles based on historical accounting fact but rather must assemble ad hoc triangles to suit the circumstances of the book of business.

CONCLUSION

Now, to come back to the question raised earlier. Is what is reasonable assumptions-wise and appropriate methods-wise in insurance reserving the same in reinsurance reserving? I think not.

Certainly the same reporting patterns, i.e. LDFS and lag factors, can not simply be carried over, even for the same lines of business on quota and surplus share contracts. Nor can estimated ultimate loss ratios as used in premium-driven techniques be carried over as reinsurance pricing is independent of insurance pricing.

It is also inappropriate to apply in some cases any pure loss-driven techniques, techniques which work fine in most primary company settings. In reinsurance, the reported losses to which the reserving factors are applied are just too erratic. Furthermore, no frequency-severity technique is appropriate on a book of reinsurance business, unless perhaps it could be used on a single contract in a sort of conditional "re-pricing" involving the contract's subject experience. I believe this is the premise of Session 1G - Loss Distributions in Loss Reserving.

I believe the best technique is a weighted average combination of the premium and loss-driven techniques, provided three refinements can be made:

1. in the premium-driven technique the estimated ultimate loss ratio is statistically motivated,
2. in combination with the above, allowance is made for year to year swings in reinsurance rate equity, and
3. in combining the separate premium and loss driven estimates, the emphasis gradually shifts from the premium driven estimate in recent years to the loss driven estimate in older years.

All this does not even address issues of business segmentation. I think it is clear that the business taxonomy, i.e, classification scheme, used on direct business is not suitable on reinsurance business. Since premiums are of necessity used in reserving I think it is inappropriate to break apart contracts, which are generally self-rated, for purposes of classifying or assembling experience. Thus, statutory line of business commonly used to segment direct business should NOT be used to segment reinsurance business since most reinsurance contracts combine two or more statutory lines of business.

It would seem that the above considerations and others would dictate that each contract be handled separately despite the problems lack of "credibility" might pose. I think it does, making questions of segmentation, at least for treaty if not facultative business, moot.

It may be acceptable now to do reinsurance reserving analyses for certain combinations of contracts, but I believe we are approaching the time when it will no longer be considered actuarially proper to do so. Risk distinctions from treaty to treaty can no longer be considered random since we know or can find out to a greater degree than ever before the precise risk parameters of each contracts' subject business, and DO something about it. And if there is one overriding principle, it is this: systematic risk variation should not be "averaged over." All this to say that one day anything less than a contract by contract reinsurance reserve analysis will not be considered reasonable or appropriate. I don't think that will ever be the case for insurance.

Reinsurance reserving is very demanding of actuarial skills; it stands to become even more so.

Thank you.

SLIDE 1

THE LOSS RESERVING PROCESS

1. Qualitative Considerations
   - A. the environment
   - B. the nature of the business
   - C. premium and loss processing procedures

2. Quantitative Analysis ["number-crunching"]
   - A. the confirmation of data integrity
   - B. the estimation of loss development patterns (using one or more "loss triangles")
   - C. the application of the loss development patterns (using one or more reserving "techniques")

SLIDE 2

THE ESTIMATION OF A LOSS DEVELOPMENT PATTERN

1. compile an appropriate loss and/or loss adjustment expense triangle.
2. calculate age-to-age loss development factors, LDFs, for each accident or underwriting year.
3. select appropriate (not necessarily based on historical averages) age-to-age LDFs.
4. assume or estimate a "tail" development factor (to account for development beyond the end of the triangle).
5. calculate age-to-ultimate LDFs and lag factors.

SLIDE 3

LOSS TRIANGLE as of 12/31/88

Case Incurred Loss and Loss Adjustment Expense ($000)

	development year				
AY	1	2	3	4	5
84	565	2,720	7,240	9,070	14,500
85	850	3,453	9,750	14,000	
86	732	3,021	3,140		
87	1,187	4,400			
88	270				

SLIDE 4

AGE-TO-AGE LOSS DEVELOPMENT FACTORS

	development year				
AY	1-2	2-3	3-4	4-5	5-ω
84	4.810	2.662	1.253	1.599	
85	4.062	2.824	1.436		
86	4.124	1.039			
87	3.705				
selected	4.000	2.200	1.500	1.400	1.400

SLIDE 5

CALCULATION OF AGE-TO-ULTIMATE LOSS DEVELOPMENT FACTORS AND LAG FACTORS

AGE	AGE-TO AGE LDF	AGE-TO ULTIMATE LDF	LAG FACTOR
1-2	4.000	25.872	0.039
2-3	2.200	6.468	0.155
3-4	1.500	2.940	0.340
4-5	1.400	1.960	0.510
5-ω		1.400	0.714

SLIDE 6

COMMON LOSS RESERVING TECHNIQUES

1. loss-driven technique (e.g. "chain-ladder")

$$\text{IBNR} = [\text{reported losses} \times \text{LDF}] - \text{reported losses}$$

2. premium-driven technique (e.g. Bornhuetter-Ferguson)

$$\text{IBNR} = [\text{earned premium} \times \text{est. ult. loss ratio}] \times [1 - \text{lag factor}]$$

3. hybrid technique (e.g. Benktander, Hovinen)

IBNR = some weighted average of results in 1. and 2.

SLIDE 7

CALCULATION OF LOSS-DRIVEN IBNR ($000) AS OF 12/31/88

AY	MOS DEV	EARNED PREMIUMS	REPORTED LOSSES	LDF	IBNR	ULTIMATE LOSSES	LOSS RATIO
84	60	18,000	14,500	1.400	5,800	20,300	112.8
85	48	27,600	14,000	1.960	13,440	27,440	99.4
86	36	30,000	3,140	2.940	6,092	9,232	30.8
87	24	28,000	4,400	6.468	24,060	28,460	101.6
88	12	16,400	270	25.872	6,715	6,985	42.6
		120,000	36,310		56,107	92,417	77.0

SLIDE 8

CALCULATION OF PREMIUM-DRIVEN IBNR ($000) AS OF 12/31/88

AY	MOS DEV	EARNED PREMIUMS	EST ULT LR	LAG FACTOR	IBNR	ULTIMATE LOSSES	LOSS RATIO
84	60	18,000	77.0	0.714	3,964	18,464	102.6
85	48	27,600	77.0	0.510	10,413	24,413	88.5
86	36	30,000	77.0	0.340	15,246	18,386	61.3
87	24	28,000	77.0	0.155	18,218	22,618	80.8
88	12	16,400	77.0	0.039	12,136	12,406	75.6
		120,000	77.0		59,977	96,287	80.2

SLIDE 9

COMPARISON OF RESERVING TECHNIQUES

1. loss-driven techniques
   - \+ not influenced by rating forces
   - \- unreliable in early stages of development

2. premium-driven techniques
   - \+ stable results
   - \- influenced by rating forces

3. hybrid technique
   - \+ relatively stable
   - \+ relatively immune to rating forces
   - \- more complicated

SLIDE 10

CONSIDERATIONS IN REINSURANCE RESERVING

1. Estimated Accounts - include or exclude?
2. ACRs, RCRs - include or exclude?
3. Exposure Profile - has it changed?
4. Retrospectively Rated Contracts -
   have rating parameters changed?
5. Special Clauses/Situations -
   index clause, sunset clause used?
   aggregate limits, aggregate retentions used?
   loss portfolios assumed or ceded?
   commutations effected?

SLIDE 11

CONCLUSION

As to reserving - -

Is "Reasonable and Appropriate" in Insurance

"Reasonable and Appropriate" in REinsurance?

NO

But, then, from my perspective the most important step in that whole process is I'll bring in an actuary of my own. In my case, we have a large division of casualty actuaries in our firm and we do assign an actuary to every audit, every financial statement audit, that we do because the conclusion that we reach on reserves is so important to the financial statements taken as a whole. Because it requires an area of expertise that I'm not qualified to bring to the audit, I want some help -- I've got to get somebody in bed with me before I sign Coopers & Lybrand's name to those financial statements.

So I'll have one of my actuaries come in in an audit support role and review the work done by the in-house or consulting actuary, make inquiries of that individual, get comfortable with the knowledge of what went into that reserve setting process. Then, finally, at that point I'm in a position to sign off on the financial statements.

That's it. That's what I do for a living. Thanks.

MS. TAYLOR: We have a couple of housekeeping details to finish up here. We do have an evaluation form and I'd like you to fill that out. You can leave those up here or on the table in the back and we'll collect those later.

Do we have any questions? Yes, sir. Could you come to the microphone, please.

QUESTION: I would like to know if there has been any move towards placing reinsurance on a claims-made basis.

MS. TAYLOR: Okay.

MR. COVNEY: Not to my knowledge, but let me just say that I think -- to editorialize a bit --- I would hope one does not develop. I would not like to see reinsurance on a claims-made basis, only because I think it poorly serves the ceding company. I think claims-made is a very complicated thing and to provide reinsurance on a claims-made basis, perhaps covering subject business which might also be on a claims-made basis, can really muddy the accounting and actuarial waters. I would hate to encounter that sort of animal.

I haven't yet seen any claims-made treaty where the reinsurance agreement itself is claims-made even though the underlying subject business might be on an occurrence basis. I haven't seen it.

MS. TAYLOR: I'm not certain in my own mind whether that would happen, for a whole variety of reasons. First of all, that doesn't necessarily serve the needs of the primary carrier.

But I disagree that it hasn't happened. Any time you pick up an in-force book of business you're doing some type of a claims-made situation because it's claims on or after January 1. So that really is a claims-made situation. If the contract is going to continue and if you are no longer going to participate, you have in essence a claims-made contract for a year. It's claims-made during that one calendar year period. So, it has happened.

In addition, the fact that it muddies the accounting or actuarial waters, well -- I mean, that's why we get paid the big bucks. Right? You've read all those stories. We do that already with indexes and sunset clauses. That is in essence a complication that none of us find easy but that we all deal with if you're in this business every day.

Other questions? Well, I have one for the panelists. If we come down to a decision-making time and the actuary says one thing and the accountant says another thing, how are we going to handle that?

MR. MACDONALD: Are we in the context of a financial statement audit?

MS. TAYLOR: Perhaps.

MR. MACDONALD: Well, that's easy. I have the last word.

(Laughter.)

Actually, my experience has been that accountants and actuaries think very much alike in evaluating issues. We think conservatively. I think the accountants may introduce a couple of considerations. I mentioned consistency before.

If there is a change, if the actuary believes that it's important to change part of the methodology for reserves, maybe to shift from a loss-driven technique to a premium-driven technique or to a hybrid, that's very important from my perspective to know. I'd like to be convinced that it's a valid change and it's likely to produce more reasonable projections of ultimate losses. But that usually is not a problem in my experience.

So I really haven't encountered a lot of situations where we're on opposite sides of the spectrum in a decision-making process.

But, you know, the CPA who is certifying the financial statement has to be comfortable in his or her own mind that financial statements are fairly presented. If we can't get comfortable with reserves, what we may see is the situation where there is insufficient historical information to form a basis for projections. Usually the accountant and the actuary will agree on it. Again, that's been my experience. But one or the other may come to a conclusion that we now have enough -- maybe we've been working with this company for five or six years and one of us may come to the conclusion that we now have enough evidentiary matter in terms of historical data to arrive at a reasonable conclusion on ultimate projections.

Then we'll just have to see. The actuary may want to sign off on the reserves and the CPA may be unwilling to give an unqualified opinion on the financial statements.

MS. TAYLOR: Another rebuttal.

MR. COVNEY: No rebuttal. In my experience I have not had problems with auditors. As a matter of fact, maybe it was some good work habits I learned early on, but I've always had very good documentation and I think that has helped considerably.

I've been very careful about it, perhaps going overboard having flow charts and everything, so that the auditors follow exactly what was done.

I will mention one instance where we had some difference but ultimately we compromised. It was interesting in the sense that I had proposed a negative IBNR. Of course, that was rejected out of hand. But ultimately my arguments prevailed and the auditors, Coopers & Lybrand, by the way, signed off on a negative IBNR. It was not for an entire book of business -- I should mention that it was only on a specific contract where we knew the case reserves were very redundant. But I or I should say my documentation, convinced the auditors.

So, initially, what turned out to be a problem was not after all. So, again, it's never been a problem for me.

MS. TAYLOR: Well, I guess they're both luckier than I am because I've had a lot of problems with auditors and I'm sure they've had a lot of problems with me.

Any other questions? Yes, sir. If you'd use the microphone, please.

QUESTION: A hypothetical question for John. In your widespread experience with Coopers & Lybrand what percentage of your audit engagements do you find that a company actually books a formula IBNR and what percentage do you find that there's always some adjustments, you know, where you look at all the work papers and the actuary says the formulas come out to $82.3 million and you actually use $82.3 million in

the corporate management, and what percentage do they use something other than $82.3 million? For instance, out of a hundred clients over ten years, or something.

MR. MACDONALD: I want to make sure that I understand the question. That the actuaries will actually develop some ultimate loss information that will produce a recommended IBNR and then management decides to do something different?

QUESTION: Yes, what percentage is that the case and what percentage is it actually precisely -- I mean, just crudely. I mean, anywhere from --

MR. MACDONALD: I don't have reliable historical data on percentages..

QUESTION: No. This is hypothetical. This is a purely hypothetical question. Just a ballpark.

MR. MACDONALD: I'd say it's fairly rare. I guess I've seen individual situations management leaning in each direction.

I've got one particular client in mind that should remain unnamed where management -- well, it's a product liability line and the management of the company is very defensive in their philosophy about product liability cases, as well they should be. So they tend to be far more optimistic than the people actually developing the loss reserves. So I see is a lot of resistance, if you will, to putting up IBNR because the management believes that they are defending the good name of the company and, by God, they're going to win these cases and that sort of thing.

I consider that to be a healthy difference of opinion because there is a valid reason for it.

We have some ethical standards to pursue, but if we believe that management is taking a different position to protect a desired earnings position that they want to present, that presents a real problem for us. There are situations where CPA's have resigned as the independent auditors because they had a strong difference of opinion, or that they've issued adverse opinions on financial statements.

Those are very rare. Usually we all sit down and come to an opinion and usually there is a range, I might add, of acceptable losses. We're very comfortable working with ranges on our side of the business. So, if we're within a reasonable range and we can get management to that that point, we usually end up agreeing.

MS. TAYLOR: We have a question from the panel.

MR. COVNEY: It's a question for John.

MR. MACDONALD: I'm under fire. Are there any other CPAs here that could help me defend myself?

(Laughter.)

MR. COVNEY: If you have a formula for your IBNR and essentially the formula says IBNR is equal to A times B times C times D, and then sometime later on you realize that factor D was not appropriate and that even perhaps a statistician in school could see that there was a bias in even having factor D in the first place, if you then correct it is that a change -- is that a refinement of your estimate or is that a mistake that you should correct and restate for prior reports?

MR. MACDONALD: Well, I referred to that Accounting Principles Board Opinion Opinion Number 20 earlier as one of the standards. That's a judgment call but if factor D -- if we look back and see that we included that five years ago and we now realize that we made a mistake, that the factor D was not an appropriate factor to use in producing IBNR for this particular company or for this particular line of business, then we could conclude that was an error.

We would account for that by going back retroactively and restating the financial statements of prior periods in which that error applied, assuming it was material.

We always have the concept of materiality to consider. If the effect was less than one percent of earnings for that year, then, no, we're not going to restate because that's not going to change anyone's opinion on that particular year.

But if we view it as a refinement, if factor D was part of the best information that was available at the time that IBNR formula was first set up and that was everyone's considered judgment, and now we come along later because we have more information to deal with and we want to refine it by eliminating or modifying that factor, then that's what we call a change in estimate. The effect of that change is accounted for in terms of profit and loss in the current period. Then presumably we would use that refined formula going forward.

But it's typical for formulas to change on a regular basis over time as we get more and more intelligent about a particular line of business or the things that affect it.

MS. TAYLOR: Or if it will give you a better answer.

MR. MACDONALD: Yes.

MS. TAYLOR: Well, I think we're out of time. I appreciate your patience. Thank you very much for listening to us this morning. If you could give the panelists a little hand, I would appreciate it.

(Applause.)

1989 CASUALTY LOSS RESERVE SEMINAR

1F: LOSS RESERVING FOR SMALL COMPANIES

Moderator

James G. Inkrott
Mercer Meidinger Hansen

Panel

Patrick J. Crowe
Kentucky Farm Bureau Mutual Insurance Company

Jeffrey L. Hanson
Central Insurance Companies

W. Vernon Rice
Independent Fire Insurance Company

MR. INKROTT: This is the session for companies with small reserves. I would like to welcome you all. My name is Jim Inkrott. I'm a consulting actuary with Mercer Meidinger Hansen in Columbus, Ohio. We have three members of the CAS with us this morning to give their versions of smaller company reserving practices.

In order to help us a little with this session and also to plan for future presentations, I'd like to take just a couple of seconds for a little survey and see who our audience is.

How many are actuaries working at either companies or in a consulting role? Wow. So, the vast majority are actuaries.

How many are working at insurance companies? So, most.

Okay. A couple of announcements. We're going to take questions, at least a few, as the presentations are made. If we go a little past the 25 minutes allotted time for each presentation, then I'll have to be the timekeeper and referee and I'll stop right at 25 minutes and we'll go on to the next presentation. We should have 15 minutes or so at the end of the three presentations for more questions if you have any.

If you would, please identify yourself when you're making a question. That way we'll know when we're doing the transcript who we might ask if we can't get it all interpreted from the recording. Please speak directly into the microphone when asking questions. The panelists should each repeat the question to ensure that the questions and answers are recorded.

We've got the handouts already taken care of. If you would, at the end of the session sometime try to fill in an evaluation form so we know what our ratings are.

With that, our first speaker will be Vern Rice. Vern is vice president and actuary with the Independent Fire at Jacksonville, Florida, and is the actuarial manager there. Vern was with Peninsular Fire in Jacksonville prior to coming to Independent Fire. Prior to that, he was associate actuary with Chubb and Son in New Jersey, and prior to that was with INA and had various responsibilities when he was at INA.

Vern is a graduate of Lebanon Valley Pennsylvania College. Vern tells me that he studied math, economics, physics, philosophy, and I think he had four or five other subjects that were on his transcript as well.

So, Vern is going to give us an overview of practices, reserving, and I guess a few comments about pricing as well. Vern.

MR. RICE: Good morning. First I want to apologize for a rather slovenly appearance on my part. My baggage is somewhere between Jacksonville and Chicago, which pretty well stretches the northern corridor of the United States. I think Eastern Airlines is going to keep it permanently.

I'm not going to talk about pricing today. It's going to be reserving. The primary objective is going to be to talk about the underlying data process or developing a data process to support a reserving practice for a small company.

All of us really have in our own mind what we consider to be a small company, we could hash this over with premium volume, geographic, demographics, whatever you choose.

I think the real point is to understand that the objectives of a small company are not necessarily very different than those of a large company. The problem is that the margin for error in a small company is considerably less. The pressures on the technical staff is enormous.

I myself am not particularly worried about my corporate image for making an error at Independent Fire. What I am worried about is wounding my company severely. Your actuary or your reserve-setter is in the position to do precisely that.

Now, to exacerbate these tensions. Your small company resources are always very, very finite. This doesn't mean lack of intelligent life. There is certainly enough of that in a small company. What it does mean is that you're really missing collaborators, you're missing staff, and you're almost always missing time.

But most of us in the small company environment have chosen it for just that reason. You're eliminating layers of bailiffs in a large corporation to review your work. You're eliminating an awful lot of second-guessing.

We're in a do environment. We get to see the results of our efforts very quickly and we get to react very quickly.

Now, I've said the point of this assignment is to establish an underlying system. This is not a hypothetical case. This is one that we are currently undergoing at Independent to try to set up a reserving system. I could have, when we got this assignment, brought one of my systems analyst here and had them talk about the technical aspect, however, I'm just not geared to listen to a lengthy discussion on details. They start talking about what data records are needed, where the data is going to come from, etc.

They lose me completely. Every now and then they'll hit the old man on the side and ask me if I agree, and I'll shake my head and agree because they've never been wrong. I leave them alone and let them do what they want.

When I assumed the direct responsibility for the reserving function, there was no real formalized reporting procedure or reports being published. The reserving process or reports being published. The reserving process was under the auspices of our founder and chairman of the board who was a Fellow of the Casualty Actuarial Society. The man had an absolute phenomenal ability to take his own set of personalized reports, kind of feel them, smell them, and come up with just an absolutely accurate reserve projection. Really incredible. I sat there year after year and watched him do this.

When I took it over, everybody expected this same Merlinism from me and that's obviously not going to happen. I need numbers and lots of time.

Last year, during the Loss Reserve Seminar, I attended a meeting where a very large company was going on the process of developing an underlying reserving system. They modified, refined, scrapped, redefined, created, and finally had one developed. Very sophisticated, very interactive, very classy.

It took, in small company terms, forever. It took a cast equivalent to Gone With The Wind. We don't have access to that kind of raw manpower in a small company nor do we have the time.

At Independent we are fortunate in that we are owned by a large life insurance operation. A southeastern life insurance company which already has established considerable compute resources.

Our DP support people are very interested in the insurance business itself and particularly in the property casualty business. They haven't reached that era where systems people start to feel that the insurance operation is there to justify the computer.

We put together a team to work on the reserving reports. What we worked out was a phased-in report system to underlying our reserving process. It begins with the essentials and eventually, down the pike, maybe even after I'm gone, will develop into whatever sophisticated system is necessary. The entire project took a mammoth team consisting of myself, one systems analyst and a programmer.

The first report from this effort came in three months ahead of schedule and actually balanced to the company numbers, the first time it was placed in my hands. I never would have expected that.

(Slide.)

I'm going to put up some exhibits. Do not get fascinated with the maze of numbers. These exhibits are not meant for your to dwell on the numbers. They are very busy. It's just to show you the format of what we're talking about.

You can see from this report that there are a considerable amount of numbers being produced. Go the the second one, if you would please.

(Slide.)

This is a blowup of the first exhibit. The report is a standard triangle type report that you would expect of some actuary without a terrible lot of imagination. It includes both our paid, our outstanding and our incurreds.

The year-end report includes as many data points as was initially available in our system. I've already put them on notice that more years are going to have to be retained, especially with these changes to Schedule P coming up.

As you can see the latest year includes quarterly data points. The systems people and the systems analyst really felt that all four quarters needed to be exhibited for the latest year and it simply wasn't worth arguing about so I just went ahead and let them do it.

On this particular report the first phase of it is on an accident year basis. All the summaries are in place. You'll notice in both of these reports there was a triangle at the top and a triangle down at the bottom, the difference being a direct and a net report.

Now, I've got some other exhibits, but they're all going to look about the same. In the interest of time, let's move on.

The systems people also like to think in terms of subcompanies or subset of the group so they produced these reports for each company within the group and then gave me a total. Again, it wasn't worth arguing. What I simply do when I get the report is throw away all the company data or at least give it to my secretary -- I assume she throws it away -- and just boil it down to a total number which then comes out to be a report about this think (indicating) as opposed to about two and half inches. It works out rather well.

The exact same format as the accident year report is also produced but on a report basis to give me a good run of what the claims department is doing. We are eventually going to change that to a Report Year Development on an Accident Year basis to make it totally compatible with the other report.

We also produced this report on an Accident Year basis for the Allocated Loss Adjustment Expense. Missing in the Allocated Loss Adjustment Expense Report is outstanding losses. Our claims adjusters do not set individual case reserves. We do that strictly from the Actuarial Department.

As you can see, these reports are not the big company type sophisticated reports, but they do suffice for a small company operation. They're very expandable and they're going to be developed.

What we're going to be doing next to these reports is adding claims counts, salvage and subrogations, catastrophe reports. We've got the flexibility built at the ground level to expand these and to do just about anything we want. But the situation when I took over reserving required that we go directly with the basics first.

Now, one of the odd features of this report for a small company is that it is produced every quarter. The systems people developed my evaluation points, which included the latest two years on a quarterly basis. This isn't worth a whole lot today. What it will eventually enable me to do is to establish a reserving system that treats each quarter as an entire 12-month entity and just roll the process every three months.

This seems like an over-elaboration for interim reserving; however, I've found in a small company that feeding people reserve changes a spoonful at a time is a lot easier then getting them to eat cinderblocks at year end. Eventually we will have a complete system that will span both quarters and year-end.

The process then goes into what we do with these reports now that they have developed a life of their own. This is not going to be a discussion on techniques. You're going to get that through the rest of the seminar. In fact, you're going to get some pretty good ideas from the next two guys.

The question is what we do with these numbers now that we have them. I receive the report within a week of the close of each quarter. The reports are not designed to be operable in our mainframe environment.

One digression we're going to throw at you here -- or at least a spur off to the side -- is the same thing I said last year. Most of us there are puzzle-solving type people. We love problems. If we can't find one, we'll create one.

We have a tendency to love to program on a PC level. I remember a number of years ago I had a reserving project at a prior company. I spend almost a week putting together a beautiful little Fortran program. The manager came in towards the end of the week and I'm showing him this great piece of craftsmanship, and he said, "How long would it have taken you to do that with a calculator?", less than two hours. So what I'd done was waste a considerable amount of time on nothing but a hobby or a project in designing programs.

The point is don't get wound up into programming. I use a Lotus program and it serves me just fine.

Your canned programs from your auditors are fine. It makes auditors very happy to have you buy a program from them. Not only have you spend a little money, but you are using reports that are on the same basis as their evaluation.

Don't get wound up in nickel/dime programming. Your time is too valuable and the company is waiting for you to come up with definite reserve answers.

Every quarter when I get this report I enter the data myself into my Lotus format. This may seem like a waste of time or a waste of effort, almost opposite to what I've said, but I really need to touch the numbers. I like to get the feel of the fabric, almost smell the numbers as my predecessor had done.

We introduce ourselves, and set up a bit of a relationship. I can pick up some of the problems that are coming through. At this time there is a sign that goes up on my office that says, "If it doesn't involve reserving, it isn't a problem," and everybody stays out. They leave me alone for the period necessary to perform the review.

The evaluation that I do goes to a reserve committee consisting of the CEO, a senior vice president and myself. The Senior Vice President has always been part of the reserving process so he brings about 30 years of experience to the table.

So now I've produced the evaluation, we've gone through the committee analysis, we do whatever subsequent evaluation is necessary, and we have a quarter or year-end reserve.

Inherent in the process is the need for whatever supplemental data we can possibly find. You all know what this is about. You get all the extra information you can from whatever source available, whether it's the nightly news or a comic book. Mostly you will have access to actuarial reports that are produced for pricing, claims analysis, marketing, et cetera.

Most of you have DP systems of one degree or another which can give you specialized reporting processes. Our people have something called a DYL system. If I don't make it too complex, within days they can solve individualistic problems for me, answer individualistic type questions.

The ISO or industry type data, Best type data -- you all have access to these. It all has to be used. Also, don't neglect competitor's data. Now I'm not ashamed to say that during the first two years of our automobile program I got a copy of State Farm's Schedule P which played a very significant role in helping us establish some initial reserves. The data is obviously not compatible. A little southeastern insurance company sitting in Florida isn't the same as the the big one. However, it beats picking reserves on a bad Monday morning, which otherwise it would have been.

One other point I'm going to branch out in my own self-defense. Last year we gave the reserving presentation and my recommendation to other small company actuary's was, when you go in with the recommendation, give management a single number per line of business.

I subsequently went into a panel which was headed by Warren Cooper, an old time friend of mine and a man I immensely respect. He had a CEO of a company on his panel who said that he wanted a pessimistic, an optimistic, and a best estimate reserve projection. This was diametrically opposed to what I said. I went home somewhat crushed.

At my next reserve meeting I gave the CEO my most optimistic and my most pessimistic estimate. He was not happy.

He wants his actuary, as his reserving specialist to provide him with the best single estimate based on all considered information. He said if subsequent adjustments are necessary because of his knowledge of the business or the environment, he will make them himself. I personally establish pessimistic and optimistic ranges during my analysis, but I provide him with a single best estimate.

You're going to have to know your customer and your CEO. Does he want the pessimistic, optimistic? Or, does he want the specific number?

MR. RICE: Now, this is an opening act for the real meat which will come later on in the presentation. There is no specific dogma or point that we're trying to make. I'm trying to give you one company's -- a small company's -- approach to the process. This is what we have done. It should evolve as something as significant as the company. It will grow with the company as we get into higher realms.

Is there a better way of doing what I have shown? Sure there is. It there a worse way? I would hope so. There certainly should be. The question is for the company actuary, as your own man, your own craftsman operating in a small company environment, do you really care about the extremes that would be possible. The answer is simply no. You've got to live with yourself you've got to be your own conscience and your own guide.

MR. INKROTT: Thanks, Vern. I think one neat thing about small company reserving is that I think the systems and the reports sort of take on the personality of the person who is responsible for the reserving at the company. I think it would be interesting to spend a day or two with Vern. I think it would be fun.

The next speaker is Pat Crowe. Pat is vice president of market research and actuary for Kentucky Farm Bureau. Pat has been at Kentucky Farm Bureau for the last ten years on a full-time basis. Prior to that, he was providing consulting actuarial services to Kentucky Farm Bureau and approximately ten other state farm bureaus.

Pat has a bachelor's degree in math and physics from Northern Illinois University and is an FCAS, MAAA and ARM. So, Patrick.

MR. CROWE: Thank you, Jim. I'm very glad to be here. I am also interested as to why many experienced actuaries would want to come and see what actuaries in small companies do. I was kidding Dave beforehand. I told him, we're going to tell you how we make reserves with no resources. I don't know what your people's excuses are.

What I want to do here is talk about reserving from a small company's point of view from three major perspectives. First, I want to talk about the frequency of my analyses the reports. How often do I analyze my data.

The second area that I want to discuss is the reports that I produce for management. Now, sometimes I think I'm not a very strong-willed individual because I have some experiences in actuarial work where I didn't win my point of view. So what I generally try to do is adapt my reports to what they want to see, something they feel comfortable with. I seem to have more success doing it that way than trying to convince them to utilize my reports.

Third I'm going to describe procedures that we use in our company to change our reserves and our loss adjustment expenses dynamically because I don't have time to do it every month but I want them to change dynamically. I don't want to wait until December and I then load $3 million or $5 million, et cetera. I would like the system to do it automatically for me so all I have to do is explain the changes in those factors, as opposed to the dollar amounts.

I'm responsible for product development, market research, and I do a lot of planning. I do a lot of -- well, not much budget work but planning as far as what our plans are going to be the next couple of years, and then I have this other function, reserving. I kind of wish the tape wasn't on because --

(Laughter.)

MR. CROWE: All my functions are important for a small company actuary. I have to admit I enjoy reserving the least. I shouldn't say it because I don't want to disappoint you here. Like Vern says, our concern is being around tomorrow. Our concern is our products and our services, and being dynamic. Reserving is an extremely important function, but to me it's kind of like a necessary evil. It's something I have to do and I have to find as much time for it as I can and then get back to our products and services which we are really worried about.

What I try to do is determine how can I maximize my time. Another point is that I consider myself as kind of a jack of all trades and master of none. We have to be very knowledgeable about our products; we have to be very knowledgeable about planning; and we have to be very knowledgeable about market research, which I think is a phenomenal field for actuaries.

So what do I do? Well, first of all, let me tell you a little about Kentucky Farm Bureau because I'm so proud of our little company. We just write in the State of Kentucky. We write about $200 million in just the State of Kentucky, and our business is primarily personal lines, 90 percent. We're the largest property insurer in the State of Kentucky for family households and we're the second largest in automobile, and the first in many other categories. We're very saturated in every county throughout our state. That's why we spend so much time on the products.

Given that, I've got to sit back and determine how I can best allocate my time. I spend most of my time on reserving in the second quarter -- the second quarter is a very important time for me because if I see any changes, I want to identify them then and get it done and over with and start putting them in the statements before year-end comes. So, it's a very critical time for me. To my CEO it's a very critical time because he tells me, "Pat, I don't want any surprises in December. If there's a problem, I want to know about it early in the year so we can address it and get on with our business." So, it's very critical.

Actually, the fourth quarter is the number one time period -- but the second quarter is a very close second. At the first quarter I spend very little time because I feel that I don't have enough development yet to spend any more time on reserves. If I don't identify any problems that I haven't found in the second quarter, then the third quarter should run very smoothly.

That's in theory the way I hope things go and that's the way I program my time. If it doesn't work like that, then I have to work overtime and weekends because we don't have any more time for loss reserve analyses.

The other thing I do which I think is kind of unique -- I don't know many other actuaries who do it -- I spend quite a bit of time on retrospective reports. Again, it's for my users and I'm trying to orient my reports to them.

So, at the beginning of the year I spend a lot of time on retrospective reports with my user areas to see how things are developing because they know what they set up last year in the annual statement and they want to know how things are developing. The retrospective reports give us an idea on how the reserves are developing. Then, as the year progresses, I spend more time on prospective reports.

The other point is that we don't have an actuarial reporting system at our company. I guess I'm sad to say that, but we've never been able to allocate the programming resources to develop a pure actuarial statistical system. Years ago I made a request for that and it was very politely denied because there were no resources and there was no money allocated for it -- and then I just kind of walked around the building and I looked in the claims and accounting departments to see what kind of reports they had.

I was amazed at the volume of reports they're producing off their claims systems and accounting systems that I could use. As a matter of fact, we had reports in our claims department which had volumes of data this high off the floor by report year, by accident

year, showing salvage and subrogation. I thought, well, gosh, I could take a lot of this data and utilize it.

Then I went over to the accounting department and I discovered that the claims systems feeds the accounting system and they have different detail. Then it dawned on me, well, the claims department spends a considerable amount of time doing quality control on the data, and they're very close to it. The accounting department spends a considerable amount of time doing quality control on the data. And I don't have resources to do quality control on my own data.

I don't know how you people feel about it, but for small companies, we don't have time for quality control but it's an unbelievably important function because you can really make some incredibly stupid decisions if you don't spend your time on quality control.

So, anyway, I found all this data in these various departments and it dawned on me that if I had a person who was a real fast keypunch operator we could transfer a lot of summary data to diskettes and use it in basic programs and Lotus spreadsheets. So that's what we did.

I don't necessarily recommend it but if you're programming department tells you that there's no resources allocated, you're going to have to do something. So, we took a lot of data that was developed from a claims accounting system and loaded it into Basic programs and Lotus spread sheets.

The amount of time it takes is not that much, now that I've pretty well streamlined it. My secretary is trained as a high-speed data entry operator and it probably takes her about two or three days to load all our incremental data and check it every quarter. Then at the end of the year she probably spends a week, So, it's still pretty efficient for the amount of time it takes.

In our department -- there's myself, my secretary, a person who does market research work, and another person who does market communications. Then we have a person that's an actuarial systems manager. Now, she'll spend maybe two or three days every quarter analyzing our reports and then I'll spend about two or three days every quarter reviewing the results that she has put together.

Very quickly I'll go through some of the reports. They're not much different from others but I want to show you why I do them the way I do.

(Slide.)

The first one is your Exhibit 1. Now, I'm just going to show you some areas that I'm going to highlight in these exhibits. If you go to your Exhibit 1, you will see some of the numbers.

Your Exhibit 1 -- the first page is the typical thing you see all the time, paid looses reserves, and incurred losses. Three matrixes. Data is entered into the computer from reports from the claims department and accounting department, which are broken down into many combinations. This is a typical spread sheet.

But what I'm excited about with Lotus is that we use spread sheets to automatically update the data quarterly. In other words, my secretary has to input quarterly increments and the computer automatically does cumulative year to dates, and things like that with the Lotus spread sheet.

Pages 2 and 3 on Exhibit 1 just show you your typical development factors. What I'm trying to emphasize with some of the tools available to us is that once you enter your data, you can develop spread sheets very easily that will automatically perform calculations for you. Pages 2 and 3 just show paid to paid development factors and incurred to incurred.

The third page is kind of important to me. I want to be able to automatically calculate these factors. I won't go through the third page with you, but I want to automatically select factors. The top part of that page shows the factors we select, incremental factors and cumulative factors. The idea is you want to be able to very quickly change the factor and immediately get a result.

The second part of that page just shows that once you select factors the Lotus spread sheet automatically calculates IBNR for you on a paid basis in the middle part and on an incurred basis at the bottom of the page. Again, it just helps us to do a lot of what if very, very rapidly for small companies. It is very critical for us.

That's the typical things that most actuaries are familiar with. Exhibit 2 is something that I do -- it's obtained from the annual statements but I very seldom hear people talk about it. It's a retrospective test on your reserves. I came up with this idea of using retrospective reserves by watching -- well, having meetings with my accounting and claims departments and finding out very quickly that they weren't paying attention to me.

You go to your claims department and your accounting department and you show your actuarial developments and how you calculate your IBNR and your selected factors and all that stuff -- I kept watching their eyes and I kept thinking, well, they're not listening to me. They have their own way of doing things. They're just nodding their heads yes but not really paying attention to me at all.

I thought, what am I going to do? I mean, am I that bad that they're not understanding a word I'm saying? As a matter of fact, we had this one session where I was showing that we needed to increase our reserves by $2 million and the vice president of accounting said -- and he's a very close friend of mine -- he said, fine, it's not my problem. He said we surely know it's not an IBNR problem. The vice president of claims said, well, it's not my problem because we set the case reserves and we know our claims adjusters do a great job.

So, they didn't have a problem with this contradiction that we needed $2 million, but it didn't belong in the IBNR and it didn't belong in the case reserve development. I walked out -- they all nodded their heads, but now what do we do since no one is agreeing. So, I said to myself, well, let's show the retrospective reserve development.

Then I had another problem with our vice president of accounting. He's a wonderful man, brilliant, but has a very short temper and I have a knack of lighting his fuse very quickly when I talk about reserves. I said to myself -- he doesn't want to hear about this actuarial stuff anyway -- well, why don't we just show year-end developments. The top line on Exhibit 2 says the claims department reserve at the end of '84 is at $6,399,000, we set an IBNR of $1,873,000, and a total of $8.2 million.

I said, okay, you put that number in the statement. They are numbers in the annual statement. Let's just bet a Coke and watch how these things develop six months or nine months down the road. If we're wrong -- if I'm wrong, I'll buy you a Coke. If you're right, you buy me a Coke. Let's not get emotional about reserves.

This is the way he looks a numbers, not the way I look at numbers. Because he knows he puts the number in the annual statement and he wants to know if they are high or low. What we do every quarter is show him retrospective tests.

It was very valuable to the claims department too. I have all kinds of explanations why we're so deficient in our reserves. But it was a real good test for the claims department and I'll go through it.

In the first three columns it says that at the year-end '84 we set up $6,399,000. Then it shows in the first quarter of '85 we paid $1,498,000. We had a reserve of $5.8 million on just those claims, '84 and prior. But immediately the claims department could see in a quarter, that we put up $6.4 million I guess it's a fact, folks. This is what your claims records say and not mine, not some actuarial form on a spread sheet.

The same thing with IBNR. We set up $1.8 million IBNR. Here are the claims that were reported after year-end. So, they felt much more comfortable breaking down the two components, areas that they're familiar with.

Over the years I've kept doing retrospective tests and now I kind of like doing them only as a test against my prospective tests. Just look at things from a different point of view and if the numbers come out differently, try and explain why to yourself. You know to get the feel of the numbers.

Now, the next page in Exhibit 2 shows your typical development factors -- let me go back to Exhibit 2, page 1.

(Slide.)

There is another thing I would like to emphasize here which is helpful to me, which makes the numbers dynamic. If you look at the percentage column in the known claims, it's a percentage of premiums in force. In other words, what it's saying is that the first quarter of '85, that's $7,300,000, or 167.7 percent of premiums in force.

What I'm trying to do is develop a relationship between known reserve developments and premiums in force and then I do the same thing with IBNR. The reason why I do that is I don't want to manually change the reserves every month. If our exposures are going up ten percent a year, I want the computer -- to automatically adjust the IBNR. If the exposure is going up ten percent, then automatically the IBNR goes up ten percent a year. Our allocated loss expenses and unallocated reserves are automatically adjusted as a function of loss reserves.

This seems reasonable. Then I'll get in there the first quarter or the second quarter and correct any small deficiencies in this approach. So, it's real critical, I think, for small companies to have a dynamic reserving process that changes as your exposures change.

There was a real practical reason why I did that. Our accounting department had a package and it said I must put a factor in there -- I couldn't give a bulk number, I had to give a factor. I said, "Well, can I make it a factor?" They said, "Well, you can make it a

factor of anything you want." I said, "Great. I'll take the opportunity to use a dynamic type variable." So we used premiums in force just to make it dynamic.

Page 2 of 2 just shows how we develop ultimate factors as a percentage of premiums in force. Then we go back and compare them to what we had in previous estimates just to see how things are changing.

I'm going to jump over real quickly to Exhibit 3. I'm sure most of you probably produce similar exhibits, but everyone keeps telling me no one does it much. I'm going to jump over to loss adjustment expenses.

You can do some things really very quickly. I just take from the annual statements the allocated payments by accident year. Then I also take the loss payments.

You just have two matrices. You divide the two matrixes and develop paid allocated to paid loss ratios. You can see some beautiful patterns that develop with paid allocated to paid loss ratios. Again, I have a dynamic system. My allocated reserves change as my loss reserves change.

I've found quite often, even looking at other company's data -- that there's some relationships between paid to paid, between paid allocated and paid looses.

Let me show you on page 2. Let's take for our company, accident year 1982. You can see how they develop very rapidly. On page 2 the 12-24 month paid allocated to paid loss ratio is .007. There is very little paid allocated in the first year. It climbs to .015, .027, .035, .038, .040, .041. It keeps growing for many, many years out and it makes sense because in the beginning years you're maybe making loss payments but your allocated payments are very small because the serious cases aren't settled until years down the road.

But as the serious claims come up three or four years down the road, you may be paying 25 cents for every dollar lost, or something like that, for allocated expenses.

What is neat, though, if you look at those patterns, is that they're really very stable. They're very stable patterns on a horizontal basis and also on a vertical basis.

For instance, just take the vertical column at 72 months. The factors are -- .041, .053, .048, .041, et cetera. The most current accident year has very little allocated expenses. If I just put a figure in for the 1989 accident year, say, of four to five percent of losses for allocated expenses -- not doing any more work -- I'm going to be pretty close until I get time to get to those numbers six months or nine months down the road. It will be responsive to your incurred losses.

That's what we need in small companies. We need responsive tools, I think, to react to things very quickly. Throughout the year let's say your exposures go up ten percent, then your IBNR goes up ten percent, and your allocated reserves go up ten percent, and the computers did it all automatically. No one comes and asks me every month why did I change my IBNR.

At the end of the year I probably have to make some more adjustments but I hope they are minor adjustments. I may have to explain a $2 million change in IBNR as opposed to a $10 million IBNR. So, it's a very selfish reason too.

Exhibit 4 is a retrospective test of allocated expenses. My point is that for my users I've got to look at things from two perspectives, prospective and retrospective. On a retrospective test, I can do little things like bet them Cokes and have fun with this process. Let's not get to serious about it and get our personalities involved and be defensive.

It's amazing that once they see these developments and the numbers themselves they say, well, I guess you're right.

Our claims department gets concerned when the reserves are deficient on a case basis. You have to be careful because they are so often misinterpreted. I keep telling them there is no way you can be 100% correct in your case reserves. As a matter of fact, if they don't develop higher, you're setting reserves too high.

How could you have all the information when all you have is a piece of brown paper stating "John Doe hit Mary Smith and Mary Smith is mad"? How could you establish a $100,000 reserve? If you did, I don't think you're doing the right thing here. I want you to set the reserve based on the knowledge you have at that time. Be consistent. Maybe we'll come out historically 20 percent short or 10 percent short. That's all I really want, consistency. Then we can load that in IBNR. It's consistency that's important.

I can't remember the exact percentage but we're always short on BI. But I keep bragging on the claims people because they're consistent. If you are 20 percent short; you're not doing it wrong. No, really, that's very important, consistency.

The last exhibit is my favorite report, Exhibit 5. It is my report to the accounting department. Our accounting department spends very little time on reserves. The package we have in accounting says you must input factors by lines of insurance, and you can relate them to premiums in force. You must also input factors for allocated expenses and unallocated expenses, and they can be a function of loss reserves.

I just give the accounting department a series of approximately 20 factors. They load them into the computer and their reserve work is done. I like it because it's responsive.

The first column in Exhibit 5 shows the premiums in force for all lines of insurance. The second column is the IBNR factors. We constantly review these factors and we change them as we think things are changing in the laws such as comparative versus contributory negligence and things like that.

Then we analyse our LAE reserves and as a function of loss reserves. We like it very much because it's very, very responsive to the environment. It's very easy for me, and it's very easy for my accounting department. They actually spend no time on loss reserve analysis. Once we decide on the factors, they are entered into the computer programs.

That concludes my part. I hope you all some day have an opportunity to work for a small company. It's a lot of fun.

(Applause.)

MR. INKROTT: Thank you, Pat. I just want to buy something when I hear you talk. I don't know what, but something.

CASUALTY LOSS RESERVE SEMINAR
LOSS RESERVING FOR SMALL COMPANIES

The purpose of this report is to briefly discuss the following from the perspective of a reserving actuary in a small company.

1. The frequency and degree of detail of loss and loss adjustment expense reserve studies.
2. Design of reports for interpretation by various users.
3. Development of procedures for adjusting IBNR and loss adjustment expense reserves that are responsive to business conditions.

The actuary of a small company often is involved in a myriad of functions: pricing, marketing, reserves, product development, underwriting and planning. It is very crucial for the actuary to allocate time and resources to these functions as efficiently as possible. All of the above functions are important, but each environment will place different priorities on the above functions. My company is a one state operation with approximately 90% of its business in personal lines. Its 1989 direct written premium is expected to be in excess of $200 million. My local environment is such that the demand for time and resources in all of the above functions allows only a minimal amount of time for loss and loss adjustment expense reserve analyses. I imagine that this is no different for actuaries in most small companies.

Frequency of Analysis

Loss and loss adjustment expense reserve reports are produced quarterly. The amount of time allocated to studying reserves varies by quarter. The greatest amount of time is spent at the fourth quarter followed by the second, third and first quarters.

At the second quarter, the major concern is to determine if there are any changes in our expectations of our IBNR and loss expense reserve factors. The third quarter analyses are similar to the second. Generally the analyses require less time at the third quarter.

As the year progresses, less reliance is placed on retrospective tests and more on prospective tests. The greatest emphasis on prospective tests is in the fourth quarter followed by the third quarter. The quarterly review process requires approximately three to four days of clerical support for the first, second and third quarters and possibly a week for the fourth quarter. Actuarial analytical time is approximately one day at the first quarter, two to three days at the second and third quarters and five days at year-end.

Detail of Reports

Our company does not have any specific reports designed for actuarial reserve analyses. The claim reporting system is used by our claims and accounting departments. It provides substantial loss and allocated loss expense data by loss year and report year. Although the data requires clerical support to transfer the data to a usable form, it has the advantage that it has passed the "quality control" procedures of the claims and accounting departments.

The data is entered into a personal computer. Basic programs and Lotus spreadsheets are used to verify the data, make reinsurance adjustments and create actuarial reports. Prospective and retrospective reports are prepared for all lines of insurance. Exhibit I is a prospective test of auto liability loss reserves. The paid losses, reserves and incurred losses are shown for successive twelve month intervals. In this report, data is shown for June of each year. Reports are also prepared for quarters ending March, September and December. Corresponding reports for average payments, reserves and incurred losses can be easily created.

On Page 2 of Exhibit I the development factors are automatically calculated from the data on page 1. On page 3, factors are selected for paid losses and incurred losses. Then the IBNR estimates for the paid and incurred loss analyses are automatically calculated. The results are reviewed for consistency and are compared to those produced from retrospective tests.

Exhibit II shows a retrospective test of bodily injury losses for accident years 1984 and prior. The data on the first line shows the case reserves and IBNR established by the company at December, 1984 for accident years 1984 and prior. This report is very useful in explaining developments to the accounting, claims and underwriting departments. This exhibit shows annual developments at quarterly intervals for known and IBNR claims. The development of known claims, IBNR claims and total claims is also expressed as a function of premiums in force. Page 2, Exhibit II shows the historical factors from retrospective tests for 1980 thru 1987. Ultimate IBNR is developed as a percentage of premiums in force. Historical IBNR loss factors and IBNR loss estimates are shown for comparisons.

Exhibit III shows the historical automobile liability paid loss and allocated expense payments by accident year. Page 2, Exhibit III shows the historical paid allocated to paid loss ratios and development factors by accident year. This data is used to develop ultimate paid allocated to paid loss ratios by accident year. Accident year estimates of allocated expenses are developed by multiplying the ultimate paid allocated to paid loss ratio by the ultimate accident year losses.

Exhibit IV is a retrospective test for allocated expenses for automobile liability. Exhibit IV shows data for twelve month intervals at the second quarter of each year of development. Developments are shown for year-end 1975 thru 1988. For instance, the values for 1987 represent the allocated expense payments for accident years 1987 and prior six months and eighteen months after December 31, 1987.

This report is also prepared for twelve month intervals at first, second and fourth quarters of each year of development. Page 2, Exhibit IV, shows the selected development factors and estimated ultimate allocated payments for year-end 1978 thru 1988. The development of ultimates for the prior year as well as current year ends is useful for analyzing trends in estimates and reviewing accuracy of previous estimates.

Procedures for Adjusting IBNR and Loss Adjustment Expense Reserves

IBNR, allocated expense and unallocated expense reserves are established in our accounting systems on a formula basis. Actuarial provides accounting with IBNR, allocated expense and unallocated expense reserve factors by line of insurance. The IBNR factors are a function of premiums in force. The allocated and unallocated expense factors are a function of case reserves and IBNR. Therefore, the estimates of these reserves change monthly as the business volume and the outstanding claims expand or contract without any interventions by actuarial or accounting.

Exhibit V is a sample of our recommendations to Accounting. Ideally the factors are changed June and December. Very rarely are any changes made at the first quarter. Changes at the third quarter are infrequent and reflect new developments obtained from our actuarial reserve analyses. The involvement by accounting is basically entering the revised factors in a table and testing the changes.

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Prospective Test
EXHIBIT I
Kentucky Farm Bureau Mutual Insurance Company
Schedule 1A-Auto Liability

Paid

Year	6	18	30	42	54	66	78	90	102
1976	0	7,845,787	11,037,943	11,697,940	12,065,055	12,270,262	12,367,130	12,452,391	12,469,679
1977	0	7,711,151	10,949,351	11,711,311	12,207,381	12,522,920	12,550,742	12,597,671	12,603,281
1978	0	8,897,504	13,071,727	13,767,958	14,410,558	14,856,128	14,683,277	14,738,329	14,781,468
1979	0	10,356,549	14,862,891	16,241,758	16,268,505	16,419,512	16,544,000	16,639,201	16,842,980
1980	0	9,843,368	15,135,989	15,598,792	15,752,878	15,858,534	15,901,289	15,999,046	16,005,988
1981	0	15,017,008	16,843,105	17,627,259	18,010,733	18,087,372	18,227,552	18,236,682	18,229,545
1982	4,798,707	15,767,115	17,796,870	18,696,272	19,172,085	19,185,929	19,174,545	19,192,160	
1983	5,229,623	17,955,470	20,943,210	22,253,335	22,538,399	22,846,127	22,871,007		
1984	5,911,294	21,741,888	25,523,711	26,831,014	27,973,566	28,203,069			
1985	6,813,166	26,519,314	31,585,558	34,213,033	35,027,314				
1986	7,780,945	28,999,401	34,724,858	37,299,473					
1987	8,996,995	35,531,335	42,642,110						
1988	10,867,707	41,224,555							
1989	12,586,806								

Reserve

Year	6	18	30	42	54	66	78	90	102
1976	0	0	0	0	0	0	128,668	56,865	68,986
1977	0	0	0	0	0	225,755	120,868	52,990	23,474
1978	0	0	0	0	550,079	291,587	169,924	94,554	52,130
1979	0	0	0	1,025,387	701,353	480,248	295,895	2,348,839	36,001
1980	0	0	1,349,321	695,138	313,545	162,732	112,197	31,508	30,700
1981	0	2,915,610	1,449,684	601,591	177,381	146,107	33,005	9,735	2,498
1982	2,457,795	3,060,856	1,581,957	727,807	246,914	125,737	36,344	16,520	
1983	2,643,951	3,503,668	2,071,735	849,273	513,640	135,108	70,984		
1984	4,546,564	3,952,613	2,138,574	1,995,077	422,830	206,974			
1985	4,141,489	5,522,788	3,300,334	1,284,759	511,422				
1986	4,349,615	5,813,549	3,154,585	1,588,038					
1987	5,104,656	6,173,501	3,268,108						
1988	6,745,174	8,759,407							
1989	7,020,636								

Incurred

Year	6	18	30	42	54	66	78	90	102
1976	0	7,845,787	11,037,943	11,697,940	12,065,055	12,270,262	12,495,798	12,509,256	12,538,666
1977	0	7,711,151	10,949,351	11,711,311	12,207,381	12,748,675	12,671,611	12,650,661	12,626,755
1978	0	8,897,504	13,071,727	13,767,958	14,960,637	15,147,715	14,853,201	14,832,883	14,833,598
1979	0	10,356,549	14,862,891	17,267,145	16,969,858	16,899,760	16,839,895	18,988,040	16,878,981
1980	0	9,843,368	16,485,310	16,293,930	16,066,422	16,021,266	16,013,486	16,030,553	16,036,688
1981	0	17,932,617	18,292,789	18,228,850	18,188,114	18,233,479	18,260,556	18,246,417	18,232,043
1982	7,256,502	18,827,971	19,378,827	19,424,079	19,418,999	19,311,666	19,210,889	19,208,680	
1983	7,873,574	21,459,138	23,014,944	23,102,609	23,052,038	22,981,234	22,941,991		
1984	10,457,857	25,694,500	27,662,285	28,826,090	28,396,395	28,410,043			
1985	10,954,655	32,042,101	34,885,892	35,497,792	35,538,736				
1986	12,130,559	34,812,949	37,879,443	38,887,510					
1987	14,101,650	41,704,837	45,910,218						
1988	17,612,881	49,983,962							
1989	19,607,442								

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Prospective Test
EXHIBIT I
Kentucky Farm Bureau Mutual Insurance Company
Schedule 1A-Auto Liability

Paid To Paid Ratios

Year	6-18	18-30	30-42	42-54	54-66	66-78	78-90	90-102
1976	0.000	1.407	1.060	1.031	1.017	1.008	1.007	1.001
1977	0.000	1.420	1.070	1.042	1.026	1.002	1.004	1.000
1978	0.000	1.469	1.053	1.047	1.031	0.988	1.004	1.003
1979	0.000	1.435	1.093	1.007	1.009	1.008	1.006	1.012
1980	0.000	1.538	1.031	1.010	1.007	1.003	1.006	1.000
1981	0.000	1.122	1.047	1.022	1.004	1.008	1.001	1.000
1982	3.286	1.129	1.051	1.025	1.001	0.999	1.001	
1983	3.433	1.166	1.063	1.013	1.014	1.001		
1984	3.678	1.174	1.051	1.043	1.008			
1985	3.892	1.191	1.083	1.024				
1986	3.727	1.197	1.074					
1987	3.949	1.200						
1988	3.793							

Incurred To Incurred Ratios

Year	6-18	18-30	30-42	42-54	54-66	66-78	78-90	90-102
1976	0.000	1.407	1.060	1.031	1.017	1.018	1.001	1.002
1977	0.000	1.420	1.070	1.042	1.044	0.994	0.998	0.998
1978	0.000	1.469	1.053	1.087	1.013	0.981	0.999	1.000
1979	0.000	1.435	1.162	0.983	0.996	0.996	1.128	0.889
1980	0.000	1.675	0.988	0.986	0.997	1.000	1.001	1.000
1981	0.000	1.020	0.997	0.998	1.002	1.001	0.999	0.999
1982	2.595	1.029	1.002	1.000	0.994	0.995	1.000	
1983	2.725	1.073	1.004	0.998	0.997	0.998		
1984	2.457	1.077	1.042	0.985	1.000			
1985	2.925	1.089	1.018	1.001				
1986	2.870	1.088	1.027					
1987	2.957	1.101						
1988	2.838							

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Prospective Test

EXHIBIT I

SCHEDULE: MUTUAL 1A
AT 2nd QTR 1989

PAID 06-18	18-30	30-42	42-54	54-66	66-78	78-90	90-102	102-114	114-126
3.808	1.196	1.079	1.033	1.011	1.003	1.004	1.001	1.000	1.000
5.173	1.359	1.136	1.053	1.019	1.008	1.005	1.001	1.000	1.000

	PAID 06/89 (1)			ULTIMATE (2)	IBNR (PAID) (2-3)
89	12,586,806	X	5.173	65,115,638	45,508,196
88	41,224,555	X	1.359	56,005,258	6,021,296
87	42,642,110	X	1.136	48,437,345	2,527,127
86	37,299,473	X	1.053	39,266,564	379,054
85	35,027,314	X	1.019	35,696,589	157,853
84	28,203,069	X	1.008	28,429,230	19,187
83	22,871,007	X	1.005	22,985,454	43,463
82	19,192,160	X	1.001	19,211,352	2,672
81	18,229,545	X	1.000	18,229,545	(2,498)
80	16,005,988	X	1.000	16,005,988	(30,700)
79	16,842,980	X	1.000	16,842,980	(36,001)
				366,225,942	54,589,648

INCURRED 12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	
2.898	1.095	1.023	1.001	1.000	1.000	1.000	1.000	1.000	1.000
3.250	1.121	1.024	1.001	1.000	1.000	1.000	1.000	1.000	1.000

	INCUR'D 06/89 (3)			ULTIMATE (4)	IBNR (INCR) (4-3)
89	19,607,442	X	3.250	63,715,215	44,107,773
88	49,983,962	X	1.121	56,047,276	6,063,314
87	45,910,218	X	1.024	47,013,119	1,102,901
86	38,887,510	X	1.001	38,926,398	38,888
85	35,538,736	X	1.000	35,538,736	0
84	28,410,043	X	1.000	28,410,043	0
83	22,941,991	X	1.000	22,941,991	0
82	19,208,680	X	1.000	19,208,680	0
81	18,232,043	X	1.000	18,232,043	0
80	16,036,688	X	1.000	16,036,688	0
79	16,878,981	X	1.000	16,878,981	0
				362,949,169	51,312,875

KFBBIDIR.WK1

Retrospective Test
Exhibit II
Kentucky Farm Bureau Mutual Insurance Company

Bodily Injury — Accident Years 1984 and Prior — Net Payment and Direct Reserve Developments (Excluding Sal and Sub)

	Known Claims				IBNR				All Claims			
	Paid	O/S	Total	%	Paid	O/S	Total	%	Paid	O/S	Total	%
			6,399,240				1,873,651				8,272,891	
3/85	1,498,091	5,807,993	7,306,084	167.7	165,523	572,583	738,106	16.9	1,663,614	6,380,576	8,044,190	184.6
6/85	2,820,609	4,810,847	7,631,456	175.1	520,372	760,683	1,281,055	29.4	3,340,981	5,571,530	8,912,511	204.5
9/85	4,021,222	4,163,254	8,184,476	187.8	836,757	902,255	1,739,012	39.9	4,857,979	5,065,509	9,923,488	227.7
12/85	5,108,109	2,841,342	7,949,451	182.4	1,149,755	884,435	2,034,190	46.7	6,257,864	3,725,777	9,983,641	229.1
3/86	5,939,313	4,695,709	10,635,022	244.1	1,462,952	865,023	2,327,975	53.4	7,402,265	5,560,732	12,962,997	297.5
6/86	6,626,524	4,223,066	10,849,590	249.0	1,658,642	834,458	2,493,100	57.2	8,285,166	5,057,524	13,342,690	306.2
9/86	6,979,535	4,018,101	10,997,636	252.4	1,922,934	696,672	2,619,606	60.1	8,902,469	4,714,773	13,617,242	312.5
12/86	7,307,981	3,666,733	10,974,714	251.9	2,144,241	603,569	2,747,810	63.1	9,452,222	4,270,302	13,722,524	314.9
3/87	7,689,369	1,265,980	8,955,349	205.5	2,228,757	568,778	2,797,535	64.2	9,918,126	1,834,758	11,752,884	269.7
6/87	7,867,911	1,409,916	9,277,827	212.9	2,399,063	433,329	2,832,392	65.0	10,266,974	1,843,245	12,110,219	277.9
9/87	8,324,098	970,710	9,294,808	213.3	2,494,457	349,429	2,843,886	65.3	10,818,555	1,320,139	12,138,694	278.6
12/87	8,586,090	705,915	9,292,005	213.3	2,578,960	306,573	2,885,533	66.2	11,165,050	1,012,488	12,177,538	279.5
3/88	8,825,720	406,912	9,232,632	211.9	2,611,561	240,690	2,852,251	65.5	11,437,281	647,602	12,084,883	277.3
6/88	8,840,594	340,813	9,181,407	210.7	2,628,678	189,689	2,818,367	64.7	11,469,272	530,502	11,999,774	275.4
9/88	8,861,857	295,436	9,157,293	210.2	2,656,578	155,220	2,811,798	64.5	11,518,435	450,656	11,969,091	274.7
12/88	8,950,355	198,035	9,148,390	210.0	2,671,078	148,097	2,819,175	64.7	11,621,433	346,132	11,967,565	274.7
3/89	9,026,978	126,023	9,153,001	210.1	2,677,328	139,597	2,816,925	64.6	11,704,306	265,620	11,969,926	274.7
6/89	9,036,978	95,020	9,131,998	209.6	2,689,507	129,096	2,818,603	64.7	11,726,485	224,116	11,950,601	274.3
EP	7,917,011											
PIF	4,357,328											

Development Factors

3-15	3.965	0.808	1.456	8.838	1.511	3.154	4.450	0.872	1.611
	2.349	0.878	1.422	3.187	1.097	1.946	2.480	0.908	1.497
	1.736	0.965	1.344	2.298	0.772	1.506	1.833	0.931	1.372
	1.431	1.290	1.381	1.865	0.682	1.351	1.510	1.146	1.375
15-27	1.295	0.270	0.842	1.523	0.658	1.202	1.340	0.330	0.907
	1.187	0.334	0.855	1.446	0.519	1.136	1.239	0.364	0.908
	1.193	0.242	0.845	1.297	0.502	1.086	1.215	0.280	0.891
	1.175	0.193	0.847	1.203	0.508	1.050	1.181	0.237	0.887
27-39	1.148	0.321	1.031	1.172	0.423	1.020	1.153	0.353	1.028
	1.124	0.242	0.990	1.096	0.438	0.995	1.117	0.288	0.991
	1.065	0.304	0.985	1.065	0.444	0.989	1.065	0.341	0.986
	1.042	0.281	0.985	1.036	0.483	0.977	1.041	0.342	0.983
39-51	1.023	0.310	0.991	1.025	0.580	0.988	1.023	0.410	0.990
	1.022	0.279	0.995	1.023	0.681	1.000	1.022	0.422	0.996

Multiplicative Factors

15-27	5.133	0.218	1.226	13.465	0.993	3.790	5.962	0.288	1.461
	2.789	0.293	1.216	4.610	0.570	2.211	3.073	0.331	1.359
	2.070	0.233	1.136	2.981	0.387	1.635	2.227	0.261	1.223
	1.681	0.248	1.169	2.243	0.347	1.419	1.784	0.272	1.220
27-39	5.891	0.070	1.264	15.778	0.420	3.864	6.875	0.101	1.502
	3.134	0.071	1.203	5.052	0.249	2.200	3.433	0.095	1.346
	2.204	0.071	1.119	3.175	0.172	1.617	2.371	0.089	1.206
	1.752	0.070	1.151	2.323	0.167	1.386	1.857	0.093	1.199
39-51	6.026	0.022	1.253	16.175	0.244	3.816	7.035	0.042	1.488
	3.204	0.020	1.197	5.168	0.170	2.200	3.510	0.040	1.341

Quarterly Reserve Analysis @ 2nd Quarter, 1989

Line MUTUAL BI
Source KFBBIDIR.WK1

	6-18	18-30	30-42	42-54	54-66	66-78
80 & Prior	1.108	1.002	0.977	0.997		
81	1.084	0.988	1.003	1.094		
82	1.102	1.021	1.095	0.955		
83	1.233	1.103	0.977	0.998		
84	1.497	0.908	0.991	0.996		
85	1.281	1.048	1.009			
86	1.275	1.073				
87	1.317					
	1.300	1.066	1.010	1.010		
	1.414	1.087	1.020	1.010		

	Current Loss Factor X	Ultimate Loss Factor X	Premium in Force =	Ultimate Loss	Ultimate establ. @ EOY	Known Claims @ EOY	Indicated IBNR
80 & Prior	208.2		3,291,141				
81	229.7		3,353,116				
82	221.4		3,440,439				
83	259.8		3,590,666		6,408,320		
84	274.3		4,357,328		8,272,891	6,399,240	
85	253.8		6,558,063		11,736,632		
86	226.5		8,903,370		16,314,834		
87	214.9	233.7	10,250,447	23,954,062	19,741,699	10,516,296	1.311
88	156.8	221.7	13,552,885	30,041,466	28,499,182	13,319,950	1.234
				DIFFERENCE	(1,542,284)		

29-Aug-89

LAE1APD.WK1

Prospective Test
EXHIBIT III
Automobile Liability
Cumulative
Paid Allocated/Paid Loss Method

Paid Loss

Accident

Year	12	24	36	48	60	72	84	96	108	120
1976	7,846	11,038	11,698	12,032	12,270	12,318	12,412	12,465	12,511	12,510
1977	7,711	10,949	11,711	12,207	12,395	12,550	12,570	12,610	12,610	12,627
1978	8,898	13,072	13,768	14,264	14,510	14,837	14,738	14,759	14,821	14,756
1979	10,357	14,863	15,869	16,222	16,390	16,499	16,568	16,656	16,900	16,883
1980	9,843	14,384	15,469	15,728	15,821	15,901	15,915	16,001	16,001	
1981	11,602	16,101	17,417	17,874	18,091	18,214	18,229	18,226		
1982	12,546	17,098	18,406	18,970	19,173	19,209	19,180			
1983	13,701	19,870	21,772	22,511	22,666	22,848				
1984	16,311	24,043	26,362	27,783	28,116					
1985	19,679	29,597	33,060	34,787						
1986	21,860	32,671	36,270							
1987	25,899	39,834								
1988	29,920									

Paid Allocated

Accident

Year	12	24	36	48	60	72	84	96	108	120
1976	41	120	264	375	451	501	533	546	566	573
1977	35	149	340	505	610	660	691	705	716	723
1978	53	182	333	519	621	710	729	741	761	768
1979	57	174	362	544	623	671	719	751	710	713
1980	48	176	405	563	631	652	668	693	694	
1981	87	234	459	607	697	741	778	786		
1982	87	248	500	668	737	764	779			
1983	86	272	560	797	886	958				
1984	104	369	673	952	1,106					
1985	173	476	937	1,233						
1986	170	571	1,041							
1987	204	597								
1988	264									

LAE1APD.WK1

Prospective Test
EXHIBIT III
Automobile Liability
Cumulative
Paid Allocated/Paid Loss Method

Paid Allocated/Paid Loss

Accident Year	12	24	36	48	60	72	84	96	108	120
1976	0.005	0.011	0.023	0.031	0.037	0.041	0.043	0.044	0.045	0.046
1977	0.005	0.014	0.029	0.041	0.049	0.053	0.055	0.056	0.057	0.057
1978	0.006	0.014	0.024	0.036	0.043	0.048	0.049	0.050	0.051	0.052
1979	0.006	0.012	0.023	0.034	0.038	0.041	0.043	0.045	0.042	0.042
1980	0.005	0.012	0.026	0.036	0.040	0.041	0.042	0.043	0.043	
1981	0.007	0.015	0.026	0.034	0.039	0.041	0.043	0.043		
1982	0.007	0.015	0.027	0.035	0.038	0.040	0.041			
1983	0.006	0.014	0.026	0.035	0.039	0.042				
1984	0.006	0.015	0.026	0.034	0.039					
1985	0.009	0.016	0.028	0.035						
1986	0.008	0.017	0.029							
1987	0.008	0.015								
1988	0.009									

Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120
1976	2.080	2.076	1.381	1.179	1.107	1.056	1.020	1.033	1.012
1977	2.998	2.133	1.425	1.190	1.069	1.045	1.017	1.016	1.008
1978	2.337	1.737	1.504	1.176	1.118	1.034	1.015	1.023	1.014
1979	2.127	1.949	1.470	1.133	1.070	1.067	1.039	0.932	1.005
1980	2.509	2.140	1.367	1.114	1.028	1.024	1.032	1.001	
1981	1.938	1.813	1.289	1.134	1.056	1.049	1.010		
1982	2.092	1.873	1.296	1.092	1.035	1.021			
1983	2.181	1.879	1.376	1.104	1.073				
1984	2.407	1.663	1.342	1.148					
1985	1.829	1.762	1.251						
1986	2.247	1.642							
1987	1.903								

29-Aug-89

LAE1A.WK1

Retrospective Test

EXHIBIT IV

Automobile Liability

Allocated Loss Expense Payments

Source: CA40

Paid Allocated LAE At Yearend

Months	6	18	30	42	54	66	78	90	102
6/75	0	0	0	0	0	1,092,763	1,098,957	1,115,455	0
6/76	0	0	0	0	1,146,367	1,189,279	1,228,061	1,243,157	1,257,473
6/77	0	0	0	1,304,974	1,405,456	1,482,319	1,523,798	1,549,791	1,560,367
6/78	278,222	0	1,272,528	1,502,404	1,680,988	1,763,180	1,798,658	1,827,133	1,851,260
6/79	336,713	958,561	1,414,143	1,690,683	1,827,812	1,914,176	1,994,100	1,979,896	1,975,427
6/80	408,377	1,066,915	1,525,481	1,777,772	1,901,072	2,005,169	2,015,906	2,017,125	2,002,840
6/81	418,135	1,088,387	1,535,750	1,779,493	1,926,011	1,990,482	2,004,674	1,993,210	
6/82	410,514	1,071,193	1,539,937	1,816,835	1,932,928	1,954,805	1,945,644		
6/83	384,006	1,082,746	1,676,052	1,914,691	2,040,148	2,067,315			
6/84	451,738	1,337,449	1,882,005	2,223,302	2,340,953				
6/85	547,437	1,503,344	2,245,606	2,565,374					
6/86	675,168	1,843,377	2,594,018						
6/87	751,502	1,942,797							
6/88	762,623								

Factors

Months	6-18	18-30	30-42	42-54	54-66	66-78	78-90	90-102
6/75	0.000	0.000	0.000	0.000	0.000	1.006	1.015	0.000
6/76	0.000	0.000	0.000	0.000	1.037	1.033	1.012	1.012
6/77	0.000	0.000	0.000	1.077	1.055	1.028	1.017	1.007
6/78	0.000	0.000	1.181	1.119	1.049	1.020	1.016	1.013
6/79	2.847	1.475	1.196	1.081	1.047	1.042	0.993	0.998
6/80	2.613	1.430	1.165	1.069	1.055	1.005	1.001	0.993
6/81	2.603	1.411	1.159	1.082	1.033	1.007	0.994	
6/82	2.609	1.438	1.180	1.064	1.011	0.995		
6/83	2.820	1.548	1.142	1.066	1.013			
6/84	2.961	1.407	1.181	1.053				
6/85	2.746	1.494	1.142					
6/86	2.730	1.407						
6/87	2.585							

Retrospective Test

LAE1A.WK1 EXHIBIT IV

LAE Reserve Analysis @ 2nd Quarter, 1989
Allocated Loss Expense Payment

Line MUTUAL 1A
Source LAE1A.WK1

	6-18	18-30	30-42	42-54	54-66	66-78	78-90	90-102
1975	0.000	0.000	0.000	0.000	0.000	1.006	1.015	0.000
1976	0.000	0.000	0.000	0.000	1.037	1.033	1.012	1.012
1977	0.000	0.000	0.000	1.077	1.055	1.028	1.017	1.007
1978	0.000	0.000	1.181	1.119	1.049	1.020	1.016	1.013
1979	2.847	1.475	1.196	1.081	1.047	1.042	0.993	0.998
1980	2.613	1.430	1.165	1.069	1.055	1.005	1.001	0.993
1981	2.603	1.411	1.159	1.082	1.033	1.007	0.994	
1982	2.609	1.438	1.180	1.064	1.011	0.995		
1983	2.820	1.548	1.142	1.066	1.013			
1984	2.961	1.407	1.181	1.053				
1985	2.746	1.494	1.142					
1986	2.730	1.407						
1987	2.585							
	2.724	1.436	1.155	1.061	1.019	1.003	1.000	1.000
	4.899	1.799	1.253	1.084	1.022	1.003	1.000	1.000

Paid Allocated at 06/89 for		Ultimate Factor	Ultimate Alloc LAE	Reserve set @ EOY ALAE	Reserve set @ EOY UALAE	Total LAE @ EOY	Total LAE %	EOY UALAE %
1978 & Prior	1,854,260							
1979	1,975,427							
1980	2,002,840	1.000	2,002,840					
1981	1,993,210	1.000	1,993,210					
1982	1,945,644	1.000	1,945,644					
1983	2,067,315	1.003	2,072,689					
1984	2,340,953	1.022	2,392,499			3,364,784		
1985	2,565,374	1.084	2,781,217	3,114,338	1,049,215	4,163,553		
1986	2,594,018	1.253	3,249,229	4,570,529	1,003,299	5,573,828		
1987	1,942,797	1.799	3,494,623	4,458,915	1,454,763	5,913,678	21.4%	24.6%
1988	762,623	4.899	3,736,355	5,932,433	1,935,516	7,867,949	21.4%	24.6%
			Difference	2,196,078				

Exhibit V
Loss Reserve Analysis
Kentucky Farm Bureau Mutual Insurance Company

	Premium in Force 6/89	IBNR %	LAE %	Unallocated LAE %
Mutual				
*BI	$14,224,504	118.3%	**19.5%	24.6%
PD	12,283,019	13.0	**19.5	24.6
PIP	8,876,887	1.0	**19.5	24.6
*UM	1,628,767	81.0	**19.5	24.6
MED	208,267	16.0	**19.5	24.6
COMP	7,021,794	9.6	8.2	16.0
COLL	$16,714,549	5.3%	8.2%	16.0%
FO	$22,526,212	6.6%	21.5%	22.0%
HO	20,193,908	3.0	21.5	22.0
SMP	3,533,226	6.5	21.5	22.0
MH	$ 3,931,449	2.0%	21.5%	22.0%
WC	$ 1,486,625	91.5%	33.8%	24.0%
OLT	$ 806,388	14.0%	52.5%	28.3%
CPL	13,136	0.0	52.5	28.3
FCL	624,204	14.0	52.5	28.3
BOAT	$ 920,983	3.0%	52.5%	28.3%
FB				
*BI	$ 1,048,988	243.0%	20.4%	15.8%
PD	1,165,160	18.0	20.4	15.8
PIP	995,006	5.0	20.4	15.8
UM	132,375	37.0	20.4	15.8
MED	15,995	19.5	20.4	15.8
COMP	304,760	15.2	8.2	32.0
COLL	$ 758,124	7.5%	8.2%	32.0%

*Indicates change in IBNR factor from December 1988
**Indicates change in LAE factor from December 1988

The next speaker is Jeff Hanson. Jeff works for a well-known mutual insurance company in northwest Ohio that has a very sophisticated reserving system, Central Mutual Insurance Company. He's worked for Central for the past three years and has over 11 years of actuarial experience.

Jeff graduated from Gustavus Adolphus College in 1977 with a bachelor or arts degree majoring in mathematics. He earned his CAS fellowship in 1985. Jeff.

MR. HANSON: Thank you, Jim. You did a very nice with that college name. That's the best I've heard it pronounced ever.

Today I'm going to talk to you about a corporate forecasting model that I use in my work at Central. I feel I should start here by delivering an apology to the members of the audience that are using very sophisticated forecasting models right now.

It's my goal to put forward a very simple, straightforward model that is really just an organization of data put together with a little bit of algebra to present the implications of your loss reserve work to all the company personnel within all the various departments of your company.

I think there is a tendency when you're doing loss reserve work in small companies to really feel rushed. You put in a lot of time and you get that final calculation exactly correct and you feel the job is done. The work goes on to your computer systems and your accounting departments and they produce all your calendar year reports. You sit back and regain some of your strength.

But with a little bit of extra work you can summarize your accident year statistics and put out a model that gives a projection for the future and all the benefits that that can create for you.

So what I'm going to show you today is a corporate forecasting model that I use that uses accident year statistics. It shows information by program. What I mean by that is the type of policies written rather than by coverage. It combines your loss information with premium and expense information. It shows historical information as well as future projections.

I guess I view it as kind of a bridge between your loss reserve work and your pricing work. So, I see it as work done by your loss reserving people because it's communication that comes out of that work. But it does bridge very nicely to your pricing side, too.

When I do my forecasting work, I concentrate first on the voluntary business that the company retains. Then I add to that any ceded or assumed business and any involuntary business that is written.

At this point if you want to separate your handout, or at least put a finger back into where the exhibits are, I think it would be most helpful for you to follow along on the exhibits during the rest of this presentation.

I guess when I agreed to do this presentation I agreed to share some work that I was doing and I didn't really know I was submitting myself to a personality test. As long as Jim elevated the stakes, I'll go ahead.

On Exhibit 1 I've shown our commercial programs. This is all fictitious data so you aren't going to derive anything exceptional here other than you'll see how the model works mechanically.

The programs are listed down the left side. I have the flexibility here to show six different commercial programs. What I mean by that is showing package policies, monoline property policies, monoline GL policies, and workers compensation policies separately. Any kind of program that you would have that you would want to display separately.

The first element on this page that you need for all completed years is your policy year direct written premiums which I'm referring to on that page as your ending inventories. You need your premium retention ratios and something that I call premium change on renewal. That's how much you changed your prices by on individual policies in that year. It can be due to rate level effects, exposure changes, or anything that would affect the premiums. Then, some kind of measure of how much new business premium you wrote.

The algebra that's involved is that you take the prior year's written premium, which I called the beginning inventory on the page, multiply it by your current year retention ratio, times your current year premium change on renewal to get your renewal premium.

To get the ending inventory, you add your new business premium, and because the calculation isn't always going to work exactly right, you have an adjustment area to report on historically how well the calculation works.

Then, down at the very bottom I've computed what I refer to as an exposure change. To calculate that I'm dividing how much new business premium you wrote, by the premium change on renewal to back it off one year in its value, divided by your prior year written premium to get a percentage measure of how much business you're replacing through new business. Add that to your retention ratio and you get your exposure change.

As far as projections for the future, there's really just three things that you need to know or need to try to make your best guess at. That's your premium retention ratios your premium changes on renewal and your new business premium. I find it fairly convenient in the new business premium area to simply use what you wrote in new business in the prior year times your premium change on renewal. It essentially assumes you'll be writing as many policies in the future as you wrote in the prior year.

But all that can be played with. Whatever works best in your situation.

Exhibit 2 addresses accident year losses and allocated loss adjustment expenses. Again there are four elements that are needed for the historical period. First you need to know what your accident year net incurred losses are, which you can get out of your loss reserve work that has just been completed. Then, you need some kind of measure of your frequency change, severity change, and the ratio of your allocated loss adjustment expenses to losses.

A lot of measures of frequency and severity are possible, industry measures or company measures. I'm sure you all have measures of those to work with.

The algebra involves just taking the prior year's losses times the frequency change times the severity change times an exposure change to get your current year losses. The exposure change that I've used there I've just taken form the prior page which was really

a policy or exposure change. What I actually do is I average two policy years together to get an accident year exposure change. I just displayed it that way so you can see where the number would come from.

The current year incurred losses and allocated loss adjustment expenses shown at the very bottom of the page are your current year losses times one plus your ratio of allocated loss adjustment expense to loss.

Three estimates are needed for your projection period to complete that exhibit. You need a measure of your frequency change. You need a measure of your severity change. And you need some kind of estimate of what your ratio of allocated loss adjustment expense to loss will be.

The third page is probably the easiest page to complete and the one that doesn't involve a whole lot of guesswork or adjustment. That involves what I refer to as operating expenses. It includes both general expense and unallocated loss adjustment expenses.

I choose to lump those together in my forecasting work because they are so much alike. They are really tied to company salaries and employee benefits. I'm sure all of you work in companies where you have allocations of people's salaries between general expense and unallocated loss adjustment expenses. Even though we try to be very sophisticated with that, the splits change through time and the splits aren't exact. It's easiest to just to lump it together, I think, for forecasting purposes.

So, for all the completed years you do need the calendar year general and unallocated loss adjustment expenses. You need the percent of those expenses that are expected to vary with premium. You need the percent of those that vary with salaries. Then you lump the rest together into more of a fixed type expense area. You need the average salary change, the employee count change, and the Consumer Price Index change.

As far as the calculation goes, there's really three different projections done. You take the prior year expenses times the percent that varies with premium and multiply that by how you're projecting the premiums to change by. You take the prior year expenses and multiply it by the percent that are salaries and multiply that by the average salary change and the employee count change.

The third step is to take the prior year expenses times one minus the percent variable and the percent salary and take that times the Consumer Price Index change.

Add those three pieces together and you've got a projection of what the current year expenses will be.

For the future period projections, you need to make an estimate of what percent of the expenses will be variable, what percent will be salary, what the average salary change will be, what the employee count change will be, and what the Consumer Price Index change will be.

Exhibit 4. The purpose of this exhibit is to turn the policy year premiums that were derived on page 1 into calendar year net earned premiums. As you can see, I've shown the prior policy year premium and the current policy year premium and a factor to put those two together into a direct calendar year earned premium. Then you subtract your ceded reinsurance premium, including both treaty and facultative, and you wind up with the net calendar year earned premium down at the bottom.

Again, an adjustment is included here because the factors may not work perfectly and you may have to do just a little bit of adjusting.

Exhibit 5 really is just collecting all the information from the prior exhibits. Up at the very top it starts with the net calendar year premium which you just derived from Exhibit 4. The net accident year incurred losses and allocated loss adjustment expenses which came from Exhibit 2. Comparing those two we get a ratio, which is labeled the loss and allocated ratio to earned premium.

The general expenses and unallocated loss adjustment expenses which were derived on Exhibit 3 are compared to the written premium to get a ratio. The commission and tax ratio and the dividend ratio which are added new at this point are displayed next.

Adding all the ratios together you get the combined underwriting ratio at the bottom. Note at this point the entire amount of the operating expense is ratioed to written premium in coming up with that combined ratio.

In most publications you'll see the unallocated loss adjustment expenses will be ratioed to earned premium, and I do that in a later exhibit. But for purposes here I've chosen just to compare the whole operating expense to the written premium.

Exhibits 6 through 10 are very similar exhibits. Here I'm showing four personal lines programs. I've chosen to separate commercial and personal in doing the detail analysis.

Please turn back to Exhibit Number 11. Exhibits 11 and 12 are what I refer to as a corporate voluntary business summary. Here I'm taking the commercial lines projections and the personal lines projections and putting them together into a total corporate projection.

The first page of Exhibit 11 shows a bunch of dollar figures for the folks that like to concentrate on dollar amounts. It summarizes the premium, loss, and expense information and shows an underwriting profit or loss on the bottom of the exhibit. On this exhibit the unallocated loss adjustment expenses and general expenses are broken out from the operating expenses.

Exhibit 12 converts all those dollar figures into ratios. At this point I show both the unallocated loss adjustment expense ratio to earned premium and the ratio to written premium. In the underwriting ratio shown at the bottom of the page I've included the unallocated ratio that's ratioed to earned premium so that that underwriting ratio then would compare to what we would see in most of our financial statements.

Any questions on any of the material up until now? Yes?

QUESTION: What is the beginning inventory?

MR. HANSON: The beginning inventory is simply the ending inventory of the prior year. So, it's the policy year direct written and premium of the prior year.

Exhibit 13 is an exhibit that might be unique to Central. Possibly you will have something similar to it in your companies. I refer to it as our corporate account. It contains all the information that we would assume from a pool. It contains what our annual aggregate retention for our reinsurance treaty would be. Any other premiums that aren't residing in our regional accounts but come into a corporate account would be retained there.

It's really just an accounting page to add that piece in. I show the direct earned premium that we get from a pool, as well as the direct written premium, what our reinsurance cost is from that pool, what our added reinsurance cost as a company is because of the premium we get from that pool, what we retain of our reinsurance costs, any adjustments from prior year retrospective reinsurance costs, and then any other adjustments that have to be included.

Then Exhibit 14 is a complete corporate summary. It combines the projection of voluntary results, the corporate account, and all the involuntary pools, such as the workers' compensation pools, assigned risk auto pools, fair plans, and so forth. This leads to figures that most people in the company are a little bit more familiar with seeing, the calendar year earned premium both on a direct and net basis, the calendar year written premiums on a direct and net basis, and, finally, the calendar year underwriting result on a net basis.

Down at the very bottom I end up with an accident year underwriting result projection, but then to build some familiarity into this model, I compare it to other statements that people are seeing, I show the difference between the calendar year and accident year losses so that I can get the calendar year underwriting ratio which would then tie to the numbers that come out of our accounting departments.

I show a dollar figure there of what the underwriting profit is expected to be and what it has been in the historical period. At this point there is a fairly direct comparison of the accident year and calendar year numbers.

This is a piece of work that I do as a follow-up to the loss reserve work. It seems to work fairly effectively in communicating with other department heads so that everybody is on the same wavelength as to how the results are looking and has a good measure of where the company is currently at.

There's a lot of other side applications that this can be applied to. For example, in your premium budgeting process you can take an exhibit like the first exhibit and do it on a state basis. You can do it on a regional office basis, which I do, and it helps you as part of your premium budgeting process. It gets used in staffing considerations by developing estimates of how many policies you're going to be writing and, therefore, how many people you'll have to have to process those policies.

Claims departments get a set of reports out of this system that estimate how many claims we might have to be handling and, therefore, how many features and how many times we might have to handle claims.

A loss control department could look at the policy count projection and try to make some estimates as to how many loss control specialists they'll have to have to be making inspections.

A third area that this model has some application is in the asset management area. You can take your current loss reserves and do a projection of how you expect them to pay out, then you can take these forecasted numbers and do some projecting on payouts of future incurred losses. Putting these payout projections together and comparing them to your current asset maturity schedules, you can determine whether the investment policy that your corporation is following leads to a matching situation or whether it doesn't lead to a matching situation.

I alluded in my introduction that this is a nice bridge to the pricing area. Probably some of you are involved in pricing. Some of you have other departments maybe that are doing the pricing. But it's a nice little communication vehicle between reserving and pricing activities. If the pricing department is developing rate indications of a certain amount, the work on these exhibits should support that work and really reinforce that work.

I guess all I want to say in conclusion is that this forecasting work and these add-ons may take a little bit of time to initially set up if you're planning to program them yourself, but they really update pretty simply. The communication value of them I think certainly makes the work worth it.

When people get familiar with the work and get their heads inside it by playing some with the variables, they understand the variables a little bit better. This develops a better understanding between pricing changes and the frequency and severity changes that the corporation experiences.

Thank you.

(Applause.)

MR. INKROTT: Thank you, Jeff. At this time we would entertain any questions.

I have one really for all three. In your experience, is it possible to have communications that are too good at a small company?

Pat, you mentioned something about the claims department being consistent. Do you find that since it's so easy for other departments to know what you're doing that there might tend to be over-reaction in the claims area or over-reaction from the CEO and that kind of thing?

MR. CROWE: Yes, especially when it comes to reserving in the claims department. I'm really sensitive about how it's expressed. I don't know if it's over-communicated. It's just amazing the statements that we get in our company when we change the reserves or we talk about reserves. Our agent's bonuses, etc.

I mean, it's hilarious. The investors say we charge too little; the consumers say we charge too much. The same is true for our reserves. The agents think they're too high; our auditors think they're too low.

But, anyway, it's a real problem whenever we talk about reserves because immediately the agents say that, yes, you're loading them up so we don't have bonuses -- it can have a terrible effect on the claim adjuster out there because it's all his fault now. He can easily overreact to the change in reserves.

That's why I keep preaching to them that if we're 20 percent deficient, that's good. You ought to be proud of how consistent you are. Every time someone criticized the reserves of our claim adjusters, I always back them up the best I can because I'm worried about them being defensive and overreacting to what they're doing. And I don't think it's right either.

MR. RICE: Yes. I'll have to double up on that one. We have just gone through a process at the company where the information of the IBNR and bulk reserve loading, particularly in their fairly new less than five years personal automobile program was taken as a criticism by the claims department despite all my protestations to the contrary -- buying

them lunch, buying them everything, congratulating them -- it still didn't make any difference. All they knew was that this crazy actuary was over there loading numbers on top of theirs.

Through the course of a couple or a number of meetings with the claims adjusters and the claims examiners, and hiring a few more from the outside, they went through and put a factor on top of the case reserving process that is going to make my life really difficult at the year end to come up with some kind of a factual adjustment to offset for this.

So, yes, there definitely can be an over-communications problem.

MR. HANSON: I guess, Jim, there's three things I'd like to say in response to that. First of all, you have to communicate at a level where people are going to accept your numbers and not do a lot of second-guessing of your numbers. But you have to be careful so that you don't influence people to disturb your historical patterns. That's a true statement.

The second thing is that throughout the year I get a lot of questions from our profit centers as to what happened in this specific program or what happened in a specific month. You've really got to be careful, I think, in answering those types of questions because I like to view the reserving process in two ways. One, you determine the dollars that your corporation needs, and, number two, you've got an allocation system to allocate the corporate need dollars with all the statistical detail that is needed.

A lot of times the bouncing around that takes place during the year is due to your allocations system moving some dollars from this area to another area, and it makes funny results in both areas.

You've got to be a little careful, I think, in explaining those types of things because it can lead to some manipulation by your profit centers. If you're reliant on an outstanding claim count and if you use that too heavily in all your explanations, it becomes putting two and two together for the profit centers to know that if they get their outstanding claim counts down they're going to be profitable.

The third thing I have a concern about -- and it especially applies, I think, in smaller companies -- is you've got to pick your most valuable information. You've got to pick your spots because you can't distribute so much information that your corporation dies in analysis. You have to be consistent. You have to give them the most important material and support it as you have to so that they can accept it and use it. But not paralyze the whole operation.

MR. INKROTT: Any other questions? Yes?

QUESTION: I have a question of Vern. You talked about giving a best guess, an optimistic and a pessimistic guess. How do you do the optimistic and the pessimistic? Do you get them close to the development factors?

MR. INKROTT: Did everybody hear the question?

MR. RICE: As I said, I've got the Lotus program and I've got everything set up there. I just usually closet myself and try to use all the factors -- a lot of them are really undefinable -- that I feel are affecting the outcome. I will make adjustment factors in there, safety factors, and optimistic factors.

But I just try to incorporate everything that I can possibly bring to it to say that, you know, like if a hurricane comes across the center of Florida, you know, I've got a different situation than if we have a nice clear year. Then the one that is given to the committee is simply the straight line, hopefully the average type result. Everything else is really a function of whatever I can throw into the pot to make it come out that way.

MR. INKROTT: Charlie?

QUESTION: This is for Jeff. On your Exhibits 1 and 2, a number of these things are based on factors -- maybe some from external information or from internal reports such as frequency or the premium retention ratio. Do you have, say in your own company, easy access to things like retention ratios or premium changes and the such?

MR. HANSON: I do have very easy access to that information. Just recently we've developed a set of reports that includes all of our nice clean business. In other words, if we write an annual term policy, just our annual term policies go into that report. If we write a semiannual policy, just the semiannual policies go into that report.

This report displays a set of policies that you wrote in the same month one year ago and separately displays the policy count and the premium for the business that you kept and what you charged for the renewal policy. This yields your premium change on renewal and retention ratios. The report also shows the new business we wrote in that month.

We also get three-month, six-month and 12-month summaries of that information. So, we get very direct information.

As far as frequency and severity are concerned, I use the industry statistics that I have available for both the frequency and severity change. Then the adjustment area will either come out with a positive or negative number depending on how our frequency and severity compared to the industry. Our claims department, our underwriters, and our other personnel like to look at the adjustment area to see whether they in their phraseology, either beat or didn't beat the industry.

So, it has a little bit of a game atmosphere to it. You could run your own company statistics into there as well. Either way would work.

QUESTION: Your Exhibit 5 talks about the IBNR as a percent of premiums in force. I've seen that in operation and for the most part I like the way it works although on long tail lines when you start developing IBNRs for many accident years a percent of one year's of in-force premium I have some difficulty with seeing this in action because some people will misunderstand this and they may have the opinion that, oh, gee, for every dollar of premium we write the actuaries put in $2.50 of IBNR and how can we possibly make any money on that?

I'd like you to comment on that and how that has worked for your company.

MR. CROWE: Well, there's some truth to that for every dollar in premium, we put $2.43 in IBNR. I guess that question hasn't come up about putting $2.43 in IBNR.

But the other issue about the long tail lines. This is not a great method. To me it's like an interim method for the months that I don't have time to evaluate. The question is, in theory if your exposure has gone up ten percent, then your IBNR should grow some proportion that you find out from history. It won't work out exactly.

As a matter of fact, we change our IBNR factors every year. There's some little adjustments up and down. But it gets me in the ballpark. Then when I have to make an adjustment in June and September I'm only making an incremental adjustment as opposed to -- and I'm trying to explain that IBNR going up for every dollar in premium by $2.43.
QUESTION: We understand that, but I've got a couple of users or customers who don't have knowledge.

MR. CROWE: Yeah.

QUESTION: It would make a real big difference if you're using some of those numbers to work out your age and continued and that kind of stuff.

MR. CROWE: Well, see, they don't --

QUESTION: Maybe somebody brand new in the system is -(Inaudible.)

MR. CROWE: Well, I guess the point -- well, I could explain it to him but I'd have to go through the increments and all that kind of stuff because I'm getting the total number which is more than just the premium. Thank God, I haven't addressed that question.

(Laughter.)

MR. INKROTT: Yes?

QUESTION: I have a question for Vern. The actuary in the small company often faces the problem of shortage of data, as you described, but you seem to be able to make up for it somewhat by being close to the operation and getting the smell and feel of things.

Would you have any advice for an actuary who is not on site, who is --

MR. INKROTT: That's a good question.

QUESTION: -- reserving for a small company?

MR. CROWE: How do you define not on-site?

QUESTION: Say, a consultant or -- in my case I'm an actuary for the holding company that owns a number of small companies. I don't have the advantage of being in the office of each company all the time and seeing monthly reports for all the companies on a continuous basis. In a small company environment you indeed have a problem. In deference to my consulting friends, their job gets easier. They just double any other projection and have it come out. If they're going to err, they're going to err on the side of not making a mistake.

The guy that you defined in off-site -- and I assume that your data sources are on-site, not where you are, also? Yes. There is some communication, some results are sent by mail.

MR. CROWE: Then basically you would not really have a good personal relationship with either the claims department or the underwriting department or even probably the geographical ramifications?

QUESTION: That exists. I have a good relationship, actually. I can call and get information and --

MR. CROWE: But you don't see it daily?

QUESTION: I don't see them daily so when things happen there, I have to wait to see it show up in the numbers rather than hear it at the lunch table, or something like that.

MR. CROWE: Yeah. I think the first thing I would be trying to do would be to make the reports that would be coming out of these areas consistent so that I would at least have the same kind of data to play with from these things.

I'm afraid if I were in that situation my frequent flyer bonuses would go up a lot because I'd have to spend an awful lot of time on site because so much of what I see and do in a small company is really hands-on, up front, looking at the situation.

I mean, bizarre little things for companies that we have in states that are not really near us -- to try to get underwriters to do things simply like prescribe to the local paper, you know, in an Arizona situation that are underwriting out there -- so that they have some touch with the geography, some touch with the situation. It's just invaluable.

I would have to be on-site to really do it correctly. Otherwise I'd be operating like a large company environment and simply spitting out numbers and just reviewing their ultimate effect without putting any of this personal touch on it. It would be a difficult job.

QUESTION: Thank you.

MR. INKROTT: Question? Leroy?

QUESTION: I'm Leroy Hare. I'm with the Berkley Group of Companies. I have a question for Jeff. I notice on your model that you measure changes in exposure. I just wonder what you're using for exposure information for, say, general liability or for Section 2 of a commercial package program. How do you measure this exposure change?

MR. HANSON: The exposure change there at the bottom is a very loose term. I'm really not looking at exposure at all. I'm just saying, for example, if you retained 80 percent of your policies and you didn't write anything new, the exposure change that would show on that page would be .8.

I look at the new business premium that is actually written and determine its relative size to what the beginning inventory was. Let's say 15 percent. If you retained 80 percent and replaced 15 percent with new business, then the exposure change on the bottom of that page would be .95.

I'm not actually looking at the amount of exposure written. I'm just looking at the premium that was written and use that as an approximation of what the exposure change was.

QUESTION: I was just curious because that's a problem that I think all small companies struggle with. It's that once you get away from automobile where you have car years, and homeowners where you have house years, and into things like general liability where you have product, M&C and OLNP, all on different selective and rating bases, how do you conglomerate those to get an exposure that is ideally independent of whether the premium is adequate or not?

MR. HANSON: I think you're well set up for another panel in another year.

MR. INKROTT: LeRoy.

QUESTION: I'm LeRoy Simon. You usually don't allow two questions from two LeRoys in a row.

(Laughter.)

MR. INKROTT: Yes.

QUESTION: If I may make a comment on your opening question, one thing that I have found in trying to be protective in talking to claims people to keep them from going crazy and not be consistent, is to explain why their reserve was 80 percent of the need amount by telling them that I have no doubt that if you had perfect knowledge, that you would have had perfect reserves. Therefore, you must have had 80 percent of the knowledge available, and things do change and they do -- you do get more information as time goes on, and all I want you to do is just keep doing what you're doing.

MR. INKROTT: Right.

QUESTION: It's not, you know, a shortfall error in judgment. It's just 80 percent of the available knowledge.

MR. INKROTT: That's good. That's tricky. I think everyone was saying that you have to watch how you say it. But there is so much interest in a smaller company in those numbers and you have to say something.

Well, thank you very much. If we break now, we can maybe beat the rest of the crowd to the coffee. I appreciate your attentiveness. Thanks.

(Applause.)

06/30/89 COMMERCIAL ********** POLICY YEAR DIRECT WRITTEN PREMIUMS ********** EXHIBIT 1

	PROGRAM	---1984----	---1985----	---1986----	---1987----	---1988----	---1989----	---1990----	---1991----
BEGINNING INVENTORY	1	1,000,000	860,000	950,000	1,128,000	1,153,000	1,272,000	1,531,008	1,789,351
	2	1,000,000	1,163,000	1,068,000	1,130,000	1,262,000	1,380,000	1,502,280	1,629,422
	3	1,000,000	964,000	1,141,000	1,179,000	1,238,000	1,353,000	1,481,810	1,624,994
	4	1,000,000	956,000	1,034,000	1,210,000	1,332,000	1,426,000	1,538,020	1,668,275
	5	1,000,000	930,000	1,090,000	1,259,000	1,288,000	1,392,000	1,511,840	1,648,117
	6	1,000,000	1,064,000	1,211,000	1,132,000	1,278,000	1,348,000	1,451,088	1,563,583
	TOTAL	6,000,000	5,937,000	6,494,000	7,038,000	7,551,000	8,171,000	9,016,046	9,923,741
PREMIUM RETENTION RATIO	1	0.6000	0.7000	0.8000	0.7000	0.7000	0.8000	0.8000	0.8000
	2	0.7000	0.6000	0.7000	0.7000	0.8000	0.8000	0.8000	0.8000
	3	0.8000	0.8000	0.7000	0.8000	0.7000	0.7000	0.7000	0.7000
	4	0.7000	0.8000	0.8000	0.7000	0.7000	0.7000	0.7000	0.7000
	5	0.6000	0.7000	0.8000	0.8000	0.7000	0.7000	0.7000	0.7000
	6	0.8000	0.8000	0.7000	0.8000	0.7000	0.7000	0.7000	0.7000
PREMIUM CHANGE ON RENEWAL	1	1.1000	1.0800	1.0900	1.0800	1.0800	1.0800	1.0800	1.0800
	2	1.0900	1.1000	1.1100	1.0900	1.0700	1.0700	1.0700	1.0700
	3	1.0800	1.0900	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000
	4	1.0800	1.0900	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000
	5	1.0500	1.0600	1.1000	1.0800	1.1000	1.1000	1.1000	1.1000
	6	1.0800	1.0700	1.1000	1.0800	1.0600	1.0800	1.0800	1.0800
RENEWAL PREMIUM	1	660,000	650,160	828,400	852,768	871,668	1,099,008	1,322,791	1,545,999
	2	763,000	767,580	829,836	862,190	1,080,272	1,181,280	1,285,952	1,394,785
	3	864,000	840,608	878,570	1,037,520	953,260	1,041,810	1,140,994	1,251,245
	4	756,000	833,632	909,920	931,700	1,025,640	1,098,020	1,184,275	1,284,572
	5	630,000	690,060	959,200	1,087,776	991,760	1,071,840	1,164,117	1,269,050
	6	864,000	910,784	932,470	978,048	948,276	1,019,088	1,097,023	1,182,068
NEW BUSINESS PREMIUM	1	200,000	300,000	300,000	300,000	400,000	432,000	466,560	503,885
	2	400,000	300,000	300,000	400,000	300,000	321,000	343,470	367,513
	3	100,000	300,000	300,000	200,000	400,000	440,000	484,000	532,400
	4	200,000	200,000	300,000	400,000	400,000	440,000	484,000	532,400
	5	300,000	400,000	300,000	200,000	400,000	440,000	484,000	532,400
	6	200,000	300,000	200,000	300,000	400,000	432,000	466,560	503,885
	TOTAL	1,400,000	1,800,000	1,700,000	1,800,000	2,300,000	2,505,000	2,728,590	2,972,483
ADJUSTMENT	1	0	-160	-400	232	332	0	0	0
	2	0	420	164	-190	-272	0	0	0
	3	0	392	430	480	-260	0	0	0
	4	0	368	80	300	360	0	0	0
	5	0	-60	-200	224	240	0	0	0
	6	0	216	-470	-48	-276	0	0	0
ENDING INVENTORY	1	860,000	950,000	1,128,000	1,153,000	1,272,000	1,531,008	1,789,351	2,049,884
	2	1,163,000	1,068,000	1,130,000	1,262,000	1,380,000	1,502,280	1,629,422	1,762,298
	3	964,000	1,141,000	1,179,000	1,238,000	1,353,000	1,481,810	1,624,994	1,783,645
	4	956,000	1,034,000	1,210,000	1,332,000	1,426,000	1,538,020	1,668,275	1,816,972
	5	930,000	1,090,000	1,259,000	1,288,000	1,392,000	1,511,840	1,648,117	1,801,450
	6	1,064,000	1,211,000	1,132,000	1,278,000	1,348,000	1,451,088	1,563,583	1,685,953
	TOTAL	5,937,000	6,494,000	7,038,000	7,551,000	8,171,000	9,016,046	9,923,741	10,900,202
EXPOSURE CHANGE	1	0.7818	1.0228	1.0893	0.9464	1.0215	1.1145	1.0822	1.0607
	2	1.0670	0.8348	0.9532	1.0246	1.0220	1.0174	1.0137	1.0108
	3	0.8926	1.0859	0.9394	0.9546	0.9935	0.9956	0.9969	0.9978
	4	0.8852	0.9923	1.0638	1.0008	0.9732	0.9805	0.9861	0.9901
	5	0.8857	1.1057	1.0500	0.9473	0.9825	0.9874	0.9910	0.9937
	6	0.9852	1.0637	0.8498	1.0453	0.9951	0.9967	0.9977	0.9984

06/30/89 COMMERCIAL ********** ACCIDENT YEAR NET INCURRED LOSSES AND ALAE ********** EXHIBIT 2

	PROGRAM	1984	1985	1986	1987	1988	1989	1990	1991
PRIOR YEAR INCURRED LOSSES	1	600,000	512,000	571,000	678,000	700,000	780,000	948,214	1,119,298
	2	700,000	823,000	757,000	795,000	897,000	1,010,000	1,131,966	1,264,026
	3	700,000	662,000	761,000	757,000	765,000	805,000	849,018	896,607
	4	600,000	592,000	654,000	779,000	879,000	960,000	1,036,260	1,124,941
	5	700,000	670,000	800,000	907,000	928,000	985,000	1,050,350	1,124,209
	6	600,000	638,000	733,000	673,000	760,000	817,000	879,480	947,661
	TOTAL	3,900,000	3,897,000	4,276,000	4,589,000	4,929,000	5,357,000	5,895,288	6,476,743
FREQUENCY CHANGE	1	1.0100	1.0100	1.0100	1.0100	1.0100	1.0100	1.0100	1.0100
	2	1.0200	1.0200	1.0200	1.0200	1.0200	1.0200	1.0200	1.0200
	3	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900	0.9900
	4	1.0100	1.0100	1.0100	1.0100	1.0100	1.0100	1.0100	1.0100
	5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
SEVERITY CHANGE	1	1.0800	1.0800	1.0800	1.0800	1.0800	1.0800	1.0800	1.0800
	2	1.0800	1.0800	1.0800	1.0800	1.0800	1.0800	1.0800	1.0800
	3	1.0700	1.0700	1.0700	1.0700	1.0700	1.0700	1.0700	1.0700
	4	1.0900	1.0900	1.0900	1.0900	1.0900	1.0900	1.0900	1.0900
	5	1.0800	1.0800	1.0800	1.0800	1.0800	1.0800	1.0800	1.0800
	6	1.0800	1.0800	1.0800	1.0800	1.0800	1.0800	1.0800	1.0800
EXPOSURE CHANGE	1	0.7818	1.0228	1.0893	0.9464	1.0215	1.1145	1.0822	1.0607
	2	1.0670	0.8348	0.9532	1.0246	1.0220	1.0174	1.0137	1.0108
	3	0.8926	1.0859	0.9394	0.9546	0.9935	0.9956	0.9969	0.9978
	4	0.8852	0.9923	1.0638	1.0008	0.9732	0.9805	0.9861	0.9901
	5	0.8857	1.1057	1.0500	0.9473	0.9825	0.9874	0.9910	0.9937
	6	0.9852	1.0637	0.8498	1.0453	0.9951	0.9967	0.9977	0.9984
ADJUSTMENT	1	316	-237	-485	43	31	0	0	0
	2	236	128	116	-316	161	0	0	0
	3	134	-481	-250	-471	-128	0	0	0
	4	7,300	7,296	13,055	20,755	18,199	0	0	0
	5	400	-85	-236	108	303	0	0	0
	6	-400	69	275	200	247	0	0	0
CURRENT YEAR INCURRED LOSSES	1	512,000	571,000	678,000	700,000	780,000	948,214	1,119,298	1,295,093
	2	823,000	757,000	795,000	897,000	1,010,000	1,131,966	1,264,026	1,407,479
	3	662,000	761,000	757,000	765,000	805,000	849,018	896,607	947,732
	4	592,000	654,000	779,000	879,000	960,000	1,036,260	1,124,941	1,226,212
	5	670,000	800,000	907,000	928,000	985,000	1,050,350	1,124,209	1,206,459
	6	638,000	733,000	673,000	760,000	817,000	879,480	947,661	1,021,828
	TOTAL	3,897,000	4,276,000	4,589,000	4,929,000	5,357,000	5,895,288	6,476,743	7,104,802
RATIO OF ALLOCATED LOSS ADJUSTMENT EXPENSE (ALAE) TO LOSS	1	0.2100	0.2200	0.2200	0.2100	0.2000	0.2000	0.2000	0.2000
	2	0.0900	0.1000	0.1200	0.1000	0.1000	0.1000	0.1000	0.1000
	3	0.1000	0.0900	0.0800	0.0800	0.0800	0.0800	0.0800	0.0800
	4	0.4300	0.3500	0.4200	0.4000	0.4000	0.4000	0.4000	0.4000
	5	0.0900	0.1000	0.0800	0.0700	0.0700	0.0700	0.0700	0.0700
	6	0.0600	0.0700	0.0800	0.0700	0.0600	0.0600	0.0600	0.0600
CURRENT YEAR INCURRED LOSSES AND ALAE	1	619,520	696,620	827,160	847,000	936,000	1,137,857	1,343,158	1,554,111
	2	897,070	832,700	890,400	986,700	1,111,000	1,245,162	1,390,429	1,548,227
	3	728,200	829,490	817,560	826,200	869,400	916,939	968,336	1,023,550
	4	846,560	882,900	1,106,180	1,230,600	1,344,000	1,450,764	1,574,918	1,716,697
	5	730,300	880,000	979,560	992,960	1,053,950	1,123,874	1,202,904	1,290,911
	6	676,280	784,310	726,840	813,200	866,020	932,249	1,004,521	1,083,137
	TOTAL	4,497,930	4,906,020	5,347,700	5,696,660	6,180,370	6,806,846	7,484,265	8,216,634

06/30/89 COMMERCIAL ********** CALENDAR YEAR GENERAL AND ULAE EXPENSES ********** EXHIBIT 3

	PROGRAM	---1984----	---1985----	---1986----	---1987----	---1988----	---1989----	---1990----	---1991----
PRIOR YEAR GENERAL EXPENSES AND ULAE	1	100,000	99,000	98,000	100,000	104,000	110,000	117,866	125,718
	2	100,000	103,000	100,000	101,000	106,000	112,000	118,205	124,689
	3	100,000	101,000	101,000	101,000	105,000	111,000	117,252	123,880
	4	100,000	100,000	98,000	100,000	105,000	110,000	115,940	122,300
	5	100,000	100,000	99,000	101,000	105,000	110,000	116,056	122,511
	6	100,000	102,000	101,000	100,000	105,000	110,000	115,908	122,150
	TOTAL	600,000	605,000	597,000	603,000	630,000	663,000	701,227	741,248
PERCENT VARIABLE	1	0.1200	0.1100	0.1300	0.1200	0.1400	0.1400	0.1400	0.1400
	2	0.1200	0.1100	0.1300	0.1200	0.1400	0.1400	0.1400	0.1400
	3	0.1200	0.1100	0.1300	0.1200	0.1400	0.1400	0.1400	0.1400
	4	0.1200	0.1100	0.1300	0.1200	0.1400	0.1400	0.1400	0.1400
	5	0.1200	0.1100	0.1300	0.1200	0.1400	0.1400	0.1400	0.1400
	6	0.1200	0.1100	0.1300	0.1200	0.1400	0.1400	0.1400	0.1400
PERCENT SALARIES	1	0.5700	0.5800	0.5700	0.6000	0.5900	0.5900	0.5900	0.5900
	2	0.5700	0.5800	0.5700	0.6000	0.5900	0.5900	0.5900	0.5900
	3	0.5700	0.5800	0.5700	0.6000	0.5900	0.5900	0.5900	0.5900
	4	0.5700	0.5800	0.5700	0.6000	0.5900	0.5900	0.5900	0.5900
	5	0.5700	0.5800	0.5700	0.6000	0.5900	0.5900	0.5900	0.5900
	6	0.5700	0.5800	0.5700	0.6000	0.5900	0.5900	0.5900	0.5900
AVERAGE SALARY CHANGE	1	1.0600	1.0400	1.0400	1.0500	1.0500	1.0500	1.0500	1.0500
	2	1.0600	1.0400	1.0400	1.0500	1.0500	1.0500	1.0500	1.0500
	3	1.0600	1.0400	1.0400	1.0500	1.0500	1.0500	1.0500	1.0500
	4	1.0600	1.0400	1.0400	1.0500	1.0500	1.0500	1.0500	1.0500
	5	1.0600	1.0400	1.0400	1.0500	1.0500	1.0500	1.0500	1.0500
	6	1.0600	1.0400	1.0400	1.0500	1.0500	1.0500	1.0500	1.0500
EMPLOYEE COUNT CHANGE	1	0.9400	0.9000	0.9500	0.9900	1.0000	1.0000	1.0000	1.0000
	2	0.9400	0.9000	0.9500	0.9900	1.0000	1.0000	1.0000	1.0000
	3	0.9400	0.9000	0.9500	0.9900	1.0000	1.0000	1.0000	1.0000
	4	0.9400	0.9000	0.9500	0.9900	1.0000	1.0000	1.0000	1.0000
	5	0.9400	0.9000	0.9500	0.9900	1.0000	1.0000	1.0000	1.0000
	6	0.9400	0.9000	0.9500	0.9900	1.0000	1.0000	1.0000	1.0000
CONSUMER PRICE INDEX CHANGE	1	1.0400	1.0400	1.0200	1.0400	1.0400	1.0500	1.0500	1.0500
	2	1.0400	1.0400	1.0200	1.0400	1.0400	1.0500	1.0500	1.0500
	3	1.0400	1.0400	1.0200	1.0400	1.0400	1.0500	1.0500	1.0500
	4	1.0400	1.0400	1.0200	1.0400	1.0400	1.0500	1.0500	1.0500
	5	1.0400	1.0400	1.0200	1.0400	1.0400	1.0500	1.0500	1.0500
	6	1.0400	1.0400	1.0200	1.0400	1.0400	1.0500	1.0500	1.0500
ADJUSTMENT	1	-355	308	-305	244	306	0	0	0
	2	9	472	329	59	341	0	0	0
	3	397	457	-352	-131	403	0	0	0
	4	-507	-425	-86	300	-269	0	0	0
	5	-195	-420	88	196	-418	0	0	0
	6	197	-29	-59	-38	-37	0	0	0
CURRENT YEAR GENERAL EXPENSES AND ULAE	1	99,000	98,000	100,000	104,000	110,000	117,866	125,718	133,687
	2	103,000	100,000	101,000	106,000	112,000	118,205	124,689	131,474
	3	101,000	101,000	101,000	105,000	111,000	117,252	123,880	130,901
	4	100,000	98,000	100,000	105,000	110,000	115,940	122,300	129,085
	5	100,000	99,000	101,000	105,000	110,000	116,056	122,511	129,374
	6	102,000	101,000	100,000	105,000	110,000	115,908	122,150	128,741
	TOTAL	605,000	597,000	603,000	630,000	663,000	701,227	741,248	783,261

06/30/89 COMMERCIAL ********** PREMIUM SUMMARY ********** EXHIBIT 4

	PROGRAM	CALENDAR YEAR ---1984----	---1985----	---1986----	---1987----	---1988----	---1989----	---1990----	---1991----
DIRECT WRITTEN PREMIUM (PRIOR POLICY YEAR)	1	1,000,000	860,000	950,000	1,128,000	1,153,000	1,272,000	1,531,008	1,789,351
	2	1,000,000	1,163,000	1,068,000	1,130,000	1,262,000	1,380,000	1,502,280	1,629,422
	3	1,000,000	964,000	1,141,000	1,179,000	1,238,000	1,353,000	1,481,810	1,624,994
	4	1,000,000	956,000	1,034,000	1,210,000	1,332,000	1,426,000	1,538,020	1,668,275
	5	1,000,000	930,000	1,090,000	1,259,000	1,288,000	1,392,000	1,511,840	1,648,117
	6	1,000,000	1,064,000	1,211,000	1,132,000	1,278,000	1,348,000	1,451,088	1,563,583
	TOTAL	6,000,000	5,937,000	6,494,000	7,038,000	7,551,000	8,171,000	9,016,046	9,923,741
DIRECT WRITTEN PREMIUM (CURRENT POLICY YEAR)	1	860,000	950,000	1,128,000	1,153,000	1,272,000	1,531,008	1,789,351	2,049,884
	2	1,163,000	1,068,000	1,130,000	1,262,000	1,380,000	1,502,280	1,629,422	1,762,298
	3	964,000	1,141,000	1,179,000	1,238,000	1,353,000	1,481,810	1,624,994	1,783,645
	4	956,000	1,034,000	1,210,000	1,332,000	1,426,000	1,538,020	1,668,275	1,816,972
	5	930,000	1,090,000	1,259,000	1,288,000	1,392,000	1,511,840	1,648,117	1,801,450
	6	1,064,000	1,211,000	1,132,000	1,278,000	1,348,000	1,451,088	1,563,583	1,685,953
	TOTAL	5,937,000	6,494,000	7,038,000	7,551,000	8,171,000	9,016,046	9,923,741	10,900,202
CURRENT POLICY YEAR SHARE OF CURRENT CALENDAR YEAR	1	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500
	2	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500
	3	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500
	4	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500
	5	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500
	6	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500
	TOTAL	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500
DIRECT CALENDAR YEAR EARNED PREMIUM	1	923,000	909,500	1,047,900	1,141,750	1,218,450	1,414,454	1,673,097	1,932,644
	2	1,089,650	1,110,750	1,102,100	1,202,600	1,326,900	1,447,254	1,572,208	1,702,504
	3	980,200	1,061,350	1,161,900	1,211,450	1,301,250	1,423,846	1,560,561	1,712,252
	4	975,800	998,900	1,130,800	1,277,100	1,383,700	1,487,611	1,609,660	1,750,059
	5	961,500	1,018,000	1,182,950	1,274,950	1,345,200	1,457,912	1,586,792	1,732,450
	6	1,035,200	1,144,850	1,167,550	1,212,300	1,316,500	1,404,698	1,512,960	1,630,886
	TOTAL	5,965,350	6,243,350	6,793,200	7,320,150	7,892,000	8,635,775	9,515,278	10,460,795
CEDED REINSURANCE PREMIUM	1	90,000	90,000	100,000	110,000	120,000	140,000	163,624	187,448
	2	110,000	110,000	110,000	120,000	130,000	140,000	151,849	164,232
	3	100,000	110,000	120,000	120,000	130,000	140,000	153,528	168,517
	4	100,000	100,000	110,000	120,000	130,000	150,000	162,704	177,206
	5	100,000	100,000	120,000	130,000	130,000	150,000	163,521	178,734
	6	100,000	110,000	120,000	120,000	130,000	140,000	150,853	162,660
	TOTAL	600,000	620,000	680,000	720,000	770,000	860,000	946,078	1,038,796
ADJUSTMENT	1	0	500	100	250	-450	0	0	0
	2	350	250	-100	400	100	0	0	0
	3	-200	-350	100	-450	-250	0	0	0
	4	200	100	200	-100	300	0	0	0
	5	500	0	50	50	-200	0	0	0
	6	-200	150	450	-300	500	0	0	0
	TOTAL	650	650	800	-150	0	0	0	0
NET CALENDAR YEAR EARNED PREMIUM	1	833,000	820,000	948,000	1,032,000	1,098,000	1,274,454	1,509,473	1,745,197
	2	980,000	1,001,000	992,000	1,083,000	1,197,000	1,307,254	1,420,359	1,538,272
	3	880,000	951,000	1,042,000	1,091,000	1,171,000	1,283,846	1,407,033	1,543,735
	4	876,000	899,000	1,021,000	1,157,000	1,254,000	1,337,611	1,446,957	1,572,853
	5	862,000	918,000	1,063,000	1,145,000	1,215,000	1,307,912	1,423,271	1,553,716
	6	935,000	1,035,000	1,048,000	1,092,000	1,187,000	1,264,698	1,362,107	1,468,227
	TOTAL	5,366,000	5,624,000	6,114,000	6,600,000	7,122,000	7,775,775	8,569,200	9,421,999

06/30/89 COMMERCIAL ********** SUMMARY ********** EXHIBIT 5

CALENDAR/ACCIDENT YEAR

	PROGRAM	---1984----	---1985----	---1986----	---1987----	---1988----	---1989----	---1990----	---1991----
NET CALENDAR YEAR EARNED PREMIUM	1	833,000	820,000	948,000	1,032,000	1,098,000	1,274,454	1,509,473	1,745,197
	2	980,000	1,001,000	992,000	1,083,000	1,197,000	1,307,254	1,420,359	1,538,272
	3	880,000	951,000	1,042,000	1,091,000	1,171,000	1,283,846	1,407,033	1,543,735
	4	876,000	899,000	1,021,000	1,157,000	1,254,000	1,337,611	1,446,957	1,572,853
	5	862,000	918,000	1,063,000	1,145,000	1,215,000	1,307,912	1,423,271	1,553,716
	6	935,000	1,035,000	1,048,000	1,092,000	1,187,000	1,264,698	1,362,107	1,468,227
	TOTAL	5,366,000	5,624,000	6,114,000	6,600,000	7,122,000	7,775,775	8,569,200	9,421,999
NET ACCIDENT YEAR INCURRED LOSSES AND ALAE	1	619,520	696,620	827,160	847,000	936,000	1,137,857	1,343,158	1,554,111
	2	897,070	832,700	890,400	986,700	1,111,000	1,245,162	1,390,429	1,548,227
	3	728,200	829,490	817,560	826,200	869,400	916,939	968,336	1,023,550
	4	846,560	882,900	1,106,180	1,230,600	1,344,000	1,450,764	1,574,918	1,716,697
	5	730,300	880,000	979,560	992,960	1,053,950	1,123,874	1,202,904	1,290,911
	6	676,280	784,310	726,840	813,200	866,020	932,249	1,004,521	1,083,137
	TOTAL	4,497,930	4,906,020	5,347,700	5,696,660	6,180,370	6,806,846	7,484,265	8,216,634
LOSS AND ALAE RATIO TO EARNED PREMIUM	1	0.7437	0.8495	0.8725	0.8207	0.8525	0.8928	0.8898	0.8905
	2	0.9154	0.8319	0.8976	0.9111	0.9282	0.9525	0.9789	1.0065
	3	0.8275	0.8722	0.7846	0.7573	0.7424	0.7142	0.6882	0.6630
	4	0.9664	0.9821	1.0834	1.0636	1.0718	1.0846	1.0884	1.0915
	5	0.8472	0.9586	0.9215	0.8672	0.8674	0.8593	0.8452	0.8309
	6	0.7233	0.7578	0.6935	0.7447	0.7296	0.7371	0.7375	0.7377
	TOTAL	0.8382	0.8723	0.8747	0.8631	0.8678	0.8754	0.8734	0.8721
GENERAL EXPENSE AND ULAE RATIO TO WRITTEN PREMIUM	1	0.1286	0.1140	0.0973	0.0997	0.0955	0.0847	0.0773	0.0718
	2	0.0978	0.1044	0.0990	0.0928	0.0896	0.0868	0.0844	0.0823
	3	0.1169	0.0980	0.0954	0.0939	0.0908	0.0874	0.0842	0.0810
	4	0.1168	0.1049	0.0909	0.0866	0.0849	0.0835	0.0812	0.0787
	5	0.1205	0.1000	0.0887	0.0907	0.0872	0.0852	0.0825	0.0797
	6	0.1058	0.0917	0.0988	0.0907	0.0903	0.0884	0.0865	0.0845
	TOTAL	0.1134	0.1016	0.0948	0.0922	0.0896	0.0860	0.0826	0.0794
COMMISSION AND TAX RATIO TO WRITTEN PREMIUM	1	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
	2	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
	3	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
	4	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
	5	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
	6	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
	TOTAL	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
DIVIDEND RATIO TO EARNED PREMIUM	1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	4	0.0100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	5	0.0500	0.0300	0.0400	0.0400	0.0400	0.0400	0.0400	0.0400
	6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	TOTAL	0.0097	0.0049	0.0070	0.0069	0.0068	0.0067	0.0066	0.0066
COMBINED UNDERWRITING RATIO	1	0.9723	1.0635	1.0698	1.0204	1.0479	1.0776	1.0671	1.0623
	2	1.1132	1.0363	1.0966	1.1039	1.1178	1.1393	1.1633	1.1887
	3	1.0444	1.0702	0.9800	0.9512	0.9332	0.9016	0.8724	0.8441
	4	1.1932	1.1870	1.2743	1.2502	1.2566	1.2681	1.2697	1.2702
	5	1.1177	1.1886	1.1502	1.0979	1.0946	1.0845	1.0677	1.0506
	6	0.9291	0.9495	0.8924	0.9354	0.9199	0.9255	0.9239	0.9222
	TOTAL	1.0613	1.0789	1.0765	1.0623	1.0642	1.0681	1.0626	1.0581

06/30/89 PERSONAL ********** POLICY YEAR DIRECT WRITTEN PREMIUMS ********** EXHIBIT 6

	PROGRAM	---1984----	---1985----	---1986----	---1987----	---1988----	---1989----	---1990----	---1991----
BEGINNING INVENTORY	1	2,000,000	2,112,000	2,067,000	2,186,000	2,271,000	2,344,000	2,434,464	2,541,861
	2	2,000,000	1,812,000	1,585,000	1,687,000	1,775,000	1,829,000	1,904,921	1,999,236
	3	2,000,000	2,196,000	2,332,000	2,179,000	2,147,000	2,123,000	2,144,988	2,204,811
	4	0	0	1,000,000	772,000	992,000	1,215,000	1,377,510	1,518,485
	TOTAL	6,000,000	6,120,000	6,984,000	6,824,000	7,185,000	7,511,000	7,861,883	8,264,393
PREMIUM RETENTION RATIO	1	0.8000	0.7000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
	2	0.7000	0.6000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000
	3	0.8000	0.8000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000
	4	0.0000	0.0000	0.6000	0.6000	0.7000	0.7000	0.7000	0.7000
PREMIUM CHANGE ON RENEWAL	1	1.0700	1.0600	1.0800	1.0700	1.0700	1.0700	1.0700	1.0700
	2	1.0800	1.0900	1.0700	1.0800	1.0700	1.0700	1.0700	1.0700
	3	1.0600	1.1000	1.0900	1.0800	1.0800	1.0800	1.0800	1.0800
	4	0.0000	0.0000	0.9532	1.0625	1.0294	1.0200	1.0300	1.0400
RENEWAL PREMIUM	1	1,712,000	1,567,104	1,785,888	1,871,216	1,943,976	2,006,464	2,083,901	2,175,833
	2	1,512,000	1,185,048	1,187,165	1,275,372	1,329,475	1,369,921	1,426,786	1,497,428
	3	1,696,000	1,932,480	1,779,316	1,647,324	1,623,132	1,604,988	1,621,611	1,666,837
	4	0	0	571,920	492,150	714,815	867,510	993,185	1,105,457
NEW BUSINESS PREMIUM	1	400,000	500,000	400,000	400,000	400,000	428,000	457,960	490,017
	2	300,000	400,000	500,000	500,000	500,000	535,000	572,450	612,522
	3	500,000	400,000	400,000	500,000	500,000	540,000	583,200	629,856
	4	0	0	200,000	500,000	500,000	510,000	525,300	546,312
	TOTAL	1,200,000	1,300,000	1,500,000	1,900,000	1,900,000	2,013,000	2,138,910	2,278,707
ADJUSTMENT	1	0	-104	112	-216	24	0	0	0
	2	0	-48	-165	-372	-475	0	0	0
	3	0	-480	-316	-324	-132	0	0	0
	4	0	0	80	-150	185	0	0	0
ENDING INVENTORY	1	2,112,000	2,067,000	2,186,000	2,271,000	2,344,000	2,434,464	2,541,861	2,665,850
	2	1,812,000	1,585,000	1,687,000	1,775,000	1,829,000	1,904,921	1,999,236	2,109,949
	3	2,196,000	2,332,000	2,179,000	2,147,000	2,123,000	2,144,988	2,204,811	2,296,693
	4	0	0	772,000	992,000	1,215,000	1,377,510	1,518,485	1,651,769
	TOTAL	6,120,000	5,984,000	6,824,000	7,185,000	7,511,000	7,861,883	8,264,393	8,724,261
EXPOSURE CHANGE	1	0.9869	0.9233	0.9792	0.9709	0.9646	0.9706	0.9758	0.9802
	2	0.8389	0.8025	0.9947	0.9742	0.9630	0.9734	0.9809	0.9863
	3	1.0358	0.9654	0.8572	0.9123	0.9156	0.9355	0.9517	0.9645
	4	0.0000	0.0000	0.8099	1.2094	1.1898	1.1115	1.0702	1.0459

06/30/89 PERSONAL ********** ACCIDENT YEAR NET INCURRED LOSSES AND ALAE ********** EXHIBIT 7

	PROGRAM	---1984----	---1985----	---1986----	---1987----	---1988----	---1989----	---1990----	---1991----
PRIOR YEAR INCURRED LOSSES	1	1,200,000	1,268,000	1,254,000	1,315,000	1,367,000	1,412,000	1,467,865	1,534,053
	2	1,200,000	1,078,000	926,000	986,000	1,028,000	1,060,000	1,104,619	1,159,960
	3	1,200,000	1,342,000	1,399,000	1,295,000	1,276,000	1,262,000	1,275,071	1,310,632
	4	0	0	600,000	508,000	643,000	801,000	931,641	1,043,337
	TOTAL	3,600,000	3,688,000	4,179,000	4,104,000	4,314,000	4,535,000	4,779,196	5,047,982
FREQUENCY CHANGE	1	1.0200	1.0200	1.0200	1.0200	1.0200	1.0200	1.0200	1.0200
	2	1.0100	1.0100	1.0100	1.0100	1.0100	1.0100	1.0100	1.0100
	3	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	4	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
SEVERITY CHANGE	1	1.0500	1.0500	1.0500	1.0500	1.0500	1.0500	1.0500	1.0500
	2	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600	1.0600
	3	1.0800	1.0800	1.0800	1.0800	1.0800	1.0800	1.0800	1.0800
	4	0.0000	0.0000	1.0464	1.0464	1.0464	1.0464	1.0464	1.0464
EXPOSURE CHANGE	1	0.9869	0.9233	0.9792	0.9709	0.9646	0.9706	0.9758	0.9802
	2	0.8389	0.8025	0.9947	0.9742	0.9630	0.9734	0.9809	0.9863
	3	1.0358	0.9654	0.8572	0.9123	0.9156	0.9355	0.9517	0.9645
	4	0.0000	0.0000	0.8099	1.2094	1.1898	1.1115	1.0702	1.0459
ADJUSTMENT	1	-384	139	-143	-409	-260	0	0	0
	2	263	-170	-144	-404	132	0	0	0
	3	-460	-200	-220	18	264	0	0	0
	4	0	600,000	-490	124	449	0	0	0
CURRENT YEAR INCURRED LOSSES	1	1,268,000	1,254,000	1,315,000	1,367,000	1,412,000	1,467,865	1,534,053	1,610,386
	2	1,078,000	926,000	986,000	1,028,000	1,060,000	1,104,619	1,159,960	1,224,883
	3	1,342,000	1,399,000	1,295,000	1,276,000	1,262,000	1,275,071	1,310,632	1,365,250
	4	0	600,000	508,000	643,000	801,000	931,641	1,043,337	1,141,900
	TOTAL	3,688,000	4,179,000	4,104,000	4,314,000	4,535,000	4,779,196	5,047,982	5,342,419
RATIO OF ALLOC LOSS ADJUST. EXPENSE (ALAE) TO LOSS	1	0.0500	0.0800	0.0700	0.0500	0.1000	0.0700	0.0700	0.0700
	2	0.0400	0.0400	0.0400	0.0500	0.0500	0.0500	0.0500	0.0500
	3	0.0700	0.0600	0.0500	0.0700	0.0700	0.0700	0.0700	0.0700
	4	0.0000	0.1300	0.0800	0.1200	0.1000	0.1000	0.1000	0.1000
CURRENT YEAR INCURRED LOSSES AND ALAE	1	1,331,400	1,354,320	1,407,050	1,435,350	1,553,200	1,570,616	1,641,436	1,723,113
	2	1,121,120	963,040	1,025,440	1,079,400	1,113,000	1,159,850	1,217,958	1,286,127
	3	1,435,940	1,482,940	1,359,750	1,365,320	1,350,340	1,364,326	1,402,376	1,460,818
	4	0	468,092	548,640	720,160	881,100	1,024,805	1,147,671	1,256,090
	TOTAL	3,888,460	4,268,392	4,340,880	4,600,230	4,897,640	5,119,596	5,409,442	5,726,147

	PROGRAM	---1984----	---1985----	---1986----	---1987----	---1988----	---1989----	---1990----	---1991----
PRIOR YEAR	1	300,000	305,000	297,000	299,000	311,000	325,000	340,731	357,487
GENERAL	2	300,000	300,000	288,000	290,000	302,000	315,000	330,376	346,872
EXPENSES	3	300,000	307,000	302,000	299,000	309,000	321,000	335,268	350,994
AND ULAE	4	0	0	150,000	145,000	155,000	166,000	176,246	186,350
	TOTAL	900,000	912,000	1,037,000	1,033,000	1,077,000	1,127,000	1,182,621	1,241,703
PERCENT	1	0.1200	0.1100	0.1300	0.1200	0.1400	0.1400	0.1400	0.1400
VARIABLE	2	0.1200	0.1100	0.1300	0.1200	0.1400	0.1400	0.1400	0.1400
	3	0.1200	0.1100	0.1300	0.1200	0.1400	0.1400	0.1400	0.1400
	4	0.0000	0.0000	0.1300	0.1200	0.1400	0.1400	0.1400	0.1400
PERCENT	1	0.5700	0.5800	0.5700	0.6000	0.5900	0.5900	0.5900	0.5900
SALARIES	2	0.5700	0.5800	0.5700	0.6000	0.5900	0.5900	0.5900	0.5900
	3	0.5700	0.5800	0.5700	0.6000	0.5900	0.5900	0.5900	0.5900
	4	0.0000	0.0000	0.5700	0.6000	0.5900	0.5900	0.5900	0.5900
AVERAGE SALARY	1	1.0600	1.0400	1.0400	1.0500	1.0500	1.0500	1.0500	1.0500
CHANGE	2	1.0600	1.0400	1.0400	1.0500	1.0500	1.0500	1.0500	1.0500
	3	1.0600	1.0400	1.0400	1.0500	1.0500	1.0500	1.0500	1.0500
	4	0.0000	0.0000	1.0400	1.0500	1.0500	1.0500	1.0500	1.0500
EMPLOYEE COUNT	1	0.9400	0.9000	0.9500	0.9900	1.0000	1.0000	1.0000	1.0000
CHANGE	2	0.9400	0.9000	0.9500	0.9900	1.0000	1.0000	1.0000	1.0000
	3	0.9400	0.9000	0.9500	0.9900	1.0000	1.0000	1.0000	1.0000
	4	0.0000	0.0000	0.9500	0.9900	1.0000	1.0000	1.0000	1.0000
CONSUMER PRICE	1	1.0400	1.0400	1.0200	1.0400	1.0400	1.0500	1.0500	1.0500
INDEX CHANGE	2	1.0400	1.0400	1.0200	1.0400	1.0400	1.0500	1.0500	1.0500
	3	1.0400	1.0400	1.0200	1.0400	1.0400	1.0500	1.0500	1.0500
	4	0.0000	0.0000	1.0200	1.0400	1.0400	1.0500	1.0500	1.0500
ADJUSTMENT	1	-120	254	27	170	67	0	0	0
	2	280	-450	-167	64	-457	0	0	0
	3	368	498	-171	92	31	0	0	0
	4	0	150,000	-428	-19	-125	0	0	0
CURRENT YEAR	1	305,000	297,000	299,000	311,000	325,000	340,731	357,487	375,300
GENERAL	2	300,000	288,000	290,000	302,000	315,000	330,376	346,872	364,476
EXPENSES	3	307,000	302,000	299,000	309,000	321,000	335,268	350,994	368,135
AND ULAE	4	0	150,000	145,000	155,000	166,000	176,246	186,350	196,653
	TOTAL	912,000	1,037,000	1,033,000	1,077,000	1,127,000	1,182,621	1,241,703	1,304,564

06/30/89 PERSONAL ********** PREMIUM SUMMARY ********** EXHIBIT 9

		CALENDAR YEAR							
	PROGRAM	---1984----	---1985----	---1986----	---1987----	---1988----	---1989----	---1990----	---1991----
DIRECT WRITTEN PREMIUM (PRIOR POLICY YEAR)	1	2,000,000	2,112,000	2,067,000	2,186,000	2,271,000	2,344,000	2,434,464	2,541,861
	2	2,000,000	1,812,000	1,585,000	1,687,000	1,775,000	1,829,000	1,904,921	1,999,236
	3	2,000,000	2,196,000	2,332,000	2,179,000	2,147,000	2,123,000	2,144,988	2,204,811
	4	0	0	1,000,000	772,000	992,000	1,215,000	1,377,510	1,518,485
	TOTAL	6,000,000	6,120,000	6,984,000	6,824,000	7,185,000	7,511,000	7,861,883	8,264,393
DIRECT WRITTEN PREMIUM (CURRENT POLICY YEAR)	1	2,112,000	2,067,000	2,186,000	2,271,000	2,344,000	2,434,464	2,541,861	2,665,850
	2	1,812,000	1,585,000	1,687,000	1,775,000	1,829,000	1,904,921	1,999,236	2,109,949
	3	2,196,000	2,332,000	2,179,000	2,147,000	2,123,000	2,144,988	2,204,811	2,296,693
	4	0	0	772,000	992,000	1,215,000	1,377,510	1,518,485	1,651,769
	TOTAL	6,120,000	5,984,000	6,824,000	7,185,000	7,511,000	7,861,883	8,264,393	8,724,261
CURRENT POLICY YEAR SHARE OF CURRENT CALENDAR YEAR	1	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500
	2	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500
	3	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500
	4	0.0000	0.0000	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500
	TOTAL	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500
DIRECT CALENDAR YEAR EARNED PREMIUM	1	2,061,600	2,087,250	2,132,450	2,232,750	2,311,150	2,393,755	2,493,532	2,610,055
	2	1,896,600	1,687,150	1,641,100	1,735,400	1,804,700	1,870,757	1,956,794	2,060,128
	3	2,107,800	2,270,800	2,247,850	2,161,400	2,133,800	2,135,093	2,177,891	2,255,346
	4	0	0	874,600	893,000	1,114,650	1,304,381	1,455,046	1,591,791
	TOTAL	6,066,000	6,045,200	6,896,000	7,022,550	7,364,300	7,703,986	8,083,263	8,517,320
CEDED REINSURANCE PREMIUM	1	100,000	100,000	110,000	110,000	120,000	120,000	125,294	131,406
	2	90,000	80,000	80,000	90,000	90,000	90,000	94,456	99,687
	3	110,000	110,000	110,000	110,000	110,000	110,000	113,068	117,780
	4	0	0	40,000	40,000	60,000	70,000	77,164	83,937
	TOTAL	300,000	290,000	340,000	350,000	380,000	390,000	409,982	432,809
ADJUSTMENT	1	400	-250	-450	250	-150	0	0	0
	2	400	-150	-100	-400	300	0	0	0
	3	200	200	150	-400	200	0	0	0
	4	0	0	400	0	350	0	0	0
	TOTAL	1,000	-200	0	-550	700	0	0	0
NET CALENDAR YEAR EARNED PREMIUM	1	1,962,000	1,987,000	2,022,000	2,123,000	2,191,000	2,273,755	2,368,239	2,478,650
	2	1,807,000	1,607,000	1,561,000	1,645,000	1,715,000	1,780,757	1,862,338	1,960,441
	3	1,998,000	2,161,000	2,138,000	2,051,000	2,024,000	2,025,093	2,064,823	2,137,566
	4	0	0	835,000	853,000	1,055,000	1,234,381	1,377,882	1,507,854
	TOTAL	5,767,000	5,755,000	6,556,000	6,672,000	6,985,000	7,313,986	7,673,282	8,084,512

06/30/89 PERSONAL ********** SUMMARY ********** EXHIBIT 10

CALENDAR/ACCIDENT YEAR

	PROGRAM	1984	1985	1986	1987	1988	1989	1990	1991
NET CALENDAR YEAR EARNED PREMIUM	1	1,962,000	1,987,000	2,022,000	2,123,000	2,191,000	2,273,755	2,368,239	2,478,650
	2	1,807,000	1,607,000	1,561,000	1,645,000	1,715,000	1,780,757	1,862,338	1,960,441
	3	1,998,000	2,161,000	2,138,000	2,051,000	2,024,000	2,025,093	2,064,823	2,137,566
	4	0	0	835,000	853,000	1,055,000	1,234,381	1,377,882	1,507,854
	TOTAL	5,767,000	5,755,000	6,556,000	6,672,000	6,985,000	7,313,986	7,673,282	8,084,512
NET ACCIDENT YEAR INCURRED LOSSES AND ALAE	1	1,331,400	1,354,320	1,407,050	1,435,350	1,553,200	1,570,616	1,641,436	1,723,113
	2	1,121,120	963,040	1,025,440	1,079,400	1,113,000	1,159,850	1,217,958	1,286,127
	3	1,435,940	1,482,940	1,359,750	1,365,320	1,350,340	1,364,326	1,402,376	1,460,818
	4	0	468,092	548,640	720,160	881,100	1,024,805	1,147,671	1,256,090
	TOTAL	3,888,460	4,268,392	4,340,880	4,600,230	4,897,640	5,119,596	5,409,442	5,726,147
LOSS AND ALAE RATIO TO EARNED PREMIUM	1	0.6786	0.6816	0.6959	0.6761	0.7089	0.6908	0.6931	0.6952
	2	0.6204	0.5993	0.6569	0.6562	0.6490	0.6513	0.6540	0.6560
	3	0.7187	0.6862	0.6360	0.6657	0.6672	0.6737	0.6792	0.6834
	4	0.0000	0.0000	0.6571	0.8443	0.8352	0.8302	0.8329	0.8330
	TOTAL	0.6743	0.7417	0.6621	0.6895	0.7012	0.7000	0.7050	0.7083
GENERAL EXPENSE AND ULAE RATIO TO WRITTEN PREMIUM	1	0.1516	0.1510	0.1440	0.1439	0.1461	0.1472	0.1479	0.1481
	2	0.1742	0.1914	0.1805	0.1792	0.1811	0.1820	0.1821	0.1813
	3	0.1472	0.1359	0.1445	0.1517	0.1595	0.1648	0.1678	0.1690
	4	0.0000	0.0000	0.1981	0.1628	0.1437	0.1348	0.1293	0.1254
	TOTAL	0.1567	0.1821	0.1593	0.1576	0.1580	0.1583	0.1581	0.1573
COMMISSION AND TAX RATIO TO WRITTEN PREMIUM	1	0.1500	0.1500	0.1500	0.1500	0.1500	0.1500	0.1500	0.1500
	2	0.1500	0.1500	0.1500	0.1500	0.1500	0.1500	0.1500	0.1500
	3	0.1500	0.1500	0.1500	0.1500	0.1500	0.1500	0.1500	0.1500
	4	0.1500	0.1500	0.1500	0.1500	0.1500	0.1500	0.1500	0.1500
	TOTAL	0.1500	0.1500	0.1500	0.1500	0.1500	0.1500	0.1500	0.1500
DIVIDEND RATIO TO EARNED PREMIUM	1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	TOTAL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
COMBINED UNDERWRITING RATIO	1	0.9802	0.9826	0.9899	0.9700	1.0050	0.9880	0.9910	0.9933
	2	0.9446	0.9406	0.9874	0.9854	0.9801	0.9834	0.9861	0.9873
	3	1.0159	0.9721	0.9305	0.9674	0.9766	0.9885	0.9970	1.0024
	4	0.1500	0.1500	1.0051	1.1571	1.1289	1.1150	1.1122	1.1085
	TOTAL	0.9810	1.0738	0.9714	0.9971	1.0092	1.0082	1.0131	1.0156

06/30/89 COMMERCIAL & PERSONAL ********** SUMMARY DOLLARS ********** EXHIBIT 11

		CALENDAR/ACCIDENT YEAR							
	--PREFIX--	---1984----	---1985----	---1986----	---1987----	---1988----	---1989----	---1990----	---1991----
DIRECT	COMMERCIAL	5,965,350	6,243,350	6,793,200	7,320,150	7,892,000	8,635,775	9,515,278	10,460,795
CALENDAR YEAR	PERSONAL	6,066,000	6,045,200	6,896,000	7,022,550	7,364,300	7,703,986	8,083,263	8,517,320
EARNED PREMIUM	TOTAL	12,031,350	12,288,550	13,689,200	14,342,700	15,256,300	16,339,761	17,598,542	18,978,115
CEDED	COMMERCIAL	600,000	620,000	680,000	720,000	770,000	860,000	946,078	1,038,796
REINSURANCE	PERSONAL	300,000	290,000	340,000	350,000	380,000	390,000	409,982	432,809
PREMIUM	TOTAL	900,000	910,000	1,020,000	1,070,000	1,150,000	1,250,000	1,356,059	1,471,605
ADJUSTMENT	COMMERCIAL	650	650	800	-150	0	0	0	0
	PERSONAL	1,000	-200	0	-550	700	0	0	0
	TOTAL	1,650	450	800	-700	700	0	0	0
NET	COMMERCIAL	5,366,000	5,624,000	6,114,000	6,600,000	7,122,000	7,775,775	8,569,200	9,421,999
CALENDAR YEAR	PERSONAL	5,767,000	5,755,000	6,556,000	6,672,000	6,985,000	7,313,986	7,673,282	8,084,512
EARNED PREMIUM	TOTAL	11,133,000	11,379,000	12,670,000	13,272,000	14,107,000	15,089,761	16,242,482	17,506,511
NET ACCIDENT	COMMERCIAL	3,897,000	4,276,000	4,589,000	4,929,000	5,357,000	5,895,288	6,476,743	7,104,802
YEAR INCURRED	PERSONAL	3,688,000	4,179,000	4,104,000	4,314,000	4,535,000	4,779,196	5,047,982	5,342,419
LOSSES	TOTAL	7,585,000	8,455,000	8,693,000	9,243,000	9,892,000	10,674,483	11,524,725	12,447,221
NET ACCIDENT	COMMERCIAL	600,930	630,020	758,700	767,660	823,370	911,558	1,007,522	1,111,832
YEAR INCURRED	PERSONAL	200,460	89,392	236,880	286,230	362,640	340,401	361,460	383,729
ALAE	TOTAL	801,390	719,412	995,580	1,053,890	1,186,010	1,251,959	1,368,981	1,495,560
NET ACCIDENT	COMMERCIAL	4,497,930	4,906,020	5,347,700	5,696,660	6,180,370	6,806,846	7,484,265	8,216,634
YEAR INCURRED	PERSONAL	3,888,460	4,268,392	4,340,880	4,600,230	4,897,640	5,119,596	5,409,442	5,726,147
LOSS AND ALAE	TOTAL	8,386,390	9,174,412	9,688,580	10,296,890	11,078,010	11,926,442	12,893,706	13,942,781
ULAE	COMMERCIAL	200,000	200,000	200,000	200,000	200,000	250,000	250,000	250,000
	PERSONAL	300,000	350,000	350,000	350,000	400,000	400,000	400,000	450,000
	TOTAL	500,000	550,000	550,000	550,000	600,000	650,000	650,000	700,000
GENERAL	COMMERCIAL	405,000	397,000	403,000	430,000	463,000	451,227	491,248	533,261
EXPENSES	PERSONAL	612,000	687,000	683,000	727,000	727,000	782,621	841,703	854,564
	TOTAL	1,017,000	1,084,000	1,086,000	1,157,000	1,190,000	1,233,848	1,332,951	1,387,826
GENERAL	COMMERCIAL	605,000	597,000	603,000	630,000	663,000	701,227	741,248	783,261
EXPENSES	PERSONAL	912,000	1,037,000	1,033,000	1,077,000	1,127,000	1,182,621	1,241,703	1,304,564
AND ULAE	TOTAL	1,517,000	1,634,000	1,636,000	1,707,000	1,790,000	1,883,848	1,982,951	2,087,826
COMMISSIONS	COMMERCIAL	533,700	587,400	635,800	683,100	740,100	815,605	897,766	986,141
AND TAXES	PERSONAL	873,000	854,100	972,600	1,025,250	1,069,650	1,120,782	1,178,162	1,243,718
	TOTAL	1,406,700	1,441,500	1,608,400	1,708,350	1,809,750	1,936,387	2,075,928	2,229,859
DIVIDENDS	COMMERCIAL	51,860	27,540	42,520	45,800	48,600	52,316	56,931	62,149
	PERSONAL	0	0	0	0	0	0	0	0
	TOTAL	51,860	27,540	42,520	45,800	48,600	52,316	56,931	62,149
UNDERWRITING	COMMERCIAL	-322,490	-493,960	-515,020	-455,560	-510,070	-600,219	-611,010	-626,185
PROFIT	PERSONAL	93,540	-404,492	209,520	-30,480	-109,290	-109,015	-156,025	-189,918
	TOTAL	-228,950	-898,452	-305,500	-486,040	-619,360	-709,233	-767,034	-816,103

CALENDAR/ACCIDENT YEAR

	--PREFIX--	---1984----	---1985----	---1986----	---1987----	---1988----	---1989----	---1990----	---1991----
DIRECT	COMMERCIAL	5,965,350	6,243,350	6,793,200	7,320,150	7,892,000	8,635,775	9,515,278	10,460,795
CALENDAR YEAR	PERSONAL	6,066,000	6,045,200	6,896,000	7,022,550	7,364,300	7,703,986	8,083,263	8,517,320
EARNED PREMIUM	TOTAL	12,031,350	12,288,550	13,689,200	14,342,700	15,256,300	16,339,761	17,598,542	18,978,115
CEDED	COMMERCIAL	600,000	620,000	680,000	720,000	770,000	860,000	946,078	1,038,796
REINSURANCE	PERSONAL	300,000	290,000	340,000	350,000	380,000	390,000	409,982	432,809
PREMIUM	TOTAL	900,000	910,000	1,020,000	1,070,000	1,150,000	1,250,000	1,356,059	1,471,605
ADJUSTMENT	COMMERCIAL	650	650	800	-150	0	0	0	0
	PERSONAL	1,000	-200	0	-550	700	0	0	0
	TOTAL	1,650	450	800	-700	700	0	0	0
NET	COMMERCIAL	5,366,000	5,624,000	6,114,000	6,600,000	7,122,000	7,775,775	8,569,200	9,421,999
CALENDAR YEAR	PERSONAL	5,767,000	5,755,000	6,556,000	6,672,000	6,985,000	7,313,986	7,673,282	8,084,512
EARNED PREMIUM	TOTAL	11,133,000	11,379,000	12,670,000	13,272,000	14,107,000	15,089,761	16,242,482	17,506,511
INCURRED LOSS	COMMERCIAL	0.7262	0.7603	0.7506	0.7468	0.7522	0.7582	0.7558	0.7541
RATIO TO	PERSONAL	0.6395	0.7262	0.6260	0.6466	0.6492	0.6534	0.6579	0.6608
EARNED PREM.	TOTAL	0.6813	0.7430	0.6861	0.6964	0.7012	0.7074	0.7095	0.7110
INCURRED ALAE	COMMERCIAL	0.1120	0.1120	0.1241	0.1163	0.1156	0.1172	0.1176	0.1180
RATIO TO	PERSONAL	0.0348	0.0155	0.0361	0.0429	0.0519	0.0465	0.0471	0.0475
EARNED PREM.	TOTAL	0.0720	0.0632	0.0786	0.0794	0.0841	0.0830	0.0843	0.0854
LOSS AND ALAE	COMMERCIAL	0.8382	0.8723	0.8747	0.8631	0.8678	0.8754	0.8734	0.8721
RATIO TO	PERSONAL	0.6743	0.7417	0.6621	0.6895	0.7012	0.7000	0.7050	0.7083
EARNED PREM.	TOTAL	0.7533	0.8063	0.7647	0.7758	0.7853	0.7904	0.7938	0.7964
ULAE	COMMERCIAL	0.0373	0.0356	0.0327	0.0303	0.0281	0.0322	0.0292	0.0265
RATIO TO	PERSONAL	0.0520	0.0608	0.0534	0.0525	0.0573	0.0547	0.0521	0.0557
EARNED PREM.	TOTAL	0.0449	0.0483	0.0434	0.0414	0.0425	0.0431	0.0400	0.0400
ULAE	COMMERCIAL	0.0375	0.0340	0.0315	0.0293	0.0270	0.0307	0.0278	0.0254
RATIO TO	PERSONAL	0.0515	0.0615	0.0540	0.0512	0.0561	0.0535	0.0509	0.0543
WRITTEN PREM.	TOTAL	0.0448	0.0475	0.0428	0.0402	0.0413	0.0416	0.0386	0.0386
GEN. EXPENSE	COMMERCIAL	0.0759	0.0676	0.0634	0.0629	0.0626	0.0553	0.0547	0.0541
RATIO TO	PERSONAL	0.1052	0.1207	0.1053	0.1064	0.1019	0.1047	0.1072	0.1031
WRITTEN PREM.	TOTAL	0.0912	0.0937	0.0846	0.0847	0.0819	0.0790	0.0792	0.0765
GEN. EXP. &	COMMERCIAL	0.1134	0.1016	0.0948	0.0922	0.0896	0.0860	0.0826	0.0794
ULAE RATIO TO	PERSONAL	0.1567	0.1821	0.1593	0.1576	0.1580	0.1583	0.1581	0.1573
WRITTEN PREM.	TOTAL	0.1360	0.1413	0.1274	0.1249	0.1232	0.1205	0.1178	0.1150
COMM. & TAX	COMMERCIAL	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
RATIO TO	PERSONAL	0.1500	0.1500	0.1500	0.1500	0.1500	0.1500	0.1500	0.1500
WRITTEN PREM.	TOTAL	0.1261	0.1246	0.1252	0.1250	0.1245	0.1239	0.1233	0.1228
DIVIDEND	COMMERCIAL	0.0097	0.0049	0.0070	0.0069	0.0068	0.0067	0.0066	0.0066
RATIO TO	PERSONAL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EARNED PREM.	TOTAL	0.0047	0.0024	0.0034	0.0035	0.0034	0.0035	0.0035	0.0036
UNDERWRITING	COMMERCIAL	1.0610	1.0804	1.0777	1.0633	1.0653	1.0696	1.0639	1.0593
RATIO	PERSONAL	0.9814	1.0732	0.9708	0.9983	1.0104	1.0094	1.0143	1.0170
	TOTAL	1.0201	1.0753	1.0213	1.0304	1.0377	1.0398	1.0399	1.0393

CORPORATE ACCOUNT

CALENDAR/ACCIDENT YEAR

	1984	1985	1986	1987	1988	1989	1990	1991
***** EARNED PREMIUM ******								
DIRECT EP ASSUMED FROM POOL1	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
REINS COST ASSUMED FROM POOL1	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000
REINS COST FROM ASSUMED	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000
NET POOL1 ASSUMED	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000
RETAINED REINS. COST	90,000	91,000	102,000	107,000	115,000	125,000	136,000	147,000
PRIOR YEARS' REINS. COST	0	0	20,000	0	0	0	0	0
ADJUSTMENTS	0	0	0	0	0	0	0	0
CORPORATE ACCOUNT-TOTAL	170,000	171,000	202,000	187,000	195,000	205,000	216,000	227,000
***** WRITTEN PREMIUM *****								
DIRECT WP ASSUMED FROM POOL1	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
REINS COST ASSUMED FROM POOL1	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000
REINS COST FROM ASSUMED	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000
NET POOL1 ASSUMED	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000
RETAINED REINS. COST	90,000	91,000	102,000	107,000	115,000	125,000	136,000	147,000
PRIOR YEARS' REINS. COST	0	0	20,000	0	0	0	0	0
ADJUSTMENTS	0	0	0	0	0	0	0	0
CORPORATE ACCOUNT-TOTAL	170,000	171,000	202,000	187,000	195,000	205,000	216,000	227,000
*** UNDERWRITING RATIO ****								
CORPORATE ACCOUNT-TOTAL	1.3000	1.2000	1.2000	0.9000	1.1000	1.0000	1.0000	1.0000

06/30/89 COMMERCIAL & PERSONAL ****** NET & DIRECT EARNED AND WRITTEN PREMIUMS & NET UNDERWRITING RATIO ***** EXHIBIT 14

	CALENDAR/ACCIDENT YEAR							
	1984	1985	1986	1987	1988	1989	1990	1991
* NET CAL YR E PREM-FORECAST	11,133,000	11,379,000	12,670,000	13,272,000	14,107,000	15,089,761	16,242,482	17,506,511
CORPORATE ACCOUNT-TOTAL	170,000	171,000	202,000	187,000	195,000	205,000	216,000	227,000
INVOLUNTARY1 NET	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
INVOLUNTARY2 NET	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
INVOLUNTARY3 NET	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
INVOLUNTARY4 NET	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
INVOLUNTARY5 NET	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
* NET CAL YR E PREM-FINANCIAL	11,453,000	11,700,000	13,022,000	13,609,000	14,452,000	15,444,761	16,608,482	17,883,511
FACULTATIVE & FACILITY CEDED	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000
TREATY & PRIOR YR RETRO CEDED	700,000	710,000	820,000	870,000	950,000	1,050,000	1,150,000	1,250,000
CEDED TO POOL1	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
POOL1 ASSUMED IN CORP ACCOUNT	-80,000	-80,000	-80,000	-80,000	-80,000	-80,000	-80,000	-80,000
INVOLUNTARY1 ASSUMED	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000
INVOLUNTARY2 ASSUMED	-20,000	-20,000	-20,000	-20,000	-20,000	-20,000	-20,000	-20,000
INVOLUNTARY3 ASSUMED	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000
INVOLUNTARY4 ASSUMED	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000
INVOLUNTARY5 ASSUMED	-50,000	-50,000	-50,000	-50,000	-50,000	-50,000	-50,000	-50,000
ADJUSTMENT	0	0	0	0	0	0	0	0
* DIR CAL YR E PREM-FINANCIAL	12,373,000	12,630,000	14,062,000	14,699,000	15,622,000	16,714,761	17,978,482	19,353,511
* NET CAL YR W PREM-FORECAST	11,157,000	11,568,000	12,842,000	13,666,000	14,532,000	15,627,929	16,832,074	18,152,859
ADJUSTMENT	0	0	0	0	0	0	0	0
* NET CAL YR W PREM-ADJUSTED	11,157,000	11,568,000	12,842,000	13,666,000	14,532,000	15,627,929	16,832,074	18,152,859
CORPORATE ACCOUNT-TOTAL	170,000	171,000	202,000	187,000	195,000	205,000	216,000	227,000
INVOLUNTARY1 NET	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
INVOLUNTARY2 NET	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
INVOLUNTARY3 NET	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
INVOLUNTARY4 NET	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
INVOLUNTARY5 NET	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
NET CAL YR W PREM-FINANCIAL	11,477,000	11,889,000	13,194,000	14,003,000	14,877,000	15,982,929	17,198,074	18,529,859
FACULTATIVE & FACILITY CEDED	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000
TREATY & PRIOR YR RETRO CEDED	700,000	710,000	820,000	870,000	950,000	1,050,000	1,150,000	1,250,000
CEDED TO POOL1	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
POOL1 ASSUMED IN CORP ACCOUNT	-80,000	-80,000	-80,000	-80,000	-80,000	-80,000	-80,000	-80,000
INVOLUNTARY1 ASSUMED	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000
INVOLUNTARY2 ASSUMED	-20,000	-20,000	-20,000	-20,000	-20,000	-20,000	-20,000	-20,000
INVOLUNTARY3 ASSUMED	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000
INVOLUNTARY4 ASSUMED	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000
INVOLUNTARY5 ASSUMED	-50,000	-50,000	-50,000	-50,000	-50,000	-50,000	-50,000	-50,000
ADJUSTMENT	0	0	0	0	0	0	0	0
* DIR CAL YR W PREM-FINANCIAL	12,397,000	12,819,000	14,234,000	15,093,000	16,047,000	17,252,929	18,568,074	19,999,859
* NET AY U/W RATIO-FORECAST	1.0201	1.0753	1.0213	1.0304	1.0377	1.0398	1.0399	1.0393
CORPORATE ACCOUNT-TOTAL	1.3000	1.2000	1.2000	0.9000	1.1000	1.0000	1.0000	1.0000
INVOLUNTARY1 NET	1.0400	1.0800	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
INVOLUNTARY2 NET	1.2000	1.3000	1.6000	1.5000	1.5000	1.5000	1.5000	1.5000
INVOLUNTARY3 NET	1.8000	1.4000	1.0000	1.1000	1.2000	1.2000	1.2000	1.2000
INVOLUNTARY4 NET	1.3000	1.3000	1.5000	1.6000	1.5000	1.5000	1.5000	1.5000
INVOLUNTARY5 NET	1.3000	1.2000	1.3000	1.4000	1.3000	1.3000	1.3000	1.3000
* NET AY U/W RATIO-FINANCIAL	1.0288	1.0797	1.0274	1.0325	1.0417	1.0422	1.0421	1.0413
CALENDAR-ACCIDENT YR DIFF.	200,000	400,000	500,000	-100,000	-200,000	-300,000	0	0
* NET CY U/W RATIO-FINANCIAL	1.0463	1.1139	1.0658	1.0251	1.0278	1.0227	1.0421	1.0413
* UNDERWRITING PROFIT	-577,864	-1,328,262	-947,628	-490,880	-521,290	-460,233	-818,034	-867,103
* NET CAL YR U/W RATIO-RPT 1	1.0500	1.1100	1.0700	1.0300	1.0300	1.0200		

1989 CASUALTY LOSS RESERVE SEMINAR

1G: LOSS DISTRIBUTIONS IN LOSS RESERVING

Moderator

Peter L. Lindquist
Coopers & Lybrand

Panel

David J. Grady
Prudential Reinsurance Company

Paul J. Kneuer
Continental Insurance

MR. LINDQUIST: I'm Pete Lindquist and this is the Loss Distributions in Loss Reserving Session. The entire session is recorded so let me do that over, and when you are asking questions you should use the mike also.

I'm Pete Lindquist and this is the session on Loss Distributions in Loss Reserving, and we promised you non-threatening and we're going to deliver for sure. Before we start, I have a couple of administrative things that won't take too long. The first two things I'm going to say are extremely important.

We'll start with the one that you get sent to prison for not paying any attention to. We are not talking about pricing here. Okay. We're talking loss reserving. Some of the things that we do intend to talk about are things that are also used in a pricing context sometimes. But we are not here to talk about pricing or pricing methods. We're here to talk about loss reserving. That's very important.

The second thing that is extremely important is that when we're talking, we are talking for ourselves. I'm with Coopers and Lybrand, but I don't speak for them. All right? And our other panelists don't speak for their employers either here today. They don't speak for the Casualty Actuarial Society either or any other organization they might happen to belong to. Okay?

Now, of course, you have to remember when we say that, that our opinions are our own. The facts, of course, are universal and belong to everybody, and it's a heavy burden to place on you of distinguishing the difference between the two at this early hour on Monday morning, but nonetheless, you're going to have to do it. Okay?

Now, we turn to the material itself. I have about a 40 second motivating speech and then I'll turn it over to our speakers, who are the guts of this panel today. Hopefully, assisted by questions from the audience.

I have seen quite a few loss reserve analyses using loss distributions. And regardless of who did the work, and regardless of exactly which models they were using and regardless of exactly how they estimated the parameters for those models, they all have one thing in common. They give answers which are lower. And I don't mean a little bit lower, I mean dramatically lower in my experience, than virtually any other generally accepted actuarial method. Okay?

Now, there are three separate groups of people who should be intrigued by that. Okay? The first is the guys who used these methods for other purposes and might be concerned if there is some kind of bias in them somewhere.

The second group is a bunch of guys who would like to make a name for themselves who just get some psychic satisfaction out of figuring out what everybody else is doing wrong in their applications of these methods. Or maybe nothing is wrong with these and something is wrong with every other method.

And the third group, and this is the one I will admit to belonging to, is that there are a whole bunch of people who would kill at the prospect of obtaining an actuarially sound method which yields low ball answers.

I'm not going to characterize the other panelists as to whether or not they belong to any of those groups. That's one of the things you're going to have to figure out for yourselves, if you can, from their presentations.

Our first speaker is Dave Grady. Dave is the head of the Actuarial Department. He's Chief Actuary for Prudential Reinsurance Company. In that context he is responsible ultimately for pricing and loss reserving and whatever else the Actuarial Department gets called upon to do. He has got extensive experience, and I can't go through a list of his prior employers any more than I can for any other actuary or we'd never get to the materials.

He started at the Travelers and he's been a couple of other places. And before he joined Pru Re, he was actually with us in New York and I enjoyed working with him there, and I'm going to enjoy hearing from him this morning. Okay?

So, Dave, why don't you take it?

MR. GRADY: Okay. I'll be hopping up and down to put slides on the screen. I have twenty minutes, during which time I will take you from elementary particles to the structure of the universe of loss distributions.

(Slide)

I'll start off with the purpose of a loss distribution. The purpose, say, is just a loss model. Why would we want to model losses?

The first purpose is to inform and to describe. Once you have described what is going on, you can then predict. An example of this process is something called industrial dynamics. It was invented back in the 50, 60's by a man by the name of Jay Forrester.

How many are familiar with industrial dynamics?

(Laughter)

No surprise. You may wonder what happened to industrial dynamics. Industrial dynamics was a process where you could look at what a manufacturing firm was doing. You could look at it in terms of the raw materials used, the types of machines that would be operating on the raw material, the quantity of the work force, the quality of the work force. And you would produce products. And Jay developed a model which looked like a lot of curves similar to the underwriting cycle.

And these curves interacted with each other, sideways, eventually producing a product. And Jay Forrester could actually begin to specify where the breakdowns would occur in the process and you could avoid those breakdowns. A group called the Club of Rome got a hold of industrial dynamics and they turned it into world dynamics. They began to measure such things as pollution, warfare, poverty. And they put together a big model of the world. And they predicted that the world would end.

(Laughter)

A lot prior to the time we are sitting here. This is why one of you in the room knows about industrial dynamics.

(Laughter)

The idea is a perfectly good procedure to describe a well controlled process. The minute you attempt to predict without description, you fall prey to really a mis-prediction. You don't do the job. So, we look at describing first.

(Slide)

Well, that's a loss distribution. It is a simple one. It was presented here last year as part of Ed Weisner and Frank Accomando's presentation. So, rather than reinvent loss distributions, I can use them in a different form.

(Slide)

This is simply a claim frequency distribution. So along the vertical axis you have number of claims. And down on the horizontal axis you have time. This is the time in which the claims are reported. The lag in their report.

For example, that first vertical line shows that you have two claims at roughly nine months during the third quarter of the reporting cycle. Actually it's one claim. And you have two claims about a year in, and so on until finally you get some of these big spikes where 16 claims are being reported. This is simply a claim count. And it's a distribution over time.

And it's one we can sort of look at and begin to wonder what happens after the "x". This is a simulated distribution. This

is not real data. And we are wondering how far this phenomenon is going to extend in future times. We can model this phenomenon in a number of ways. One way is we can grab a whole bunch of these. This is a single year number of claims. Let's look at a number of years number of claims.

(Slide)

Now, we've got a whole bunch of these things. We have six years, six accident years out of a loss triangle. All on claim frequency. You must be aware of the different scales. We have a scale that goes to number 18 in the first six month period. Then the next accident year again has 18 claims in the first six months. The one down on the bottom has 30 claims in six months.

We could represent this in a different form called a loss triangle. As you can see each of the newer years has less and less information. We won't do that. You're going to be seeing enough of loss triangles. So, loss triangles appear in my presentation under something called "deterministic loss models." Why do I call them that? Because you look at the information in a loss triangle, you average it, and you create a tail, and you call that your best projection.

But it doesn't take into account, in general, the way the data varies. The fact that you could have had the first realization or another realization. Your data could have come out totally different.

The second deterministic method is simply subjective evaluation. I know the ultimate loss ratio. And these claims are going to give me trouble. So, if too many come in, if you hit that big spike, you will then have to create negative IBNR. Subjective evaluation can be a powerful tool for creating negative IBNR.

You could shorten the tail. And as Peter has indicated, there may be a strength in this method for having shorter tails or smaller tails than might be available under the standard deterministic processes.

So, we go to the stochastic processes. How can we model this statistically? Well, we've got a couple of problems here when we look at these. We certainly want to get out there into the tail of an individual accident year. And then we have a relationship, maybe, between the accident years themselves.

So, our first consideration is are these accident years independent? Are they like ponies starting off at the race track and the older pony is farther ahead? But it has nothing to do with the second pony or the third. Or are they somehow related and there is actually a tail going in both directions?

I call these tails of time and space, science-fiction enthusiast.

(Slide)

You can analyze these in another way using regression models. And you can see regression models at some of the sessions here. They essentially look at components of the loss and they look at something called the error term. If you can map what is happening in all of these data sets, you then have something called a residual you can't explain and the assumption is that the residual must be normally distributed. You begin to use a distribution in a loss reserving process.

So, let's look at the nature of the underlying process that gives us loss reserves.

(Slide)

What's the underlying process? What do we need in order to put distributions on our data? Well, the event ought to be coming out of the same process. They should be all private passenger automobiles in Iowa. If they aren't, then we have our distributions changing through time and we've got to worry about that. Well, we have our distributions changing through space, but this is not a private passenger automobile, it's a doctor operating. You can't compare the two. We need independence.

Are these events interrelated in some ways? Do the cars hit each other? Is there a contagion? Is there a disease involved? Is it Hugo that's coming? It could rise to one giant contagious event.

The next thing we want is stationarity. Try to look that one up in your dictionary. It exists in a lot of stochastic processes books. You want the process to be stable over time. And this doesn't mean it has to be inert. It can have a trend, but you want to be able to predict the trend. So, if you can predict pretty well or you have a uniform trend like regular inflation, but then you superimpose the trend on social inflation where the courts are making decisions that you couldn't possibly predict when you initially established loss reserves. Then you may have a problem in using loss distributions.

Finally, we have the aspect of completeness. Is the data complete or is the data you're using loss reserves set up by the claim department based on sketchy early information only to be filled in later. And I say it's always that way.

So, here are the four requisites of the process, and we can talk later about how we satisfy these pre-req's. Let's go on and look at some examples of loss distributions.

(Slide)

I'm just going to put them on very quickly. There are a few I tend to use. This is an exponential model and many of you have used this model or the next two. You can see it assumes that your losses are going to come in over "x". PDF is probability density function. It has a nice algebraic formula. It has a mean and a variance, which we'll talk about.

This is supposed to be a non-threatening session, so I'm actually going to define for you in homespun terms concepts like mean and variance so nobody will be threatened except the Ph.D.'s in statistics who will take me to account because of the homespunness.

Here is a rich model called a Weibull reminiscent of the gamma. As you can see you can get an exponential as one of the sub cases. And then you can get this thing that doesn't seem to have an end at either end on the X or the Y axis. And then you get a thing with a lump in it. I told you I'd be non-threatening. That thing with the lump then, that interests us, because a lot of the distributions we use in actuarial work has the lump, the single turning point.

(Slide)

Finally, we show you a log normal model which is just the thing with the lump. Things with lumps are interesting because they begin to have properties. The mean sits there in the middle of the lump. So, we'll talk about means. Let me put the mean page on and I'll come back to the log normal.

(Slide)

There are some measures of location. One of them is the mean. I say the mean is the arithmetic average. The median is the mid point. It's halfway. Half the events are below it and half the events are above it. Finally, the mode is the most frequently occurring event. So, where is the mode?

(Slide)

That's the mode. The mode is the lump.

(Inaudible)

Where is the median? The median is right here. It's above the mode. Here you have 50 percent and here you have the other 50 percent of the distribution. Finally, the question is where is the mean? It's probably not all the way out there. But nonetheless, the mean is higher than the mode and higher the mean.

So, we look at a property that's rather an odd distribution. It has a long right-hand tail. Anything that has a long right-hand tail, the measures of location will exist in reverse alphabetical order. Mode is lower than median is lower than mean. So, here you have your lesson for today.

What does that mean? It means that Hugo is once in a great while. And that you're going to go through a lot of years without Hugo's. You're going to go through a lot of years with modes or maybe medians.

So, when you're reserving you've got to watch your contagions. You have to be sure you've got the large claims in there. And if people are not looking at a claim as being very, very small, only to have it explode. So, if you're using data which is incomplete, is there a problem in the reserve process? Just questions.

Okay. We'll do a quick look at measures of dispersion.

(Slide)

Very homespun definitions. See, they're all related to the mean. You look at something called the variance and this is the expected value of the squared deviations of the possible occurrences from the mean, that's the theoretical definition. The idea is you want to get some kind of dispersion about the mean, begin to measure how the spread of the distribution is occurring. Or you can use something like minimum absolute deviation.

But you want to go after spread. Why do you want to do this? Because wider spread out distributions, particularly towards the tail are going to be riskier. And your loss reserve forecast will be less and less certain.

(Slide)

So, here it is. What's our problem? Our problem is to fit the curve to the data we saw in the first transparency. And you can see that it's very easy to do. You simply fold the paper and you move it over. And, indeed, it just sort of flops onto that data. How do you do this? You use methods of maximum likelihood, use all kinds of things to look at parameters.

And let's just look at the way we would do this. We'll see a much clearer example later on through Paul. I'll just give you an inkling with loss frequency.

We know our city of losses, our skyline is not complete. In this example we have 150 known losses. We want to get those total losses. We want to know how many future claims are going to come in.

So, what we do is we have a known number and by magic, by the magic fitting of the distribution, we know that this number constitutes 60 percent of all claims in the universe. So, it's a simple matter of dividing 150 by .6 to get 250 and a little subtraction to get a 100 claims left in the IBNR. It's scientific. That's the game. Let's look at how the game looks in practice.

(Slide)

To do this what do you need? You need each claim of being the same lag distribution in this case; homogeneity. Each claim is independent of the others; no Hugo. And because of experience of knowledge, we can actually specify what the distribution finally is going to be. We can specify the finally, get those parameters. Watch for elements like stability and completeness of the data. Under these assumptions, we'll go get them and, indeed, we will form our function.

(Slide)

There it is; success. A little method of maximum likelihood and it is an amazing thing. The mode isn't where you thought it was going to be. If you are like me, I would look at that tall skyscraper almost at the end and say, well, the mode is going to kind of be over there, but it's not when you fit those parameters. Instead when you put a Weibull to this data, and this data was generated from a Weibull, there is a much shorter tail than you or I might have thought being practical people.

So, indeed, this confirms what Peter has been saying. That there is an interesting occurrence here. Maybe practical people looking at this in terms of an element of a loss triangle would come up with a substantially different answer.

I'd like to take us from using a loss distribution to model the data to another form of loss distribution used in loss reserving. I have a rationale for this.

(Slide)

This is the confidence interval. How many have not heard of a confidence interval? Good. It's the elementary non-threatening confidence interval. This is a confidence interval based on samples. We're lucky in that our sample is 100 percent. But the realization of one accident year is a sample of size one. So, we have difficulties in that routine.

This is simply trying to find where the true mean lies using mean and variance, sample mean and sample variance. In this case, sample standard mean or the sample standard deviation. A good concept that insurance commissioners would like us to use more often, I know that my own management would like me to have 99 percent confidence in my reserve levels.

They were able to do this on Group by adding 1.7 percent to the loss reserves. I was unable to do this on our reinsurance portfolio using the same sort of display of money. So, my confidence intervals expanded wildly.

(Slide)

So, I want to look at the context. This is a philosophy session. It is not really, you know, how to do lax. Then look at the context of confidence intervals and look at the context of loss distributions in general from it.

My first item under confidence interval is something called a deterministic confidence interval. Well, how could you possibly have that given the sample confidence interval that I've just given.

You get a deterministic confidence interval by using your age to age triangles, and you average them, and you do a weighted average, and then you do a non-weighted average. And then you do an average of the latest five years, and then you do an average of the latest three years. And then you do some outlier examination, you throw out the outliers and you average again. All this is deterministic.

By the time you're through with it you have about 17 answers. You can put those answers down on a piece of paper and you can say, well, most of my answers cluster around here and you can develop, hey, here are a couple of answers that lie outside the realm of reasonableness, and my deterministic, in quotes, confidence interval, is that all these methods are kind of honing in on something. So, 75 percent of the time or 50 percent of the time the answer seems to be in this range. But there ain't much stochastic about it. It arises from a deterministic source.

Then we have the stochastic confidence interval, which is the one I showed you for samples. And then we have problems that underlie it. The stochastic confidence interval is based on the central limit theorem. No matter how many long right-hand tails you have with your distributions, if you get enough of these claims all together, everything is going to converge on the normal distribution, the bell shaped curve. And your mean will be normally distributed.

How wonderful, because that's what we're concerned with, means. And we can just apply the central limit theorem and all is well.

Now, the problem is that everything converges to normality from the outside, not the inside, and it converges from the most risky states. Also, not only do we not have stability and completeness, independence and homogeneity, we have these

little things. Down at the bottom of the confidence interval is classical statistics.

But we have other concerns, actuarial work may not be based on classical statistics. It may be more Bayesian in nature. So, you may have a distribution that is a prior distribution. You know reality. I know what reasonable ranges of loss ratios are. And you work that in Bayesian in the forecasting. Now, you've got other distributions working. The credibility of the data that you're utilizing.

So, if you have 18 claims, you may not be able to say much in terms of distributions. Your prior, deterministic though it may be, of no more than 80 percent loss ratio may hold.

Finally, we have what I call -- here we have confidence, credibility and coming from utility theory, risk aversion. That's another distribution, the preference curve. We are beginning to mount distribution on distribution. So, it may not be as simple as just mapping losses by means of a lag distribution. As a matter of fact, it may be a great deal worse than that.

When you get to it, you get to different types of risk in the distribution itself. So, apart from the fact that as you go toward the universe, you have more and more generalized assumptions, you get this.

(Slide)

Within the distribution itself you will have processes. You have a known distribution, the log normal, with parameters X and Y, A and B. We have a possibility of an adverse outcome; Hugo.

Okay. That's for the known distribution. But do we know those parameters really. For a known family of distributions, could we not perhaps mis-specify the parameters. And do we really know that distribution or is reality really measured by a more serious distribution. Remember we're going from partial incomplete data and trying to get a fit.

This is the heart of the question. If we do a description of the underlying process, we have to look at the conditions of the exposure. What is truly happening. And we may divide our distributions down into claim frequency distributions, claim severity distributions, distributions of aggregate claims. We can make a lot of distributions. The distributions interact. It may be that the big claims are reported later. If so, then frequency and severity are not independent.

What happens with distributions? Here you have them in the simple case. But behind the simple case are distributions of your own preference, distributions of management's preference

certainly, distributions upon distributions, compounded distributions. It's an interesting universe.

Your confidence interval may not be only related to the data itself, but the context in which you apply it. Why would you ever want to use distributions when you have a nice deterministic and, hopefully, conservative approach? Because there is power in distributions. The world is not deterministic.

If you begin to investigate the world through probability distributions, you begin to see what is happening. You begin to expose the weaknesses. It may be that distributions are used in pricing and not in reserving, because you are too close to the real problems in reserving. The price is always next year's price and the realization just didn't happen to work out on that particular contract.

So, I talk in the end of something called stable chaos. Nature is chaotic, but you have fractiles that form beautiful patterns. Also the universe appears to work by law. There seems to be a design. When you look into the theory of chaos, you find out that the design is in different places. It is not where you expected it to be. But by looking, by actually constructing the distributions, you begin the inquiry and you may be able to do something in your work that is truly meaningful.

So, when we look at distributions, the comment that I may make about this is from a quote by Hilaire Belloc, "All these have never yet been seen, but scientists who ought to know assure us that they must be so. Oh, let us never, never doubt what nobody is sure about."

(Applause)

MR. LINDQUIST: Thank you, Dave. Our next speaker is Paul Kneuer, who is the Assistant Vice President at Continental in New York City. He is working with their special operations unit. He has been with Continental for two years and before that, he was with ISO.

Paul has an example worked through from beginning to end and he promised us that in the tradition of non-threatening, which is probably all of half an hour old so far, he's not going to talk too much about actual equations. Okay?

MR. KNEUER: Thanks, Pete. Let's start out with two exceptions to things that had been mentioned earlier. First, Pete, when you said that Dave and I would represent the guts of the panel, you were speaking metaphorically, I hope. And second, both Pete and Dave mentioned that loss distribution techniques are often associated with lower answers.

I don't think that is because there is something magical that let's you erase 30 percent of your losses, but rather it's representative of the fact that loss distributions are more intricate to use and are probably the hardest methods you're going to approach.

So, if you do three different incurred loss methodologies and you come up with nice simple triangle answers and they're all the same, and they're also showing nice high profits, I think people are going to be very happy with them. And when you come into a situation where nice, simple familiar triangular methods tell you about huge losses, then you start scratching your head and try and find something else. And often loss distribution techniques are a way to do that.

I've seen people find higher answers as well. In particular, my boss who thinks that the only things that come out of New York are crazy: those New York guys are too close to the underwriters. So, when we think about loss distributions we can find that they really must be undercharging. And you can sometimes find loss distribution techniques can give you a higher result, but you may want to do that in an easier or more obvious way.

The example I'm going to work through is a bit different from what David sketched out. And I think it might help you if you have all got the handouts. There are some in the front and some in the back. So, if you don't have them, you might want to get a set.

What we're going to be looking at is some excess reinsurance reserves and I'll simplify it a bit to workers compensation only. And this is all in kind of a skeleton form. I suppose that, in principle, I might be willing to admit that at some time, there might be some doubt, about some reserves, for some Continental operations. But of course, not about any specific one. So, the names here have been changed to protect the innocent.

And in the simplification, we've got a company that is going to write only workers compensation, it's going to retain its whole primary layer and it's going to cede a layer of $300,000 excess of $100,000 and all kinds of niceties will apply. We're going to know where they write. We're going to know that the accident year matches the underwriting year. The sort of things which never hold in reality.

One other thing I might note here is that Continental owns both the reinsurer and the cedent in this relationship. I guess that would lead to the question of: Why on earth did you want to go addressing this problem? why don't you just throw it all in one bucket and reserve that? Well, I think one of the reasons we want to do this is we want to be able to assess which areas are causing problems, if there are problems.

Is it the part that's internally ceded? Or the part that's internally retained? And I think it's also important to understand future decisions to retain or cede the business. So, it's certainly worth doing.

The fact that we'll have big impacts on who gets big bonuses and who gets small bonuses is just an academic nicety that I'll fly by at this point.

Well, one of the first things we did in looking at this was to use the incurred loss development method. We had some assumed business patterns from ourselves and from the RAA. And we took a look at our internal reports of the losses in the interval, and we found out that there was a good chunk of incurred losses and that using familiar patterns in your triangles, you ended up with a very high ceded reserve. That got the people that worked for the ceding company to scratch their heads a bit and try to find other approaches.

One of the first other things we focused on was the paid losses. They were zero. So that definitely gave us a low ball answer. Another method that we thought about and rejected was the counts and averages approach. I think that's often a very good thing for looking at this kind of a situation.

I think we could have done some loss distributions and come up with an average ceded claim in this layer. It probably would be about $297,000. Because, once you've got a loss over $100,000, it's quite likely to keep on going further and further out your tail. But we had some concern about developing ceded counts, because there had been some changes in the claims department, as there always is. And that gave us some concern about differences in what we were counting as counts earlier in the pattern, compared to what we were counting later.

Well, that left us in the situation of either admitting to our colleagues, our reinsurers, that we had burned them pretty badly or finding a new method. Our method was something familiar to the pricing side. And if I was going to talk about pricing, I'd say it's just like, gee, I'll use increased limits factors, or something like that. But since I can't, I won't.

But when you get into the example, you'll see there's kind of a basic part of the answer and an excess part of the answer. And if you think about it in terms of how you price liability business, it shouldn't be too confusing.

Well, let's see how we go about implementing this. You've got a basic equation that: your ceded reserves will be equal to your net reserves times what we're going to call the excess ratio.

(Slide)

Let's take a look at the first term on the right-hand side, the net reserves. This is easy. We've got an internal chalkboard where written for everybody to read is dollars of incurred loss, by year, by coverage. And since we're simplifying this, it's just workers' comp, that's somewhat easier.

In truth, this is as tough a problem as the whole problem we're facing here. But we are willing to accept the net reserves, and while it's certainly a tough process to do the net reserves, all the other panels at the seminar are going to address that. It's probably also a process that gives you a more stable answer. And that's probably a better place to build your model.

Now, the right-hand side ends with the excess ratio and let's see how we get to that. In doing that, we have to pick a distribution, and we have to pick some parameters for that distribution. Let's talk about the parameters a bit first. Whenever you're thinking about a claim size distribution, the first thing you have to think about is the severity. And maybe this would be a good time for a digression, just to draw a distinction between the nice plots that Dave showed and the plots that I'm not going to show you.

The X axis that Dave was showing you was months. This was report lags. I'm not talking about a reporting process here. I'm talking about how, at ultimate, you'd plot out your loss distribution. I mean, your claim sizes, distributed by amount. And it will happen to be the Weibull distribution that I used and there is no reason why it's the same as what Dave showed you. It just happened to be that we both chose that distribution.

MR. GRADY: Carefully orchestrated panel.

MR. KNEUER: So, it's different things we're talking about. The probability function I'm talking about is the probability that (at ultimate) a loss will be greater than or equal to a certain size, or actually the first derivative of that function. And it's an entirely different process from the one Dave discussed.

Anyway, in a claim size distribution, the thing that bites you on the nose about a distribution is its severity. Everybody knows that homeowners theft losses excess of a $1,000 deductible are much smaller than neurosurgeons liability claims. I think it's not so obvious how the shapes of those distributions are different. But I think with a distribution, everybody is willing to talk about a severity size, even people who are not at all quantitative in their approach to insurance problems will see that.

Now, given a severity, and given a choice of a distribution, and something else I'm going to pull in from the outside, we're ready to compute the excess ratios.

And the last step is just applying the two, and the arithmetic gives the answer in a very simple way.

Let's wander a bit into the severity problem. And again in the interest of anonymity, I've suppressed the real data, but I think you can see the form here.

The first thing we've got is development of net losses. Or this can be done with gross losses. Next you take a development factor and the way we proceed is just a typical development approach. And I would think that you certainly ought to include at least reflections on other methods: counts and averages, payments, paid as percent of open, things like that.

And you may or may not want to include a benefit change factor there. Certainly if you want to use the severity from the '86 year as a component in projecting the severity for the '88 year, you'd want to do that. If you have development factors which explicitly build out the benefit change factor, it'd also belong there.

The product across would give you the adjusted incurred losses and LAE. The second block of data you see there is claim counts. These are first dollar claims. And you'll take a similar claim development factor, and that will give you an ultimate number of claims. The ratio of your ultimate dollars and ultimate counts will be your mean severity.

And I would point out that it's something you ought to do almost any time you can, when you're doing a reserving problem. First of all, it's an important check. If you take a look at your developed mean severity, and you see a pattern like 1,800 then 1,400, that's telling you that you've got some data that bounces around a lot. Nothing leaps out and tells you that you've got a problem. But if your developed means of severities go 7,000, 4,000, 300, I bet you're under-developing your later years.

Sometimes it's good news here. Sometimes you'll see a pattern in your developed severities that increases very rapidly, much faster than a trend factor would lead you to think. One possibility might be that you had one claim -- one claim -- two claims, and you can believe that. But another possibility might be that you're over-developing the later years.

In general, you're going to be developing the oldest years less and you'll be more confident about them. So trends in this implicit severity will tell you something about how you're doing in developing the later years.

In putting this exhibit together, a guy on my staff had a further observation: he thought "all my X's came from Texas." Enough levity.

The next page looks at the other parameter that we're going to talk about. Parameters are going to be specific to a distribution, and this distribution is the Weibull distribution. The Weibull distribution is a nice one for claims sizes. The arithmetic is easy. The parameter estimation is easy. And it has a lot of other powers that I don't understand.

I am very glad to see that there's a lot of people who don't look like they're currently studying for Part IV in the room. I don't know if that's because you're all senior practitioners who are going to give me very hard questions, or if you're willing to take some rough and ready explanations.

Anyway, I take another shortcut on this page. I'm going to use least squared estimation. When you're picking two parameters, you've got different ways of estimating your parameter set. And we're using least squares here. The alternative would have been to use maximum likelihood.

When I run some "bouncy" data through a statistical package and come up with some MLE's, I sometimes see some funny things. Like parameters that just "bounced out" from the fact that you've got more noise than signal in your data.

However, you do objectively know some things, like you ought to be able to feel comfortable about what your mean severity is. And you can judge your estimates, given that. That won't necessarily hold with MLE explanation.

If you run the data that's underlying this calculation through an MLE estimation, you'll find that the parameter that tells you about the mean doesn't exactly match the mean shown here. And then it also tells you that the C parameter, the shape parameter, doesn't match the shape, but collectively the two do the best possible job of fitting the data.

I get very uneasy when I use the MLE output without checking the reasonableness. I would rather go ahead putting brick on brick and some mortar in between. My approach was to make sure I knew the mean, and then given that mean find the least squared estimator for the shape parameter. And that, I think, gives me something which will get to about the same place. In fact, the answers are very close. But it at least gives me more comfort.

Now, one important final observation is that, given a mean, we come up with a shape parameter, and the shape parameter will depend on the mean. The mean is telling us about the scale of

the distribution. The shape and mean together will give you a particular plot of the curve.

Maybe another observation I'd make is that these fits are just running down the latest undeveloped diagonal, evaluated as of March '89. The claims will certainly develop later and that must be reflected. But the '88 year pops out with a value for the shape parameter of .33.

That tell us that probably we're not going to have a distribution with a hump, which is good, because intuitively we don't expect to see workers' comp claims become more frequent as size increases up, until roughly the mean. We don't expect to see more $5,000 claims than $4,000 claims. We just expect to see them kind of tail-off rapidly.

And having plotted them out, I think it's clear that some development is going to be needed. And I was amazed at how easy it was to develop this. Looking down the column here, it seems to me that the ultimate mean is always going to be .27 but I won't know that for 11 years. And I feel pretty comfortable in making that kind of an estimate.

We also split the data a bunch of different ways to test the 27. We found that in 49 states, there is no reason that you'd pick anything significantly different from the 27. But there's one state, it's a state that has got a tough worker's comp market right now, and it seems to be that they have got a law that says you cannot have a small worker's comp loss.

(Laughter)

I'm not going to get myself in any more trouble with regulators than I already am by telling you who, but if I did tell you who, you'd say, oh, that explains something.

Well, I think I'll just leave this page with that. We now have, I think, a good feel for where the mean came from and given the mean and the shape parameter, I'd have to write down the form of my distribution. Part IV students can go to the last page to do that. I'm not going to get you there.

The next page will take us to an excess ratio. We've got a mean, that's in the first column. We've got a scale parameter. And when I said the arithmetic is easy, it really is, I don't often do gamma functions in my head, but you can do them pretty easily in lotus.

You can also even do them on some pocket calculators: the more advanced Hewlitt Packard ones. If you press the factorial key, that can be jiggered to get you the valuations of gamma functions.

Well, there is two things we want to look at in pricing or reserving this layer. The first number is the top and the top is going to be the depth of the layer, $300,000, added to the attachment, $100,000. So, we're talking about 300 X 100. Our biggest loss is, on a ground-up basis, $400,000. And our attachment is 100,000. The layer starts at $100,000 and ends at $400,000.

Now, these ratios are just going to be a percent of your ultimate gross losses. Or actually a proportion. And they'll plot out very nicely and you'll see nice trends in these columns if you've got nice trends in your severities. And the excess layers is simply the difference, and that will give you the proportion of your total ground-up losses that will fall in that layer.

Alternatively, if I had my total ground-up losses, and if I had my ultimate net from somewhere else, then I could subtract and do the reserving. Barring that, I have to back into what my net is. And the way I do that is I use the attachment column, the Column D ratio. For example, if in the '82 year, my numbers are one percent and three percent, I know I've got two percent of my gross, but that's going to be two percent divided by 97 percent of the gross because my net is 97 percent of my gross.

I think the arithmetic there is pretty clear. So, this gives me some ratios, which I can now apply to net losses, which I had from somewhere else.

That's done on the last page. We show some severities and some excess ratios, and some made-up ultimate net losses, and the net ceded losses drop out. And that gave us an answer, which perhaps not coincidentally was a lot lower than what the incurred development method would have shown us.

I'll leave questions until the end unless Pete has got some -- thanks.

(Applause)

MR. LINDQUIST: Thank you, Paul. I would like to pick up on something that each of these guys has mentioned and sort of beat you over the head with it until you're sick of it. Okay? And so I'm going to try to do that in a non-threatening way.

My two basic topics, for those of you who are taking notes, are parameter estimation and percentiles. I'm going to have something to say about each of them.

The first one is parameter estimation. On the plane out here, I took a nap and I dreamed I was 12 years old and my grandfather came into my bedroom and handed me a shotgun from the log normal firearms company and said, "Okay, son, we're

going to go duck hunting." And I grabbed it and I said, "Great, let's go." And he said, "No, no. First we have sight it in and pattern it." And I said, "What for?" And in my dream he said, "Well, when you go duck hunting a lot of nasty things happen. First of all, your toes freeze. All right? Second, at the end of the day your ears are going to ring for a week. You've got a sore shoulder and you've got to ride home in a pick up truck with a very wet dog."

"And if you're going to suffer through all that, you would at least like to have some ducks to show for it." Okay? So, I said, "Gee, gramps, that sounds like parameter estimation to me." And he said, "Well, if you're going to cuss like that boy, you know, you go let me right out of your dream right here." So, I woke up on the plane and I took some notes on parameter estimation. Okay?

Now, this is something that is critical and in Paul's presentation, he said something almost in passing that when you get your transcript, I want you to underscore. He said, "I presume I know the mean and then I solve for the standard deviation or variance or measured dispersion or whatever." And I like that. That makes a lot of sense to me and it seems to me that that goes a long way towards reducing the low ball nature of what happens when you do this stuff most of the time.

I've had some very bad experiences fitting distributions. The particular distributions I've had bad experiences, well, pick one, the negative binomial, and recently I had a really bad one with the log normal. Okay? And at first I thought it was me. Okay? So, in duck hunting terms, you know, both of these distributions have two parameters. Okay? Which if you stop and think about what Dave said, you know, loss distribution in theory tells you everything you need to know. All right?

It's a model of a particular universe. And in order to get one you only need to know three things, okay, in these particular cases.

First of all, what's the name of the distribution and second, what are the two specific parameters. Okay? Now, any time you've got three things which together define the universe, it makes some intuitive sense that specifying precisely what those three things are is critical. And close ain't going to be good enough most of the time.

So, what I did in the log normal case and it was truly distressing, and I'm going to take Paul's idea and go back and maybe I can fix some of it, but I took -- I have a software program on my computer, as most of us do, which will generate random numbers according to whatever distribution you specify. And another thing it will do is it will take some data that you've got and fit a distribution to it.

So, I did the obvious thing, I generated some log normally distributed numbers and I put them in a data file and I turned around and I said, "Gee, now, if I tell it it's a log normal distribution and ask it to solve for the parameters, will it give me back the same parameters I put in the first place?" And I got back a parameter for the mean, which was one and a half percent low and I felt really good. And I got back a parameter for the standard deviation and it was 30 percent low.

At first I thought it was me, but it wasn't me, I hadn't hit any wrong buttons, I did it again. And then I thought maybe it's the sample size. So, I tried taking a bigger sample size and I got a work space full error because my sample size where the standard deviation was 30 percent low was 5,000. Okay?

Now, how many times in the real world do you have more than 5,000 claims that you're using to try and estimate parameters out of? Okay. So, that's one real thing you should really worry about.

I had a discussion once with a client and it degenerated rather rapidly because we were discussing a particular method and he wanted me to admit that his method was a better predictor than mine based on theoretical grounds. And I made the simple observation, gee, the test of a better predictor is that it predicts better. And when I use your company's data from three years ago and I used both methods, the real world at this point is closer to mine than yours, so I can't say yours is theoretically better if mine predicts better, and I'm very sorry. Okay.

And you don't want to hear how the rest of the conversation went or the subsequent conversations with my boss back at the office or any of that stuff.

But in terms of better predictors, all right, statisticians like to use words like asymptotic and unbiased, and things like that, okay, in deciding on theoretical grounds which predictor is better. Now, if you're going duck hunting asymptotic means you've got infinitely many shells in the gun and if you shoot them all off you're going to be closer to a duck than you would have been otherwise. Okay?

So, that's neat, but it requires maybe, you know, more shells than you've got or more claims than you've got or more something than you've got. Okay?

Unbiased means -- I'm not quite sure how to put unbiased in a duck hunting context. I guess if you stood up in the boat, all right, and closed your eyes and spun around and shot off the gun at random, that's unbiased with respect to where the duck actually is. Okay? But once again it's not particularly wonderful. Okay? And I'm sure we could probably think of a better way to do it.

One of the things I mean to do once I can get the two parameters back is I'm going to start looking at sample size. Because my idea was that I would pattern my method. You know, you have a line across, which is the deviation in percent terms on the mean and you've got a line up and down which is the deviation in percent terms of the other parameter. And the ducks, I guess, where they cross.

And if I take various sample sizes, I can figure out which sample size gives me patterns I like and then I'll know not to go below that. So, that's a combined theoretical practical exercise I hope to get into eventually. But it's not there yet because I still have this problem with the variance.

So, that's a major unaddressed issue in using these things. It's probably not good enough (and this is the lay actuary in me speaking), it's probably not good enough just to say, "Well, we'll use the maximum likelihood estimate, or we'll use the method of moments," or whatever.

That's particularly true in the case of skewed distributions. Okay. Most of the distributions we're concerned about go all the way up, but they only go down to zero. And I have a small, but not negligible probability of an event ridiculously larger than you have ever seen so far. If you think about that a little, it leads you to a conclusion which I had a marketing guy argue with me for an hour before I understood what he meant and he was right, that the frequency and severity are not independent. Okay.

If you're talking about the observed frequency and the observed severity in a skewed distribution. All right. You take a log normal and you take samples of claims, 60, 65 percent of the time you're going to get a sample average below the true average. All right. It's not symmetric that way. And based on my results to date, you're even worse off trying to estimate variance from sample data alone.

This causes the perennial problem we thought we could get away from, but I guess we can't. If you're not going to base it on data, then you have to base it on judgment and once you base it on judgment then where are you. But, you know, I guess maybe on the brighter side, we'll always need actuarial judgments, always need actuaries. Okay? So, that's the end of my parameter estimation remarks.

With respect to percentiles, and I guess that's another word which means approximately the same thing as confidence intervals, and I don't choose to define it because I'm being non-threatening. When we do percentiles, in the literature there are a couple of different things you can do. You can do simulations which everybody knows about.

And then there's the thing called the Heckman Meyers method which allows you to do percentiles and we generally don't do that because we're trying to combine different years. Okay. For the things we're looking at in a loss reserve study, you are never looking at just one year at a time. You're always looking at a bunch of years. And the process is not stationary until you make some adjustments. And sometimes you can make those adjustments and combine all the years, but most of the time you can't.

Retentions change frequently and one of the advantages of loss distribution methods is you can do some kind of formal procedure, which appears to make sense, which will take specific account of that instead of just fudging your development factors either upward or downward because you know approximately where it changed.

Another use of percentiles is in calculating ruin probabilities. Now, that's a highly theoretical exercise except maybe possibly you are considering about buying an insurance company and you want to know what's really happening with the loss reserves and you're not interested in a point estimate. You want to know how bad could it be really. This is the one time when people really like to hear high loss reserve estimates instead of low ones, because it lowers the net worth.

Another use which I ran across, and actually is the context in which I ran across the log normal problem, is one of our audit people called me up and said, "We have a client and they have this reinsurance contract, and they've had a contract like this for several years, and we're the auditors this year, and I need to know is there any risk transfer in here, and I mean underwriting risk transfer, because to me it doesn't look like it, but I'm not an actuary." And I did some actuarial stuff and to me it didn't look like it either, so I reported that back. And I don't know what happened after that, I wasn't in those discussions either, which is just as well.

So, there are all different kinds of context where you need to know percentiles. All right? And referring back to the first point for a minute about parameter estimation, if you missed on the variance, then all the percentiles are going to be way off. Okay?

The final thing about percentiles and I hesitate to mention this. Let me explain why I hesitate to mention it first. All right? The actuarial literature says you should have a margin of conservatism. All right? And sometimes the person you're giving the report to doesn't particularly want a margin of conservatism. Okay?

So, what some of us have been known to do on occasion, all right, is to stick one in places where nobody is ever going to see it, but we know it's there.

One of the best places to do that, and it's really surprising nobody has ever picked up on it ever in my experience, is you've got six different years and you calculate the 90th percentile for each year together separately, not together, separately and then you add up those figures and that's your 90th percentile answer for the loss reserve.

Now, you guys are snickering, but I bet we slipped it past at least one of you.

Now, that's not necessarily wrong. And let me now go back and beat on what Dave was saying about parameter risk versus process risk.

In duck hunting terms, you all sit around and play poker. Okay? And process risk is the cards you're dealt and parameter risk is if all the other guys in the room are better poker players than you, you're going to lose your shirt. In theory, you have an interesting concept here because if you consider are the years related or not. All right? The first year, the second year, the third year, because you're doing a loss reserve that applies -- it's a sum of years.

In theory, the process risk acts like independent trials from the first year to the second year to the third year. But the parameter risk does not most likely, because if you specify the wrong model you've probably specified it wrong for each and every year. All right? So, now when you go to add percentiles, it's not right to sort them first in any of the years, it's equally wrong most likely to add them all up first and then sort.

What you want is some kind of mixture and the mixture depends on which risk dominates, process risk or parameter risk. And I can see I'm starting to get really threatening because people are looking at each other.

But an ad hoc thing I've done and I would like somebody else to look at it and see if they like it or not, and you might even try using it if you get desperate enough, is to take an analogy from the concept of correlation coefficient. All right. A correlation coefficient between two variables ranges between plus and minus one. Okay.

And so, the concept I came across - - I had a situation where I figured that about 50 percent of the risk was process risk and 50 percent was parameter risk. So, that means half of the time from one year to the next the results are correlated and the other half they aren't.

So, what I did was I took my thousand outcomes for each of the years and I took the first half of each set of outcomes and I sorted those. And then I added across. So, now I have a thousand outcomes for all years combined, half of the time the results are positively correlated and the other half of that time they are not. They are random. And we quibble about whether that's a 50 percent correlation coefficient or whatever.

But it allows me to manipulate based on things I believe or understand, but can't necessarily prove from the data. It allows me to manipulate the answer in a way such that I think I've eliminated the distortion from the simple minded application of percentiles either the way we do it to get extra money into the answer or the way you would do it if you believed there was no parameter risk at all. So, you guys should think about that too.

The good news is I think we've pretty much reached the end of the formal presentation and that means that we have lots of time for questions, socializing, or coffee, or anything else. If you're going to ask a question, please use the microphone and identify yourself, because we are being recorded.

I want to thank the panelists here, particularly in addition to the fact that I found their presentations edifying and non-threatening and I guess you did too because you are all still here. But also because they are both actually not able to stay through the whole session today and tomorrow. They both have commitments. Dave has to run for a plane in what, an hour, maybe a little less than that?

MR. GRADY: They cancelled it.

MR. LINDQUIST: All right. Well, that's good for the guys who want to ask long questions. Okay. So, Dave will be available for the foreseeable future to ask difficult questions.

Okay. I want to thank you all for your attention. I hope you've got some insights into this thing and I hope some of you are energized to go out and do some really neat stuff which will show us all how simple minded we are and how to do it right.

Thank you very much.

(Applause)

MR. LINDQUIST: Questions. Yes. The microphone.

QUESTION: Being an equalitarian, I'll ask a question of both of the gentlemen unless there is somebody behind me. I'm John Narvell from Coopers and Lybrand, and as everyone else is saying, I'm not speaking for my company.

The first question is to Dave Grady. The talk that you gave seemed to concentrate strictly on frequency and there was no discussion of severity. And going beyond that, once you have the number of claims, it seems to ignore one of the critical components of IBNR that all of my clients prefer to ignore and that is development of known claims incurred, but not enough, which in my experience seems to be a quite significant element of the loss development that wouldn't be included in your modeling process. Can you respond to that?

ANSWER: Well, first of all, my talk was a philosophical talk, not recommending that the procedure of loss distributions be used solely on claim frequency. Claim frequency may be the easy part of the problem. My comment on claim severity is that they may be interrelated. Peter made the same comment.

The claim frequency and claim severity may be interrelated. If they're not, you can assume an average of claim cost and just work it back against your claim frequency distribution and assume that's the only distribution. You must, however, also look at the development of known cases. So, you have quite a complex process operating.

Now, if the basic process, the elementary process is complex, it leads to my final remarks on chaos. How many of you have read, say, some of the works on chaos? That's quite a few. What comes out is things like, oh, the deterministic process again.

Let's look at an antinion universe, an antinion universe is represented by balls on a billiard table. And you take your pool cue and you go after a ball. Pretty soon you have all of these interactions among the balls. Well, what happens is by the 15th hit the uncertainty is bigger than the billiard table. You can no longer predict. You can no longer know. The chance of error beginning so very slightly in that pool table situation magnifies repeatedly ball after ball and claim after claim.

So, what is brought to our attention among other things in this loss distribution process is not only the basic complexity as John has brought out, but the fact that you are reaching towards something that is very, very sensitive to small changes. A small unpredicted change can quickly overwhelm you. That's why I ended my talk on chaos at the end.

QUESTION: And the question for Mr. Kneuer. In looking at the estimates of the shape parameter for the Weibull distribution, it was very clear that there was some convergence that appeared as one moved to later report years, later development stages. In that you're only looking at a diagonal on a development triangle, the first thought that came to my mind is that is there some shift that's occurring in the shape parameter.

When I looked at the general shape of the Weibull it did seem not unlikely to me that there could be some shifting among the accident years or the policy years, whichever you had, to such an extent such that the C parameter would be shifting to the right which would give you a bigger tail in your severity distribution as you went along. Did you notice any of that in the triangle or was this just an -- aberration.

ANSWER: To be honest with you, we didn't have a triangle. So, to speak to it from a practical point of view, we tried to address that by cutting the data. And we found that looking at subsets we didn't see different C's falling out of the sets that had different means to them.

And also, in thinking through the process, I guess that'd be very much a concern in a line where there's a big social component to the inflation, like med-mal. This is comp and we figured that relative proportions of banged knees and broken arms won't change too much over time. But that's certainly an assumption we had to make. If we'd had a triangle where we could have computed this for the '78 year at first report, that would have been something we would have liked to have done.

QUESTION: I'm Rich Woll from Allstate, and like everybody else I'm talking for myself. And actually all I want to do is to follow up a little bit further with the last question and some of your comments. I guess I have a certain skepticism that shape changes over time represent a real phenomenon to a homogeneous group of insurance.

Well, after Dave's chaos idea, maybe you can't conclude anything. But I am thinking -- he stressed -- Dave started by stressing homogeneity and my feeling is that a shape change is almost prima facia evidence that something is going on in there that is -- that you're starting with something that's not homogeneous and that lack of homogeneity is starting to shift.

So, have you any comments on that? I kind of think a shape change is -- I would look first for homogeneity. And your answer, by the way, gave really kind of some idea that that's what you do, but I wanted to bring it out a bit more.

KNEUER: Yes. Something else that we thought that we know is changing worker's comp, is that the medical piece of the pie is becoming bigger as medical inflation becomes bigger than wage inflation. And just to scratch our head a bit, we were able to separate the data to some extent. Since wage loss is present in only some claims, we don't want to look at the wage loss severity, because that would have a funny denominator.

But we were able to divide our universe into claims that had no wage loss and claims that had positive wage loss. And when we did that exercise we came up with two very different

parameters. And one parameter is much more skewed than the other.

Then we said, "Okay, knowing this, what do we think 1988 is now," because we know or we're willing to bet we know what the 1988 medical share of the pie is, and what the excess ratios would be for the medical part only, and what the excess ratios would be for the claims for wage loss. And we came up in roughly the same place. If it hadn't, I think we would have been concerned about that.

MR. LINDQUIST: Let me just observe something in the interest of making it a little more complicated. With respect to this particular example here, not only would you expect the medical shape to change over time, but there's a mechanism which has been going on for the past few years which have also caused the wage distribution to change. And that is that rehabilitation is a lot more popular than it used to be.

Ten years ago nobody did it and now everybody claims to do it and whether they actually are doing as much as they claim to we'll only see some time in the future. But rehabilitation is coded as medical expense in the data bases.

And so, on the assumption that it does provide an economic benefit as well as a social one, you would expect to see the wage loss distribution also changing over time. Perhaps dramatically, because the people who used to be permanently disabled may now get back to work. So, that's the worst possible cases that would tend to be changed the most. So, that's one more thing to worry about.

Yes?

QUESTION: I'm Ben Zehnwirth and I'm from McCoy University, Sidney, Australia. I've traveled three-quarters of the way around the globe to get here today.

MR. LINDQUIST: Thank you.

QUESTION: And I'm glad to say that I'm not downstairs flying with Pan Am this morning. Hi, David. A number of comments. First of all, I share some of Richard's views on the heterogeneity of these distributions. I think the reason you design a model is to extract the maximum information in your data and the model itself should be able to tell you whether there is any heterogeneity in these distributions and what the nature of the heterogeneity is.

When you postulate a model or you specify a model, it's very important that it is tested. It's very important that it is validated and I think Peter was referring to validation when he said, "Let's assume we didn't have the last three years

information." And in that way you can also test your model for stability.

I've just got one more comment. Your definition of confidence interval is wrong. Thank you.

(Laughter)

MR. LINDQUIST: We will now have a short break in which we're going to break up into groups of three and the object of the exercise is to have every group come back with a definition of confidence interval and you're not allowed to leave until they're all the same. Okay?

QUESTION: Ed Weisner. I just want to make a comment on that estimation of log normals. There's a great little book, I can't remember the exact title, but it has log normal in it and I think it's written in the late 50's, but it's by, I believe it's Aitchison and Brown, A-i-t-c-h-i-s-o-n, there's a couple of i's there misplaced, but it's Aitchison and Brown, some kind of a log normal. And they go through taking all these simulations and censoring and it just has tons of data. So, if you don't have a computer and a slave to do it, you can read the book.

MR. LINDQUIST: Thank you. Any other questions?

QUESTION: Dan Benkson, Employers Insurance of Texas. I want to follow up on the testing of the model. Can you remark on different techniques to do that like goodness of fit? Do you do that often? As well as some of the sensitivities of maybe different methods?

ANSWER: The answers are very sensitive to different methods as I remarked in the beginning. There is really no good way to validate a model except to see if it works in the long run. And we haven't really been doing it long enough to be sure of that. I don't think any of us for any particular model or particular set of data is actually comfortable that we've got the best conceivable answer.

It's just that if we haven't reached a point where we feel reasonably comfortable with the results; we'll put it in the bottom left-hand drawer of our desk and never show it to anybody.

Most of us at the current state of the art are relying on what I jokingly refer to as the Goldilocks method, some numbers are too big and some are too small and some are just right.

(Laughter)

MR. LINDQUIST: Anything else?

QUESTION: I'm Gary Venter, Workers' Compensation Reinsurance Bureau. Just a couple of comments on the C parameter in the two Weibull's actually.

MR. LINDQUIST: Non-threatening comments?

QUESTION: Hopefully, yeah, useful. A few people have tried fitting the C parameters with some big data sets, including claims with, you know, over $5 million and, you know, tens of thousands of claims, and they find that the C is usually a little smaller for work comp than you were getting, usually round point 2. So, you might find that useful and you might see if that helps your estimation.

The other thing we found is for when C is greater than one and you get the hump, that Weibull is a very short tailed distribution, in fact, more short tailed than normal. So, when you're using that sort of Weibull you really, you know, have a smaller tail than the normal, which definitely has implications for how much IBNR you put in.

ANSWER: You can see it on my -- (Inaudible)

MR. LINDQUIST: Anything else?

(No response)

MR. LINDQUIST: Okay. Thank you all. Go forth and multiply.

(Applause)

LOSS DISTRIBUTIONS IN LOSS RESERVING

DAVID J. GRADY

1989 CASUALTY LOSS RESERVE SEMINAR
SEPTEMBER 18, 1989

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   B. Stochastic

      1. Distributions through Time

         a. Independent

         b. Interdependent

      2. Regression Models

         a. Components of Loss

         b. Analysis of Variance

III. Nature of the Underlying Process

   A. Homogeneity

   B. Independence of Events

   C. Stability over Time

   D. Completeness of Information

IV. Characteristics of Loss Distributions

   A. Examples of Distributions

      1. Exponential

      2. Weibull

      3. Lognormal

B. Measures of Location

1. Mean

2. Median

Mode

C. Measures of Dispersion

1. Variance

2. Minimum Deviation

V. Confidence Intervals

A. Deterministic

B. Stochastic

1. Variance of the Mean

2. Central Limit Theorem

VI. Types of Uncertainty (Risk)

A. Process Risk

B. Parameter Risk

1. Parameter Estimation Risk

2. Model Specification Risk

VII. Description of the Underlying Process

A. Conditions of Exposure

B. Realizations

1. Claim Frequency Distribution

2. Claim Severity Distribution

3. Distribution of Aggregate Claims

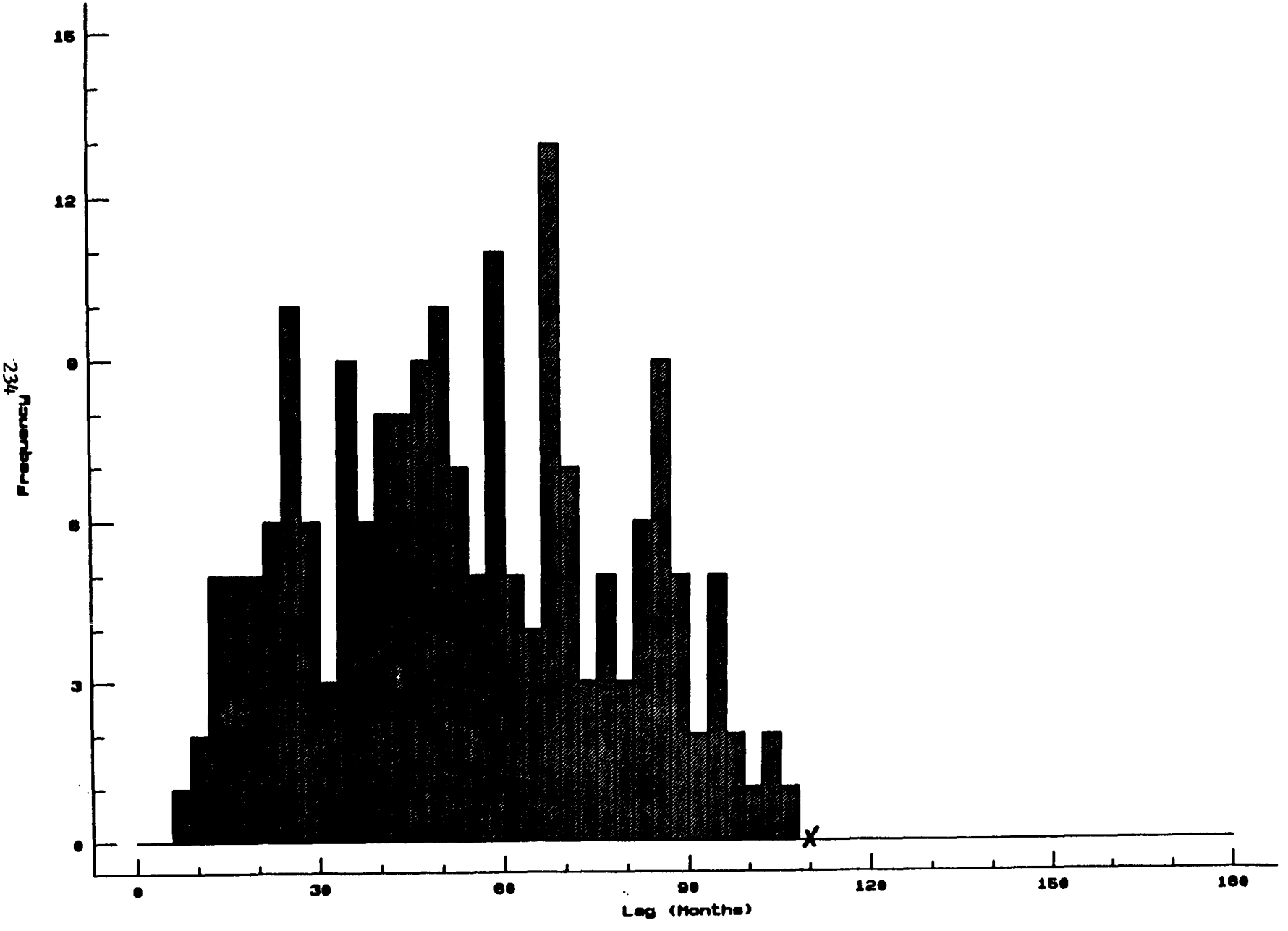
VIII. Future Possibilities

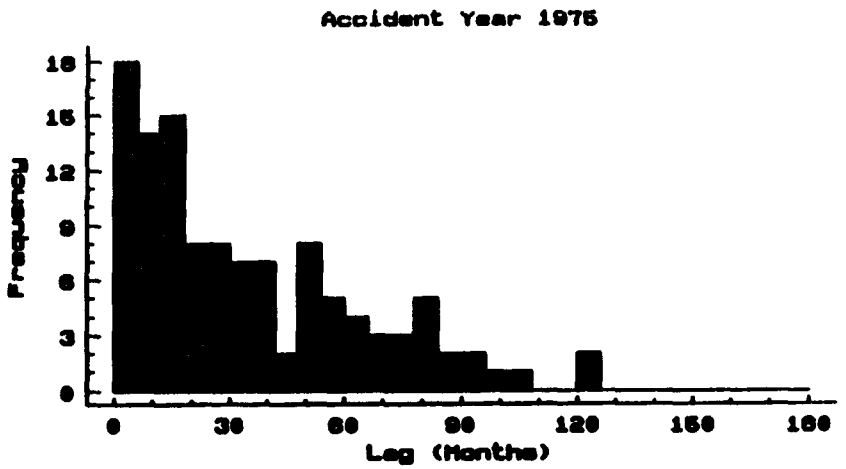
A. Minimum Confidence Intervals

B. Stable Chaos

Simulated Weibull Mean of 62 Months

Casualty Loss Reserve Seminar

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3
6
9
12
15
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0
30
60
90
120
150
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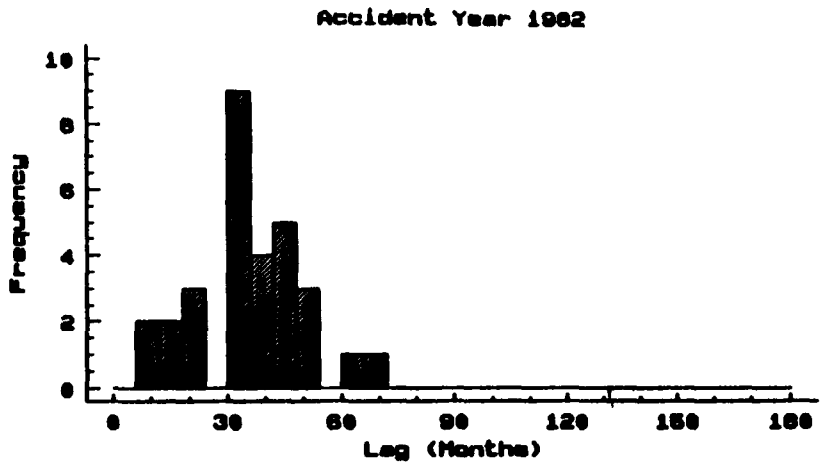
Lag (Months)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Frequency
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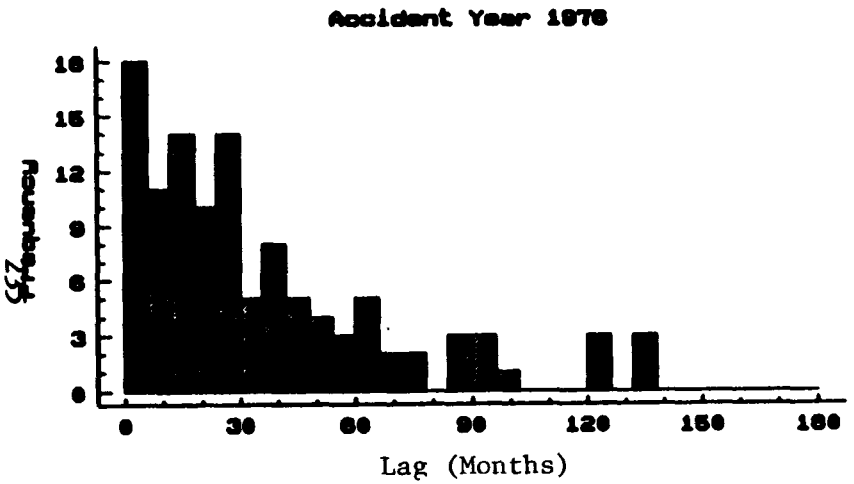
Lag (Months)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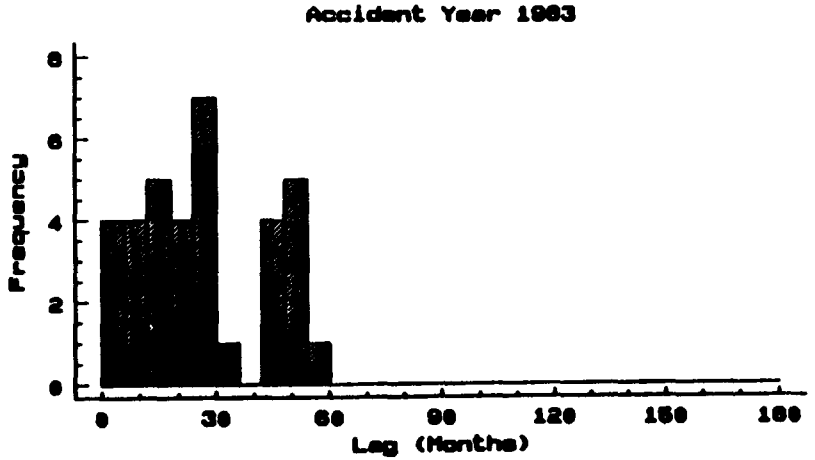
Lag (Months)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Frequency
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30
60
90
120
150
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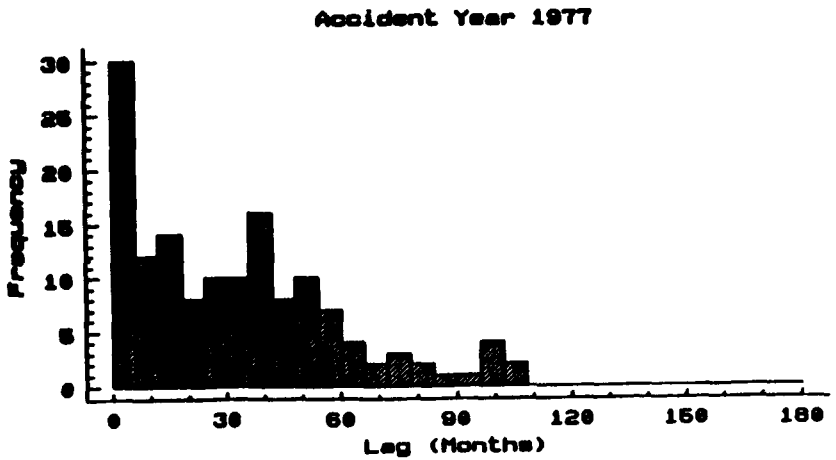
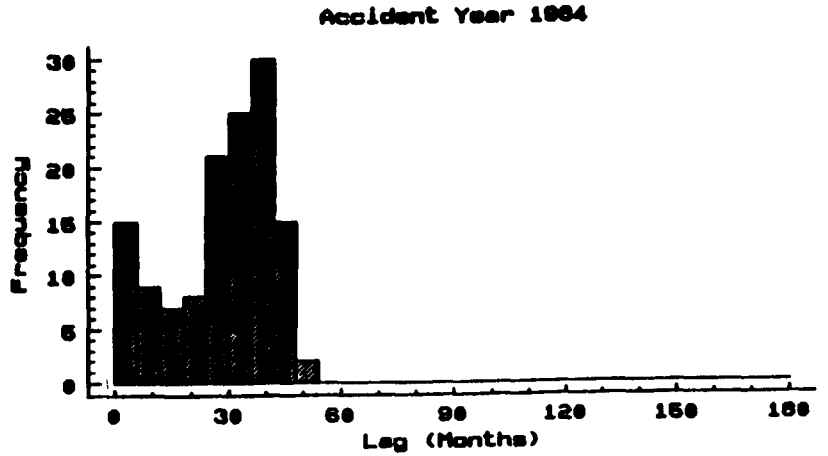
Lag (Months)


Accident Year 1977
Frequency
0
5
10
15
20
25
30
0
30
60
90
120
150
180
Lag (Months)


Accident Year 1984
Frequency
0
5
10
15
20
25
30
0
30
60
90
120
150
180
Lag (Months)

NATURE OF THE UNDERLYING PROCESS

HOMOGENEITY: Do the events all arise from the same process?

INDEPENDENCE: Are the events interrelated in some way? Is there contagion?

STATIONARITY: How stable are results over time? Does inflation (or social inflation) produce unstable trends?

COMPLETENESS: Is the known information partial or incomplete in some way?

MEASURES OF LOCATION

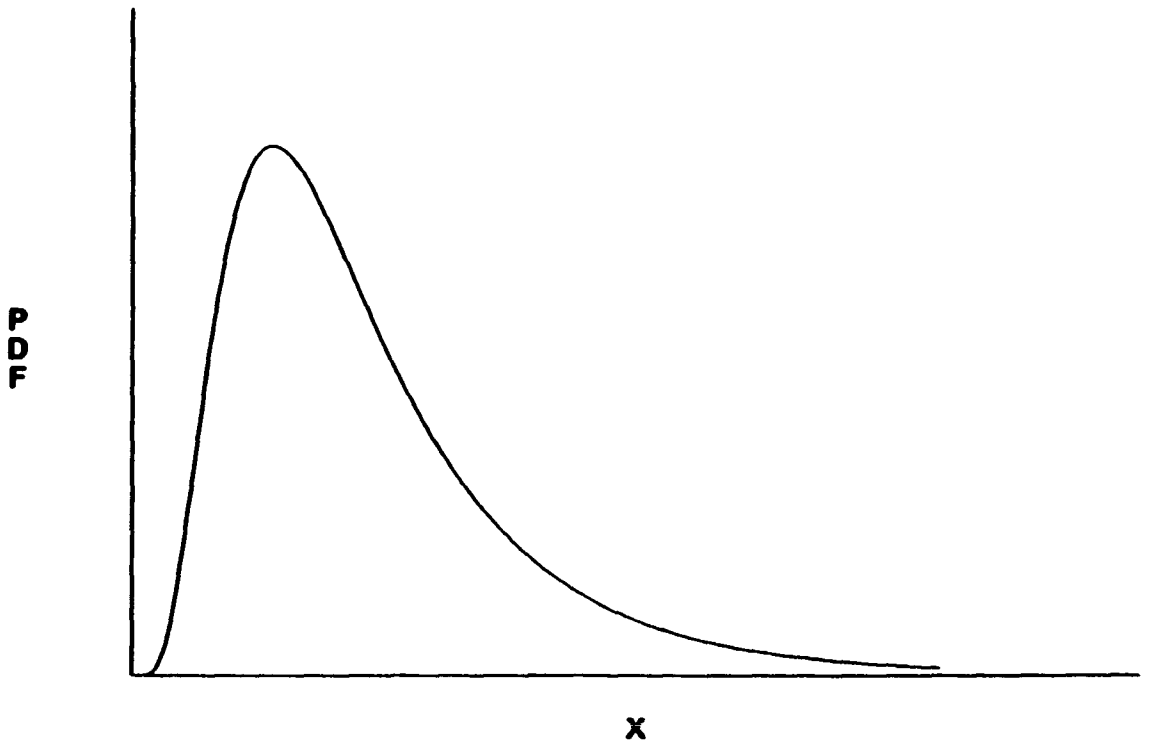
MEAN: The arithmetic average of the events

MEDIAN: The midpoint (half of the events lie above the median and half of the events fall below the median)

MODE: The most frequently occurring event

Lognormal Model

CLRS



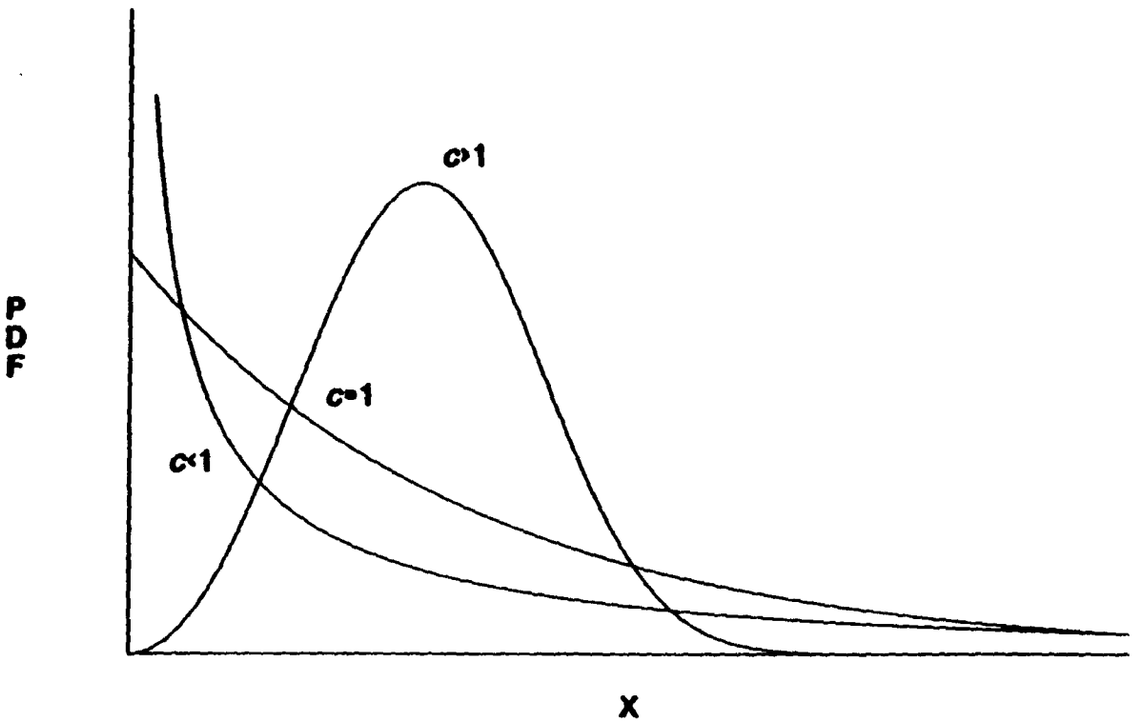
Parameters: σ, μ i.e., ln(x)~Normal

Mean: $e^{(\mu + \frac{\sigma^2}{2})}$

Variance: $(e^{(\sigma^2 - 1)} - 1)e^{(2\mu + \sigma^2)}$

Weibull Model

CLRS

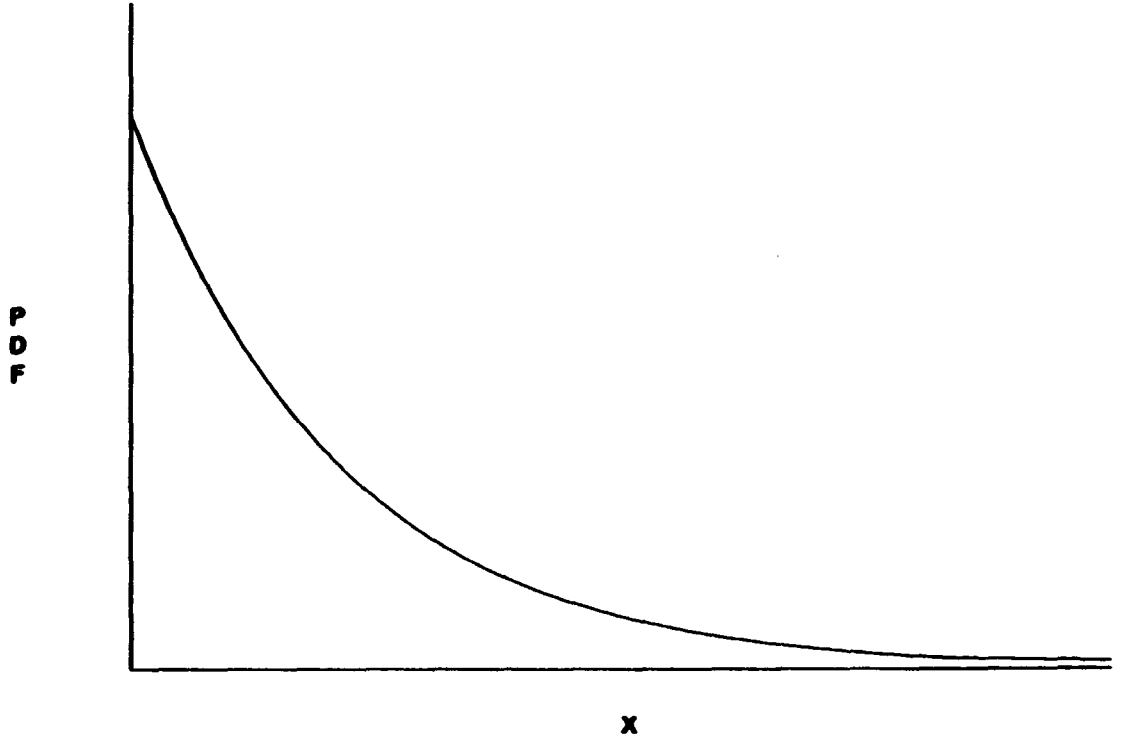


pdf: $\frac{c}{b^c} x^{c-1} e^{-(\frac{x}{b})^c}$

Mean: $b\,\Gamma(\frac{c+1}{c})$

Exponential Model

CLRS



pdf: $(1/b)\exp(-x/b)$

Mean: $1/b$

Variance: b^2

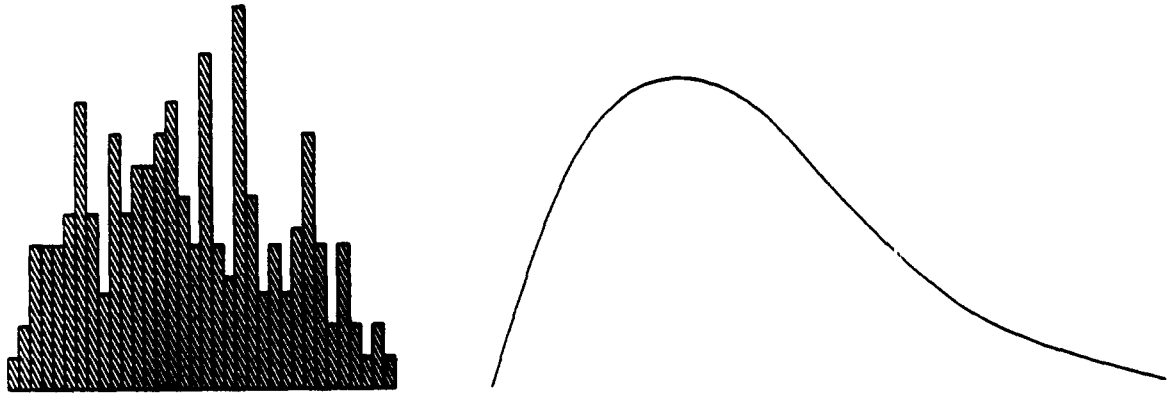
MEASURES OF DISPERSION

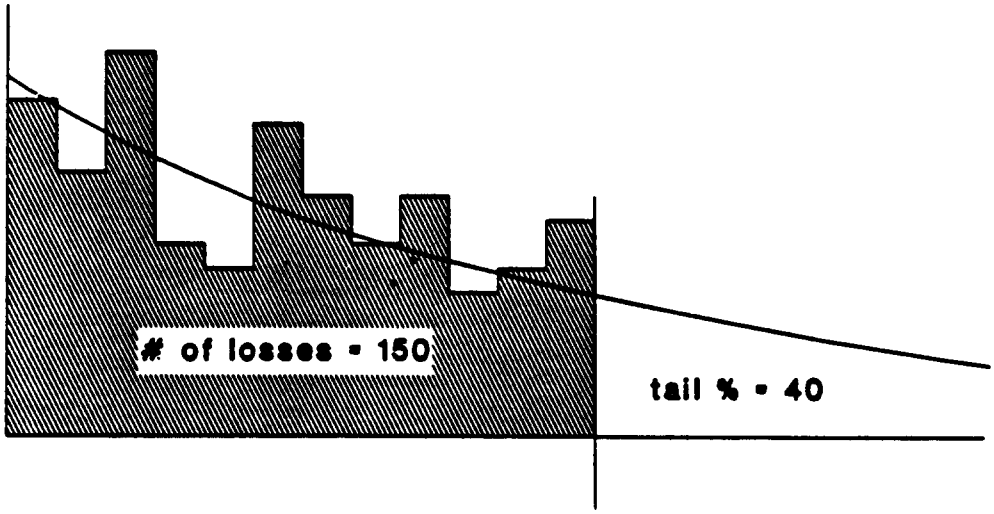
VARIANCE: The expected value of the squared deviations of the possible occurrences from the mean

MINIMUM DEVIATION: The expected value of the absolute values of the differences of the possible occurrences from the mean

ESTIMATION OF THE REPORT LAG DISTRIBUTION

The Problem: Given a sample of Report Lags $\{x_1, x_2, \ldots, x_n\}$, Estimate the Report Lag Distribution.





$$\text{total \# of losses} = \frac{\text{known \#}}{\text{known reported \%}} = \frac{150}{.60} = 250$$

$$\text{IBNR \# of losses} = 250 \cdot \text{IBNR\%} = 250 \times .4 = 100$$

Assume: 1. Each claim obeys the same Lag Distribution, $F(\bullet)$.

2. Each claim is independent of the others.

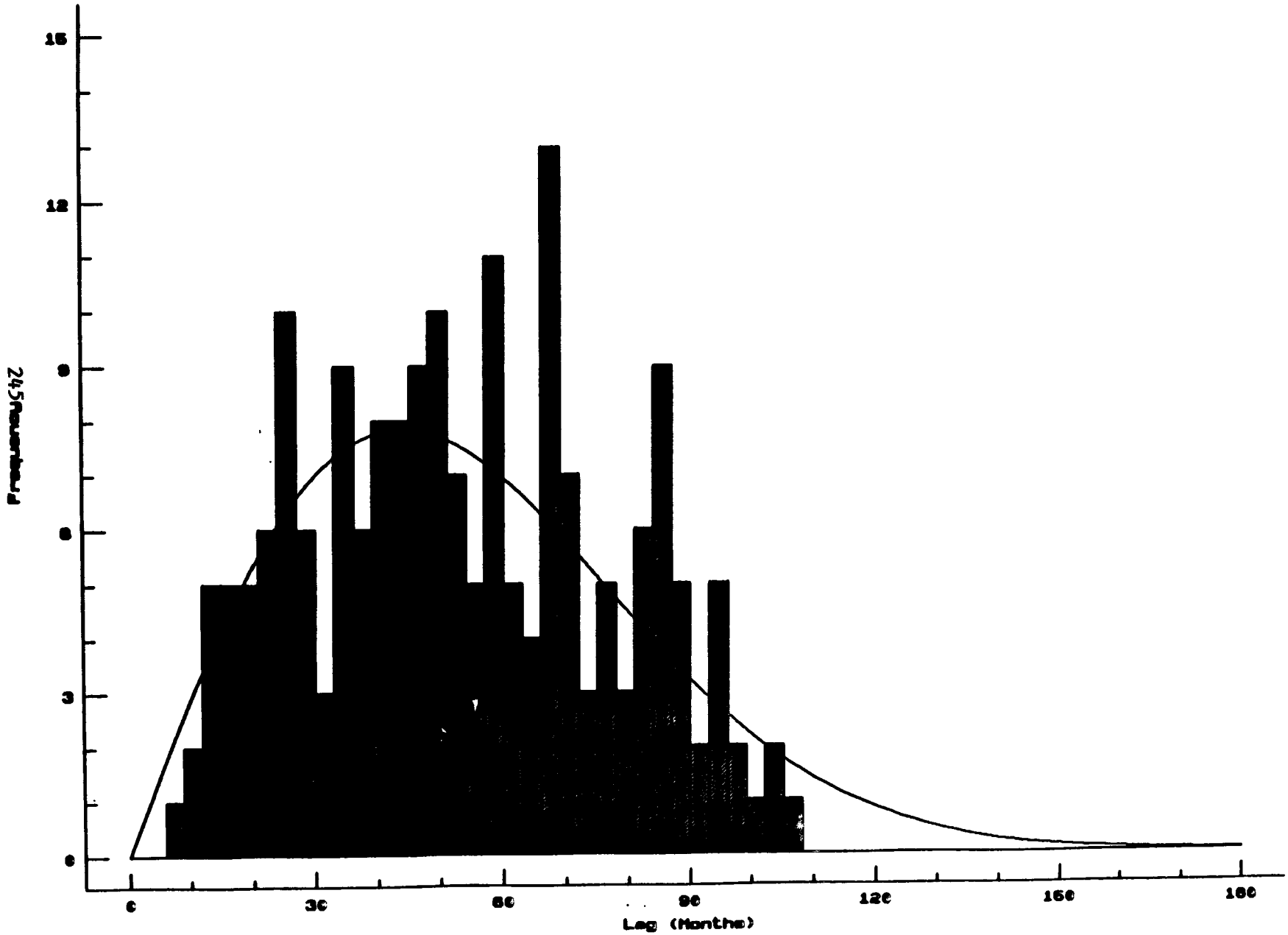
3. Because of experience and knowledge we can specify the Family of Distributions of which $F(\bullet)$ is a member.

I.E. F is Normal or F is Exponential or
F is Pareto or F is Gamma or

Under These Assumptions, Our Question is: Given a sample of independent Lags and that F belongs to the XYZ family, estimate the XYZ family parameters of that F.

Simulated Weibull Mean of 62 Months

Casualty Loss Reserve Seminar



DESCRIPTION OF A CONFIDENCE INTERVAL

Probability that the true mean lies between

(1) (Sample Mean) - (Multiplier) x
(Standard Error of the Mean)

and

(2) (Sample Mean) + (Multiplier) x
(Standard Error of the Mean)

where

(Standard Error of the Mean)

$$= \frac{\text{Sample Standard Deviation}}{\text{Square Root of [(Sample Size) - 1]}}$$

CONTEXT FOR CONFIDENCE INTERVALS

Area of Concern	Discipline
Level of Comfort	Utility Theory
Degree of Belief (Credibility)	Bayesian Forecasting
Interval of Confidence	Classical Statistics

TYPES OF UNCERTAINTY

PROCESS RISK: For a known distribution the risk of an adverse outcome

PARAMETER ESTIMATION RISK: For a known family of distributions the risk of adversely misspecifying the parameters

MODEL SPECIFICATION RISK: Selecting a less risky form of distribution then is actually the case

LOSS DISTRIBUTION ANALYSIS

APPLICATION TO RESERVING

TASK: Evaluate Workers' Compensation Reinsurance Reserves

SPECIFICS:

-Given Ultimate Net Losses, Determine The Ultimate Value of Net Ceded Losses in the Interval $100,000 - $400,000.

-Incurred Loss Development Method Assessed as Unacceptable

-Select Methodology

-Implement

APPROACH

Basic Equation: Ceded Reserves = Net Reserves X Excess Ratio

Preliminaries:

-Calculate Mean Severity

-Derive Excess Ratios via Two Parameter Weibull Distribution

-Compute Ceded Losses In $300,000 excess of $100,000 Layer

DEVELOPED MEAN SEVERITY

DEVELOPED LOSSES

POLICY YEAR	LOSSES INC. LAE	DEVELOPMENT FACTOR	BENEFIT LEVEL FACTOR	ADJUSTED LOSSES INC. LAE
1986	xxx,xxx,xxx	x.xxx	x.xxx	xxx,xxx,xxx
1987	xxx,xxx,xxx	x.xxx	x.xxx	xxx,xxx,xxx
1988	xxx,xxx,xxx	x.xxx	x.xxx	xxx,xxx,xxx

DEVELOPED CLAIM COUNTS

POLICY YEAR	# OF CLAIMS	CLAIM DEV. FACTOR	DEV. CLAIMS
1986	xx,xxx	x.xxx	xx,xxx
1987	xx,xxx	x.xxx	xx,xxx
1988	xx,xxx	x.xxx	xx,xxx

DEVELOPED SEVERITIES

POLICY YEAR	DEVELOPED MEAN SEVERITY
1986	x,xxx
1987	x,xxx
1988	x,xxx
1989	= AVG TRENDED TO 1/1/90

Historical Least Squared Error Estimates of the Shape Parameter (c)

YEAR	REPORT	(c)
1988	First	0.330219
1987	Second	0.315202
1986	Third	0.297270
1985	Fourth	0.292008
1984	Fifth	0.285786
1983	Sixth	0.278963
1982	Seventh	0.285531
1981	Eighth	0.275669
1980	Ninth	0.271003
1979	Tenth	0.271006
Selected Ultimate		0.270

EXCESS RATIOS GENERATED BY WEIBULL DISTRIBUTION

GIVEN SHAPE PARAMETER (c)

YEAR (A)	MEAN SEVERITY (B)	SCALE PARAMETER (b) (C)	ESTIMATED EXCESS RATIOS * 100,000 (D)	400,000 (E)	EXCESS LAYER (300,000 ex. of 100,000) (F)	EXCESS AS A % OF PRIMARY (G)
1982	u1	$\Gamma((c+1)/c)/u1$	x1	y1	y1-x1	(y1-x1)/(1-x1)
1983	u2	$\Gamma((c+1)/c)/u2$	x2	y2	y2-x2	(y2-x2)/(1-x2)
1984	u3	$\Gamma((c+1)/c)/u3$	x3	y3	y3-x3	(y3-x3)/(1-x3)
1985	u4	$\Gamma((c+1)/c)/u4$	x4	y4	y4-x4	(y4-x4)/(1-x4)
1986	u5	$\Gamma((c+1)/c)/u5$	x5	y5	y5-x5	(y5-x5)/(1-x5)
1987	u6	$\Gamma((c+1)/c)/u6$	x6	y6	y6-x6	(y6-x6)/(1-x6)
1988	u7	$\Gamma((c+1)/c)/u7$	x7	y7	y7-x7	(y7-x7)/(1-x7)

* Excess ratios are calculated via the method detailed in the Background on Weibull Distribution Exhibit e.g. $w1 = 1 - 100{,}000/u1 - \int_0^{100{,}000} xf(x)dx/u1 + 100{,}000 \times F(100{,}000)/u1$

CALCULATION OF
NET CEDED LOSSES

Workers' Compensation

Underwriting Year Beg. 4/1	*Mean Severity*	*Excess Ratio*	*Ultimate Net Loss & LAE*	*Net Ceded Losses*
1985	1,750	12.0	10,000,000	1,200,000
1986	2,000	12.5	11,000,000	1,375,000
1987	2,250	13.0	12,000,000	1,560,000
1988	2,500	13.5	13,000,000	1,755,000
			Line Total	5,890,000

- Background on Weibull Distribution -

The methodology currently in use in most jurisdictions for determining excess values in pricing Workers' Compensation coverage has received increased criticism in recent years. One prominent objection is that the current technique relies upon immature loss data which has lead to a disparity of disturbing amplitude between actual and fitted values. As a result of extensive testing, the two parameter Weibull distribution, a distribution known to model Workers' Comp. claim severity, has emerged as a viable alternative. The Weibull distribution function is defined:

$$F(x) = 1 - \exp\{-(x*b)^{c}\}$$

where b = scale parameter
and c = shape parameter

Use of this distribution allows us to express Excess Ratios as a function of claim severity once we have established the shape parameter (c). The other parameter (b), the scale parameter or characteristic life, is defined intrinsically by the relationship between (c) and the severity. The equation which describes this relationship is:

$$b = \frac{\Gamma[(c+1)/c]}{\text{Mean Severity}}$$

Since developing the mean severity of losses for any rating period is a relatively straightforward procedure, determining the shape parameter becomes the crux of the analysis. One characteristic of the Weibull Distribution which simplifies our task is the tendency for (c) to remain reasonably constant over time. With this in mind, historical Workers' Comp. losses can be used to promulgate (c) parameter estimates. Once an ultimate (c) value is selected, an ultimate claim severity is projected, and an ultimate (b) value is calculated, we may proceed to determine excess ratios. An outline of the mathematical manipulation involved follows:

1. Excess losses $= E(n)\int_a^\infty (x-a)f(x)dx$

   where E(n) = expected number of claims,
   a = loss limit
   and f(x) = Weibull density function

   $$= cx^{(c-1)} \exp\{(-x*b)^{c}\} / (1/b)^{c}$$

2. Total losses $= E(n)\int_0^\infty xf(x)dx$

3. The ratio of excess to total = (1)/(2)

   $$= \frac{E(n)\int_a^\infty (x-a)f(x)dx}{E(n)\int_0^\infty xf(x)dx}$$

   $$= \frac{\int_0^\infty xf(x)dx - a\int_a^\infty f(x)dx - \int_a^\infty xf(x)dx + a\int_a^\infty f(x)dx}{\int xf(x)dx}$$

   $$= 1 - \frac{a}{\text{mean}} - \frac{\int_a^\infty xf(x)dx}{\text{mean}} + \frac{aF(a)}{\text{mean}}$$

1989 CASUALTY LOSS RESERVE SEMINAR

2C/3D: INTERMEDIATE TECHNIQUES II

Moderator

Stuart B. Mathewson
E. W. Blanch Company

Panel

Marvin A. Johnson
Nationwide Insurance Company

MR. MATHEWSON: My name is Stu Mathewson and I'm with E. W. Blanch Company. With me is Marvin Johnson from Nationwide. Marvin works in reserving at Nationwide.

We have a couple of statements that we need to make. One is a disclaimer. The opinions that you'll see today are those of the presenters and not necessarily those of the American Academy or the Casualty Actuarial Society. Number two, we have evaluation forms in the packet. Please fill them out at the end and drop them at one of the chairs in the back. They'll be picked up there. Obviously, we also want you to fill out the total evaluation form at the end of the entire seminar. I know they use them to design the seminars in the future and so they are very helpful.

This is again, Intermediate Techniques II, and it's basically just a continuation of Intermediate Techniques I. A number of not necessarily complex techniques that aren't connected to one another to handle different situations that you may or may not run into from time-to-time. They are not difficult techniques technically. They're just situations that arise and we'd like to point them out so that if they arise you have some idea of what to do with them.

Our slides are going to be simplistic so that you can quickly see what's going on. You will never see anything that's quite as straight forward and easy as this. We would like you to hold all your questions until the end and then when we have questions, there's a mike here and we'll ask you to speak clearly into the mike because these sessions are taped.

(Slide 1-1)

The first item is "Segmenting Data." Here is a basic principle which has to do with any kind of loss reserving and that is that "loss reserve data should contain a long stable history of homogeneous claim experience with sufficient number of claims to produce credible loss reserve patterns." And that's really nice. And that's what we'd like. And so this is what we're always aiming at. Something that involves a group of data where everything in it is enough like everything else in it that the patterns we can be expected to repeat into the future.

Because all we're doing as actuaries is taking the past, projecting into the future. To do that, the past must have some credibility and, some homogeneity and some assurance that the future will look like the past.

(Slide 1-2)

This is the classic actuarial dilemma. This has to do with loss reserves, it has to do with pricing or whatever actuaries get involved with. It is balancing between stability and responsiveness. That is we have new data, it is different from the last data we had. We want to be responsive to the change in data because we presume that it is reflecting the real world out there, that things are changing and we want to be responsive.

But we don't want to be so responsive that we continue to move our answers, in this case our loss reserves, up and down and up and down, because people out there, be it the company executives, consumers, or regulators get a little tired of things going up and down and up and down, and they get to feel that you don't have any idea of what's going on.

The differences between that ideal basic principle we had the first slide and the real world would be real evident for anybody that does loss reserving. We just don't quite have that kind of stability. We want lots of data. We want homogeneous data to draw nice clear conclusions from. But it's not always there.

(Slide 1-3)

Slide 3 shows a very unreal triangle. And I have to apologize at this moment. My triangles run this way and Marv's triangles showing the same numbers run the other way. So, after you have seen these, when he puts his up, you'll have to mentally turn them 90 degrees. That's your challenge for the morning.

Okay. Again, this is very stable. It looks like a company for whom their writings don't change much, their loss patterns don't change, nothing seems to change much, and there is a nice steady pattern. And you could look at this and you could pretty well guess that after 24 months they'll have $4 million and after 36 months they'll have $5 million for 1987.

Don't worry about actually running into these, you're never going to find anything quite like this.

(Slide 1-4)

Slide 4 shows that looks can sometimes be deceptive however. This is actually a company that writes two different lines of business which are very different and have totally different loss development patterns. It just so happens that over the history of these three years, the mix and losses between these two have been very stable. So, we have, in fact, two homogeneous subsets of data rather than one.

Now, what do I mean by a subset? What I'm saying is you have a piece of business that develops in the same way as another piece of business does. Those would be relatively homogeneous. Don't just look at what you think will be a good subset. You have to look at the result. You have to see how it actually develops out.

A couple of examples. First, look at territories. You might have a company which writes automobile and half of their business is in their home state and the other half is kind of spread all over. And if that home state has significantly different development than other states, (maybe New York or New Jersey) we would expect that to develop maybe differently and you break those in those two pieces. You should at least see if they develop differently.

An obvious example would be BI and PD liability for auto or liability and physical damage. Or even an urban and rural break may be useful if you have your statistics in that fashion. Obviously the bigger company you are, the bigger the data base you have, the more subsets you're going to have.

(Slide 1-5)

Go on to slide 5. This company now has made a big change in 1987 and their mix of losses has gone from 75 percent subset A to 75 percent subset B. It's drastic. You're hardly ever going to see anything quite this big, but in order to make the point you show what can happen if your mix all of the sudden changes. It could happen in a small specialty company which was specializing, say, in nonstandard auto and all of a sudden

saw this wonderful niche in, say, pollution liability and decided to write that. And now, all of a sudden the losses are coming in.

(Slide 1-6)

Go to slide 6. This shows what will happen if you are given those losses and take the same loss development patterns as above. And now you'll see that if you had used the totals instead of coming out at 5.0, you should come out at 9.7. If you came out at 5.0 you'd end up with almost 50 percent deficiency in your reserves. So, if your mix is changing, you can have a problem like this.

Can this happen? Not necessarily as drastically, but it can happen. There are different things that I have heard about. One is an outfit that had a claims manager who got his reserves to a significantly different level than the other claims managers in the company. He was a small unit manager and he handled about 5 percent of the business in the company. He got promoted and now he was running 40 percent in some regional office. Well, 40 percent of the business will probably now develop the way his unit used to develop; that is the reserves will be very strong.

Another one would be, again, a specialty company going from a niche of a short tail business to some sort of long tail E&S business. The real point is that you have to break things into subsets.

(Slide 1-7)

Slide 7 gives the further principle then. Always search for subdivisions related to possible causes of variable loss development. Again, it's the results we're worried about. It's now always easy to judge what subsets will have different variable loss development patterns, but often just by knowing the business you can guess about what might develop differently. Break them out, take a look at them. You may not find enough credibility in a small piece that you've broken out or it may not be significantly different. But until you've checked it, you really don't know. And you don't lose much by going through and at least doing a quick check.

(Slide 1-8)

Slide 8. Here are some suggested subdivisions of data. I'm sure you can come up with other ones, but it's not just the BI versus PD or whatever. It could be geographic like the example I just mentioned of an auto writer who half the writings are in New York and the rest are spread around. It could be production source. If you have a significant book of business that comes from an MGA source rather than standard agents, those can often develop at a little different rate. The MGA has some control over the claims usually and by the time they get on your books it might be a little different.

Sublines is the obvious one, BI versus PD or standard versus nonstandard auto for instance. Products liability versus prem-ops-type liability, and any number of subline divisions.

Also there could be legal changes. A state goes to a no fault, for instance, or any number of other legal changes that effect coverage. You may have to move that state's data in with a bunch of other states which have similar legal environments.

And then there's excess or high deductible business. You might need to look at your high deductible business or your excess business in a different fashion than the stuff you're writing ground up or with small deductibles.

In reinsurance, look at attachment points. You can have significantly different loss development for a working layer of $250,000 or $500,000 attachment point as opposed to the $5 million attachment points or the high excess over $25 million attachment points. Those pieces of business probably should be looked at differently.

Again, production sources. There are small specialty companies where most of their writings come from MGA sources. You might want to split them out from the standard lines type companies or companies that write from, you know, different production sources.

Sublines again. Although as a reinsurer you're probably not going to get the level of detail that you would get at a primary company, but at least try to split out your work comp from your GL, from your auto and from your medical malpractice, and of course from your property. But split out whatever you can get and take a look at it, because they're probably going to develop differently.

(Slide 1-9)

So, how do you decide? Where do you look? What seems to make sense in your company? You have to ask people. Talk to underwriters. Ask them what changes they're making, what changes they see coming in, what kind of new forms there might be. They have contacts all over the country, usually. See if they can get in touch with their contacts to see what might be going on in different places. Read the trade press for legal changes.

Ask agents. If you have contact with agents or if you have an agents group that comes in, talk to them. Or have your underwriting or marketing people talk to your agents. Certainly talk to your claims staff. The claims staff can tell you what things might be coming in, reserve levels that might be funny, things that might be changing.

And then lastly, of course, talk to your fellow actuaries. Talk to actuaries you know. At meetings like this you can meet people and then you've got somebody you can call and see if they've run into a similar situation. So, ask around, get lots of feedback. See what kinds of partitions you can move your data into that seem homogeneous, test it and if you have enough data there and enough credibility, then use it in that fashion. If you don't, then you're going to have to combine some things in as close to a homogeneous fashion as possible.

Okay. The next techniques are going to be given to you by Marvin.

MR. JOHNSON: Good morning. I want to talk with you about three major topics or issues. One having to do with changes in loss patterns and the various causes. Secondly, reinsurance and excess loss data, its development patterns and characteristics. And, thirdly, tail factors.

I think what you'll find as we talk through this material, looking at both my part and Stu's, is that most of these issues are data base related in terms of trying to detect changes, trying to assess what may cause the change and what you can do with the data to try to make adjustment for those changes. The data base problem is one over which you may not have complete control. Sometimes the data itself is too sparse. As Stu

indicated, you can slice it up in so many ways to try to get at a problem but you may end up with data that is so small that the development patterns themselves lose all identity, and that's a major problem. And, of course, too, there is a cost associated with refining data bases and trying to make them more suitable for loss reserve analysis.

But what we're trying to do here is to give you some indication of how you can go about detecting change. That's probably the key issue. And some insights to techniques that you can use for trying to overcome distortions in the data so that you don't make the wrong conclusions.

(Slide 2-1)

The first slide, as Stu already mentioned, is the same data and the same development here with the problem, so to speak, that it has been rotated, so that the accident years appear across the top row with the development months shown down the first column. And as you probably noticed from earlier sessions or from your own experience, evaluation months are conventionally defined in terms of months from the beginning of the year.

So, we're talking in the first row about the information we have from the claims that occurred in 1984 as of December '84. Second, those that occurred in 1985 as of December '85 and so on.

Well, this triangle obviously is pretty unrealistic. If we ever saw one like this we certainly wouldn't be hiring actuaries to do reserve analysis and that would be an unfortunate thing. This triangle may reflect a no growth situation. That would be one instance and that's unlikely. It may indicate instead that there is some kind of contraction going on that is offset by growth. Rarely, though, is contraction exactly offset by growth. But we will use this as a basic pattern and try to indicate what happens when the data doesn't follow this nice pattern.

(Slide 2-2)

Looking at the next slide then, let's take an instance here where the development follows the pattern of the previous slide up to 1987. And in 1987, all of a sudden where we had two units, two million, two whatever, paid losses at the end of each respective accident year, all of a sudden we run into a situation where we only have one and a half.

Now, if you ignored the rest of the data you might easily say to yourself, well, that's possible. There are a lot of things that could cause the loss level to drop, a drop in the portfolio would be one, probably the most apparent kind of situation that you might run across. It might also be due to a change in the mix of business that underlies this data.

Stu gave an example where there could be underlying mix changes that would cause the development to look differently. Perhaps what we're getting in 1987 is a heavier mix of smaller claims. Claims that tend to be adjusted and settled faster. Say property type coverage versus injury type coverage or third party coverage. There are a whole number of possibilities that might be apparent in the data as indicated here.

The second row, though, at 24 months development, begins to cause us a little bit further concern because we see that the 1986 losses that totaled payments of two units at the end of 1986 have now only developed cumulatively to 3.5 units -- million or whatever at the end of the following year. And this begins to cause us a little bit more concern.

For one thing, you'll notice that the 1.5 and the 3.5 variances from the previous patterns both occur in calendar year 1987. The 1987 losses through December '87, equal 1.5 and 1986 losses that now have developed through December '87, at 24 months, are only at 3.5. So, we might begin to question whether or not there is some kind of distortion to the development as opposed to some inherent difference in the mix of claims or other kinds of coverage issues.

And, in fact, I guess, what we would probably want to investigate is whether there has been a change in the settlement patterns or payment patterns. We're talking about cumulative paid losses here and we might want to come up with some way to try to confirm that suspicion and try to deal with it.

(Slide 2-3)

The next slide deals with the issue of change in settlement patterns. Going about trying to develop scenarios that might explain the data as it has been reported and then trying to make adjustments to the data are really what the loss reserve actuary often does. They are given kind of circumstantial evidence in the development patterns that the reserve actuary has to use to project to ultimate cost based upon certain assumptions.

The key to the reserve analysis is to explicitly identify the assumptions and to follow the assumptions through to see whether or not you can develop inconsistencies in the data based on the assumptions. If so, then you have to go back to the drawing board and try to come up with some others.

Another thing we might want to mention here is that obviously this data is simplistic. Oftentimes the patterns themselves are never quite so well behaved and so explicitly indicate change in patterns. You're going to see variations in the patterns typically from year-to-year. The question is when does that variation become significant and when should it be dealt with.

In this instance we're looking at one measure of settlement rate and that is claims closed as percent of claims reported. The denominator, claims reported, simply means the number of claims paid plus the number that are still open. You can define the paid claims in the reported component -- to include claims without payment or to exclude claims without payment if that's a concern.

So, in any event, we're looking now at the claim count information apart from the aggregate paid loss information. And we find that at the end of 1987 for accidents occurring in that year, all of a sudden we've only closed 40 percent of the claims at 12 months development wherein previously we had closed 50 percent of the claims. Now, this is a different issue, it would seem, from the underlying paid loss data itself. And likewise, following the pattern of the paid loss data for 1986 accident year, we find at the end of two years we've only closed 80 percent of these claims where previously we had closed 90 percent.

So, there seems to be, again, at least some confirmation of an underlying change in the development of the data that we need to try to address and adjust for.

Now, again, it's not necessarily obvious that that's the case. There may be some other reasons why this kind of thing could happen. But we need to try to look further into the data. In opposition to that, following a business as usual approach is quite likely to get us into some trouble unless we investigate the causes.

(Slide 2-4)

Look at the combination in the next slide of both the payment data and the percent closed or closure rate data that we have just discussed. Putting the two together leads us to the conclusion that there is something going on fundamentally in the rate of settlements or rate of payments.

Most data would include partial payments as well as settlements, so that may be another issue as far as the paid data goes. But as far as the percent closed goes, the question is, is this an inherent change in the pattern or is it instead just some kind of anomaly in the data -- something that may be temporary, something unique to calendar year '87, perhaps a change in management, or some other kind of short term problem. Maybe it's some kind of backlog problem, things of that nature.

But what we do see here is evidence, circumstantial evidence, that there is a change in the settlement rate itself and we need to try to make adjustments for that. And obviously in trying to resolve this, we're not only looking toward making good estimates of what the 1987 and 1986 losses will ultimately be when all of them are settled. That's important, of course.

But remember that a year or two from now we'll be looking back at this history and we're still going to notice these aberrations in the data. The question then will be is that more recent history typical or predictive or is the history prior to that point in time more predictive?

So, we're probably trying to do two things at once and that's give the best opinion we can today, but also to try to document why these changes are evident in the data so we can make proper assumptions in the future about these patterns.

Some other things we might mention as we go along here that could explain this sort of thing, maybe we're getting a change in the mix of claims where the smaller claims all of a sudden are being adjusted as opposed to the the larger claims. There may be more time devoted to the investigation of these larger losses than in the past when perhaps a larger segment of the claims had been the smaller ones that we could adjust more rapidly and pay off more rapidly. So, you have to be thinking of a whole variety of possible causes in order that you can start focusing your study or research on what may explain this particular situation.

(Slide 2-5)

The next slide illustrates a technique that you may use, if you have the luxury of the data to do it with, for adjusting for this change in pattern. You'll notice here that instead of exhibiting the data at 12 month intervals, we have a 9 month development and a 21 month development. Now, what this suggests is that you have available quarterly development. And we're just slicing off the development here at 9 months and 21 months to illustrate a point.

Quarterly development patterns can be much more responsive than annual development patterns to changes in the underlying data. And that can be very useful as long as the quarterly developments don't cut the data so fine that all patterns themselves begin to be confused and lost. But quarterly developments oftentimes can have quite a bit of merit as far as trying to detect changes in loss patterns.

While we're talking about it, perhaps quarterly accident periods, likewise, can give us a little more insight to what is going on. What we're looking at in this example is all claims occurring within an annual period, and we're indicating here that we're looking at them as they develop over quarterly periods. If you think about it, that is kind of a mismatch though, because the first quarter of the annual period has aged more than the more recent quarters.

But, nevertheless, just to try to illustrate a point, suppose that we look at the data on a quarterly basis and we notice that at 9 months of development that the 1985 and '86 accident years' reported claims were 40 percent settled or closed, and for 1987, where we notice this change in pattern, it takes us 12 months before that same closure rate is achieved. Okay. Wouldn't that be nice? Because that certainly suggests what we might be able to do with the data in order to adjust for this change in the pattern.

Not only that, but if we move a year ahead we find that the 1986 accident year at 24 months of development is 80 percent closed and that matches quite nicely with the '85 accident year at 21 months. There seems to be in the data the indication of a three month lag in the 1987 and 1986 most recent development periods over their corresponding histories in the prior years.

The development is slowing down and this suggests to us that we can quantify that or at least build assumptions that would suggest to us how we can go about projecting ultimate losses from the data that has this change in pattern.

One solution simply would be to take the 9 month to ultimate ratio and apply that to the 1987 data at 12 months. All right? That would adjust, so to speak, the development for 1987, which we observe as being more slow than the prior years; to their ultimate costs. If we practiced business as usual and didn't make such an adjustment and, in fact, there was some change in the pattern, we're likely to substantially understate those ultimate or settlement costs.

And, likewise, for 1986 we have data through 24 months. It's developing more like data through 21 months for its corresponding prior year. And so we might apply the 21 month to ultimate factor, instead of the 24 month ultimate factor, to the '86 data at 24 months.

Now, rarely would you want to put all your eggs in one basket and make one kind of adjustment and crank out a number and say that's probably the right answer. You, in fact, are going to look at a whole variety of data. Both to detect changes in the patterns and to make adjustments for those changes. And then you would like to apply some kind of reasonability test to see whether or not those give you results that seem consistent with other information that you have.

(Slide 2-6)

Okay. We've indicated through this example how we can make adjustments to the data for changes in settlement patterns. And that kind of begs the question of how do you go about detecting changes in the patterns in the first place.

And as we said, if you're looking at cumulative paid losses as we were in the original example, you'd probably want to concentrate on the more recent years where, for property coverages, most of the development, particularly in paid losses, is likely to occur, and see whether you can detect something that suggests a significant and underlying change in the payment patterns. You might focus on those. You'll probably

have available much longer development than just the two to three year period, but that's probably where it's going to be most apparent.

Now, you do have some coverages obviously where paid data is practically nil clear through the first or second year. Umbrella type losses or excess type losses are examples. There may be very little paid data at all. In that case, you really are left with a very substantial uncertainty until, in a sense, it may be somewhat too late to make the proper adjustments in a timely fashion.

Some other suggestions for trying to detect changes in patterns, are given. Many of these are more in the category of common-sense than anything else. If you are looking at data from one line of business and see something that's causing you some concern, it's probably wise to look at other similar lines of data as well to see if there is something suggesting an inherent change in the settlement patterns -- something that might be related to the process of settling losses, the investigation and the payments and so forth, as opposed to something that may be instead unique to the coverage itself.

So, you might be inclined to look at, say, an auto UM coverage as well as an auto BI coverage and see if those patterns exhibit the same kind of change. It's probably unlikely that if the change has something to do with the claim practices themselves, that the claim people adjusting these losses are going to single out one line of business and make those kinds of changes. The patterns themselves may be inherently different, but you'll probably see the same kinds of changes in patterns.

And as noted as the third suggestion, you can ask the claims staff about changes in opening and closing practices. What we probably would be most likely to come up with here would be a change in policy, a change in direction that the claims staff has given to the field. Those would be the most readily identifiable. We might think a little bit beyond that and see what kinds of changes we can come up with. Probably the one that would have the most immediate impact would be a change in an opening practice. Right?

Maybe a new claim manager comes in, as suggested in an earlier example, and his attitude toward opening claims is very different from his predecessor's. Perhaps this claim manager wants to be very aggressive in opening claims. He's going to open proportionately many more claims than his predecessor did. He wants to get them recorded on the books, claim files set up so the investigation can begin, or simply as kind of a precaution that the claim notice has been taken and recorded.

Now, that obviously isn't going to have a whole lot to do necessarily with the rate of payments, but if this kind of opening practice change occurs it is going to have a lot to do with the number of reported claims. You're going to probably see a spike in the number of reported claims when this person takes over. And so the ratio of claims closed and claims reported could take a real nose dive, right, and it has nothing to do with the inherent claim payment practice or even in the claim adjustment practice. It simply means we're reporting more claims sooner. So that would be one kind of an example.

Another example might be a change in mix of business. We've talked about that. If you're looking at the aggregate data, which is always suspect, say the aggregate of first and third party data for some reason, you may find a change in these patterns is simply due to the change in the underlying mix between those first and third party type losses. And if more of the first party are present than in the past, then you're probably going to see some kind of evidence of speed up perhaps, just the opposite kind of effect than we had in the earlier example.

Another example that has been mentioned is the change in the UM coverage where recently, or at least in the early 80's, we've had introduced an underinsured motorist coverage in addition to uninsured. The underinsured motorist coverage basically is to indemnify for the amount of loss in excess of the defendant's limits of liability. Now, this puts the coverage on a little different basis than uninsured motorists, which is really basically a first party type coverage, and that can affect the patterns, of the reporting of the loss, as well as the patterns of the adjustment and settlement of the loss.

Another example, following the UM coverage for a moment, is the introduction of the PD coverage in addition to the BI coverage. The property damage coverage is going to have very different patterns than the BI coverage of uninsured motorists. So, you have to oftentimes look underneath if you have the luxury of doing that, look underneath the aggregate data that you're looking at for reserve analysis purposes and try to get at the causes that might explain changes in patterns. It's a real treasure hunt for information.

(Slide 2-7)

Instead of the payment data, let's now look at the incurred data. Incurred losses here will be defined to the mean paid losses, including partial payments, as well as the pending reserves -- the case reserves typically. Some companies may use average reserves in addition to case reserves.

But here we have a pattern of incurred losses, payments plus case reserves. And, again, reading across the top line there, we see that in 1987 the pattern of nice smooth increases of ten percent from one year to the next in incurred losses is broken. In fact, the '87 incurred losses are even less than the '86 incurred losses. That certainly suggests a change.

When we look at incurred data, of course we're looking at a combination of payments and pending reserves or case reserves both, and that complicates the process of trying to explain or even to detect causes for change in those patterns. Because you have, at least, potentially both the change in the payment pattern underlying the incurred data, as well as something that is causing changes to the pending reserves themselves.

With all of that, you might wonder why would we want to look at incurred data when we can at least isolate changes in the payments by ignoring this. The reason is that it can give us a lot more information a lot sooner.

This is primarily of concern where we're talking about lines where we may have very, very little paid data to work with early on. But if the claims are being recorded fairly promptly, we might have quite a bit of case reserve information.

Adopting the case reserve information, on the other hand, may leave us vulnerable to some of the causes for changes in pending reserves.

So, again, in this example, we're looking at 1987 development through 12 months at a much different level from 1986's and 1985's and so on. Even at 24 months we see the 1986 accident year developing differently from '85 and '84.

So, we want to go about trying to determine what is causing this kind of change in this pattern. Well, one thing you probably would look to almost immediately would be the paid development and try to confirm that that isn't the cause for the change, if the patterns are stable enough to do that.

So, we might take that as the working assumption here and concentrate on the pending reserves or the case reserves. We'll look at the next slide here that is quite a revelation.

(Slide 2-8)

This is average reserve per open or pending claim. And we see that all of a sudden in 1987 it has dropped by about a factor of 50 percent from 1986. And for 1986, on the other hand, at 24 months, the average reserve or average pending reserve is much lower than '85 and '84 even.

So, there must be something going on here that is causing the claim managers or adjusters to set much different levels of reserves than they had previously.

Well, is this necessarily a cause for alarm? Well, I think it probably would be if you actually saw this kind of dramatic change in your data, because it's pretty unlikely that there can be changes in the book of business that are going to affect averages quite that dramatically and quite that suddenly. In reality, those changes don't usually occur in, literally, an overnight fashion.

On the other hand, there could be some things that we've already talked about that would explain this. Again, if there is simply a much heavier concentration of smaller losses beginning in 1987, we would expect to see that kind of reduction. As before though, it's a little more difficult to explain why the 1986 average reserves between 12 and 24 months have declined when increase occurred at the corresponding development stage in the past.

So, we might look at the further possibility of a change in the reserving practices themselves -- opening practices and adjusting practices and so forth.

(Slide 2-9)

Let's look at the next example that might give us a way to try to adjust for the change in the average reserves. And this is, as most of these examples are, very simplistic, but at least it gives you an indication of a technique that you might use. Let us suppose that we have somehow convinced ourselves or confirmed that the level of reserves that are being set in '87, both accident year '87 at 12 months and '86 accident year at 24 months, are for some reason the more proper level of reserves. All other things we'll assume are about equal.

What does that mean? Well, I guess what it means is that we've been grossly over-reserving in terms of case reserves in the past. And again a claim manager might be the most typical example of where this kind of change can occur. It's usually quite prominent in the data, at least the data we look at, where claim management has changed in a regional office or whatever. You do oftentimes see very startling changes in the development pattern.

Well, what has been done here is we start from the paid loss developments that we had already looked at on slide 2-1, the twos and fours and fives, the same example underlying the incurred development. Assuming that the $666 average is the proper average for accident year 1987 at 12 months (see slide 2-8) then one approach we might use is simply to adjust the prior pending reserves to the new average and see if by restating those reserves we can get something a little more consistent for predicting future development. Okay. So, we're banking on the fact that the lower average reserve is the

more proper reserve and the one which will be implied by the data as it develops on out to the future.

So, what has been done here, and the footnote on the exhibit indicates it, is that we've restated the average reserves for the prior years on the basis of the $666 amount. So, all you do is subtract out the paid loss amount and deflate the $666 average for 1987. We are assuming 10 percent inflation. So, you might deflate that back to the appropriate accident year level using a 10 percent annual inflation rate. Multiply that new average by the number of claims that you had pending and add the paid amount. The result is a restated incurred amount.

So, basically it's very simple. All we're doing is saying $666 adjusted for inflation is the proper average at 12 months proper maybe is the wrong word -- it's the average on which we choose to base future development. And, therefore, it's the amount we would like to use to restate history in order to determine patterns for future projections. So, what is exhibited here is just after the arithmetic of adjusting the incurred losses to new averages using ten percent inflation.

And in those terms it seems very fortunate, because having done that, the pattern smooths out very nicely for us. And the next slide then shows that.

(Slide 2-10)

Based on the restated averages, we can complete the triangle. We can make the projections for 1987 and 1986 to their ultimate values and the data here suggests that it's about 36 months. This must be a very short tail coverage with rapidly closing claims. The standard link ratio or age-to-age technique can now be used to project the current development to ultimate.

Well, again, the key is not so much the example, but it's the point that the example is trying to illustrate. And that is that you need to be looking very conscientiously for changes in patterns, trying to build scenarios perhaps that would be consistent with those changes and make adjustments for them.

So, we looked at a closure rate as one example of an index, so to speak, that might indicate change. And there are many, many others you can find in the literature or by talking with your colleagues. Another one, since we've been focusing on paid and incurred data that you probably would want to look at, would be the paid to incurred ratios. Now, the change in that ratio probably signals something is different about the information. Unfortunately, it doesn't give you conclusive evidence as to what is changing -- payments or pending reserves but something is changing.

So, you want to look at a number of different indices that may suggest changes in the pattern.

(Slide 2-11)

Well, let's follow my previous example, and see how we could make adjustments to the closure rate for the change that's evident. Again, here we're looking at the percent of claims closed at various points in time by individual accident year. As before, the same example, we see that for 1987 we dropped all of a sudden from 50 percent of the reported claims closed at 12 months to 40 percent. Likewise for 1986 at 24 months, it's dropped from 90 percent that was indicated by the 1985 data down to 80 percent. The corresponding incurred loss amounts are shown on this example with the ratios.

Now, if we make, again, a fundamental assumption that there's no underlying kind of intrinsic cause for the changes as far as the kind of the inherent value of the claim information itself is concerned, then we could make a fairly straight forward adjustment for the change in the closure ratio. We try to look in the data for that point at which earlier accident years had developed to corresponding closure ratios. If something has slowed down, it probably hasn't slowed down very abruptly, in fact. But we might try that approach to come up with some, at least, initial projection of ultimate losses that recognizes this change.

(Slide 2-12)

And so, on the next slide, like the previous example with paid loss amounts, we find that by using quarterly data that these two most recent accident year development periods match their predecessors after a lag of three months. Again, accident year 1987 at 12 months is 40 percent closed and we find that that's precisely and conveniently the amount closed for 1986 accident year at 9 months.

Okay. Now, if it really were that straight forward then obviously all you need to do is apply the 9 to ultimate factor times the incurred losses at 9 months to try to bring them to their ultimate value.

One caution here: it's probably not true that the causes for the changes are going to solely affect the claims closed.

These kinds of effects are probably going to run completely through the data and you're going to see changes both in closure rates and in average reserves going on at the same time. And, again, we might think of why those things are happening.

We gave an example where perhaps for some reason there's a greater emphasis on adjusting before closing out the larger losses, and so they are tending to hang on a little longer than in the past. And that would leave us likely with a lower reserve at that comparable point in time and with fewer claims closed at that comparable point in time.

Now, that's a pretty significant change in the pattern. We'd have to be pretty sensitive to it in order to make proper adjustments to the data. So, you want to look both at counts and amounts in most instances where you begin to detect changes in either one of them.

That completes that topic of trying to illustrate changes in claim patterns, how to detect them and how to adjust for them.

(Slide 3-1)

The next topic I want to talk about is reinsurance and excess coverage. Here, we're working with a little bit different animal. In the previous examples, it probably would be most reasonable to assume we're working with direct data to have that kind of information available and to detect the changes as evidently as they were indicated in the data.

Now, suppose instead we're focusing here on the question of reinsurance and excess loss data. Now, what do you do when you try to address problems with those data. Well, there are a number of different techniques that can be applied and some have their rightful place in some situations and others in different situations.

The question we're trying to deal with here is that of whether we want to look at the loss data on a direct or gross of reinsurance basis as opposed to a net basis. Now, it probably is going to be true that you really don't have a choice of this kind. You're going to need gross information in some places and you're going to need net information in other places. So, I'm not sure how significant these advantages and disadvantages, so to speak, are.

But in any event, when looking at the data, I guess you should be aware of what the potential distortions in the data are, depending on whether you're looking at gross or net.

On a gross basis, and probably most importantly, we can ignore the problem of changes in the levels of retention. If levels of retention aren't changing, then there's no need to be concerned about them, but typically they do change over time and typically you would need to use a fairly long history of development in order to make your judgment as to how future development will occur. And over that history it's probably true that the retention levels have, in fact, changed.

On a gross basis, that's not material, because you're not addressing the issue of reinsurance ceded in the data itself.

And obviously if you're looking at gross data you're going to have a gross estimate. That is, you're going to have an estimate of the company's liability before reinsurance. That may be important in itself. You certainly would want to be able to tell management or your client what the total liability potential is for their book of business and separate the issue of reinsurance from that. And as noted here, this might be very important if you need to try to identify the problem of collectibles under reinsurance agreements.

On the other hand, there is value in looking at net data and the value that's indicated here for reinsurance net is probably equally valuable if you have the ability to cap your direct losses and apply some sort of limit to the losses. And mainly that is that it will tend to stabilize the data substantially. If you exclude losses above a certain limit, or above the retention for that matter, you're likely to have more stable data below the limit. And the penalty for that is you're likely to have very much more unstable data in the excess layer. So, there's no free lunch I guess. But in any case, if you look at the data on a net of reinsurance basis, then you are going to have more stability typically.

You need to know in addition to the gross amount the net amount. It's the net amounts that are recorded in financial statements -- annual statement and so forth. And there may be examples in your company or clients' companies where something analogous to reinsurance, for example pooling agreements, would dictate that you use some approach that's similar to using a net of reinsurance basis.

For example, it may be that charges to profit centers are limited to a certain amount per loss and the home office assumes the balance. That might be an example of where there's kind of an inter company reinsurance arrangement that is needed for management's information.

(Slide 3-2)

Okay. If we can look at the next slide, we'll talk about, in addition to the problem of identifying which technique to use, what techniques are available. And, again, we're trying here to focus on the excess layer. The most direct, I guess, conceptually is just to look at the excess losses and their development. That is, look at all losses over a certain limit if we're capping large losses or applying a retention or something like that.

And, again, you have to be pretty cautious if your retentions have been changing over time because you're going to get more than just the inherent excess loss development in the data. And I guess the ideal solution to that is to restate your history at the new retention.

Then you can see how they would have developed if the current retentions had been in place throughout the history. Oftentimes you're going to find that kind of data is not available to you and so you have to often make very heavily subjective kinds of decisions or opinions about the development.

Another approach that might give you a little bit more satisfactory answers, as far as development patterns themselves are concerned, is to look at the development of the primary layer, which we expect to be a little more stable, and look at the development of the total business. That is, ignore the retention or the capping of losses and so forth.

Now, the primary layer is probably going to be the best behaved and the second best is probably going to be the total limits data and the excess data worst of all. But if you use this approach, then of course by subtraction you can get an implied excess loss estimate.

And, thirdly, we can use information that's developed in the course of pricing, namely increase limit factors, for developing excess losses to their ultimate. This might be most appropriate if you have very sparse excess loss data in the first place and really have no hope of using development patterns at all. And that probably applies in many more situations than we would want to admit.

So, we have to take some recourse and that recourse typically would be then to the development of excess losses as derived from studies that ISO or some kind of rating organization does or from some composite information from insurance companies.

(Slide 3-3)

The next example shows how to apply the increase limit approach and again it's pretty intuitive. We'll cap the losses. Let's suppose that the retention here is a million dollars and that the total losses limited to the million dollar retention was $1,000.

And again these are more units than absolute amounts. Suppose that we're in an excess layer between one and two million dollars, and we find that in that layer, the excess, the corresponding increase limit factor rather is 1.3.

The 1.3 has to come from recourse to other data. Statistical organizations, as we mentioned, or something of that sort. Before you go slapping in a factor like that, you want to be careful that the factor is doing what you assume it does to the data.

For one thing, you want to measure the average increase limit over your particular book of business because that's likely to vary considerably from the industry's. And that is the average over the various policy limits that are inherent in the data here. Another question or consideration is that the increase limit factor only address the loss portion if you are looking at loss reserves and loss development.

Oftentimes, probably more often than not, the allocated loss expense may be brought into the loss information itself and the increase limit factors may reflect both the amount of indemnification for losses and the allocated loss adjustment expense itself. Or there may be risk loadings or contingencies built into the increase limit factors that

you don't believe are really appropriate for the purpose that you're applying them to here in this data.

So, you want to be careful that what you have is what you think you have and make proper adjustments if you can for those variances.

So, in any event, we have the primary losses of $1,000, an increase limit factor of 1.3333. That gives us the total up to the two million dollar limit of $1,333. That would be at least one approach that can be used. This kind of information is fairly readily available.

The third topic that I want to cover in the same general area has to do with tail factors. I guess this probably has been covered in earlier sessions. But first of all, what is a tail factor is the most fundamental question.

(Slide 4-1)

Tail factors are used to indicate the amount of development from the latest development period available to you to the ultimate value. Oftentimes companies have to limit the history of data that they can retain as a cost consideration or you may be left without a history that is appropriate to the particular line of business that you're looking at. Your instinct tells you that there's got to be development out there some place, but we have no way in our own data to measure and quantify that development.

So, what can we do about it? Now, the development on the tail, that is after the available history can be quite significant and, really, we don't want to overlook it in doing the reserve analysis. But knowing it's there and knowing how to quantify it are two very different things.

So, suppose we don't have internal data. Suppose our data is limited to ten years and yet we're looking at a line of business like worker's comp where you feel that it's probably not true that the claim is closed and settled at ten years' time. Maybe you're looking at a line of business where you can't even be sure all the claims are reported at ten years time, let along adjusted and settled.

Well, one possibility kind of analogous to the increase limit factor approach, is to look to external data for some information about tail factors. Examples include ISO, the National Council on Compensation Insurance, the Reinsurance Association of America data, and Best data, which has Schedule P aggregates available. These would give some kind of indication, as long as we're applying the information in an apples-to-apples fashion, as to what kind of development after the history we have available could be expected.

This next method that's indicated here is the Bondy method. This is one of rules of thumb that can be adopted, and there's really nothing wrong with the rules of thumb I guess, as long as they're applied consistently and stand the test of time. This one says assume that the loss development factor from the latest development period out to ultimate is the loss development factor for the most recent available development period.

Now, why should that be? Well, that's pretty tough to defend. Again, the only way you can use this kind of method with confidence is if you used it in the past or apply it to past data and see whether or not you get reasonable results.

There are all sorts of variations on this. You might assume that the development decreases by a factor of half in each future development period.

So, find what the development is for the most recent period from N minus one to N, for example, from 9 years to 10 years, and assume that the development from 10 to 11 is half of that and from 11 to 12 is half again as much, and that sort of thing. Any reasonable way to try to recognize the development that's going to occur after your available history I guess, is really what we're trying to focus on.

A third method that may have a little more appeal, at least analytically, is using some method for fitting a curve to the available history that you do have. That opens up a whole bunch of possibilities at least. All sorts of curves are discussed in the literature and could be adopted. You might see whether or not you can select parameters for a curve that give you a reasonably good fit to the available history and then extrapolate on out to the point where the development isn't significant any further.

Now, again, that begs a lot of questions. But it does give you an alternative technique for trying to develop ultimate losses from a limited history. That's a third possibility.

(Slide 4-2)

The next slide does use some external data for indicating how much development there can be on the tail. Age is measured here in years and the data is taken from the Reinsurance Association of America 1987 study. Three lines are used for the illustration: worker's comp, general liability, and all other liability. The abbreviation is a little peculiar.

But anyway, based on that external source, you can see that there is substantial development for a very long period of time. Worker's comp at 15 years has yet another almost 25 percent to develop. Even from 20 years, it has got about 10 percent development left. And at 25 years, three percent. Now, that's the worse case scenario as indicated by these examples. Of course, we're talking here on worker's comp about a lot of lifetime payment claims -- pension type claims -- and so we would expect a very long development period.

If you're focusing on worker's comp, if that's one of your primary lines, you probably want to spend the money to accumulate this information over time to develop your own history. And as indicated here, you'd probably want to develop it to 25 years or even more if it's worth the cost. General liability is a little less prone to development on the tail as indicated there and than all other the liability even less so.

Medical malpractice down at the bottom of the exhibit probably causes the most concern. Here, speaking of medical malpractice, the cause for this kind of tail can come from a number of different sources. We may have a line of business where the claim is reported fairly promptly, but it takes a long time to develop to ultimate cost, because there are payments involved over a very long period of time, even lifetime type payments.

You may have another line of business where the development is more a function of the reporting lag for the claim in the first place. The old medical malpractice occurrence business was very prone to that, because oftentimes a claimant would wait until just before the age of majority to determine the scope of the injury and to try to get some quantification of the cost of the injury -- birth defects, for example, or something of that nature.

So, there could be a very, very long lag in the reporting of the claim. And, of course, that kind of problem, which occurs elsewhere, is why claims made coverage became more popular.

(Slide 4-3)

In addition to that example, then the next slide here gives you some others that you might want to be sensitive to if these kinds of lines of business are the ones that you're focusing on. Products liability claims probably give us the most easily identified examples.

For example, under products we may have very complicated claim situations. We may have situations where even coverage is an issue and has to be resolved. Perhaps it has to be resolved through the court system, for example.

Uncertain date of loss. You're probably pretty well aware of the difficulties in ascertaining date of loss for coverage like asbestos. Agreements have been reached or conventions have been adopted for identifying dates of loss for asbestos type claims. There are other examples where there is no such thing really as accident date as we probably think of it most often.

We may have in the case of products liability multiple claimants. Again, asbestos may be an example. And, therefore, it takes a considerable amount of time to be sure that all of the claimants have been identified and recorded in the data. There may be aggregate deductibles involved, which is going to tend to delay possibly both the reporting and the settlement of the loss.

The deductible has to be met and if it's a high deductible, of course, that suggests it will be a considerable amount of time before those claims pop through and appear in the data for the line that you're doing.

Delayed manifestation. We talked about asbestos. Pollution claims can also have very long manifestation periods. And there have been a number of notorious examples in insurance data. IUD devices were another example where there was considerable lag.

Marine insurance is kind of a different animal all together. You may have in the case of reinsurance severe problems with litigation or some kind of arbitration to determine the assessment of losses, for example. Reopened claims are mentioned under marine. Reopened claims certainly aren't peculiar though to marine. They are oftentimes associated with worker's comp claims where what appeared to have been the injury turns out to be much more severe than originally thought -- the back injury type claim for example. We may find ourselves reopening claims for a considerable period of time. And reopened claims, depending on how you account for that kind of claim in your data base, might appear to be IBNR, that is, they might appear to be late reported claims if they're kind of separated from their original, reported history.

That concludes the three topics that I wanted to cover and so I'll turn it back over to Stu to wind up the session.

MR. MATHEWSON: I've have two brief items. One is a method that's probably the easiest age-old method to use and it's called Expected Loss Ratio method. On one hand it's very simple. That is if you have an idea of what the loss ratio is going to be in the

business that you're worried about and you know how much loss has been reported, you just take the difference and that's your IBNR.

So, if you're expecting a 65 percent loss ratio and you have 20 percent that's been reported so far, then you have to put 45 percent of that earned premium in for IBNR.

Like I say it's very simple and it's actually used a lot. It's used in the annual statement as a minimum for the Schedule P lines. But there are a lot of dangers to it and so before you just go and use it you ought to have an idea of what those dangers are. The first is, of course, that this is a rather circular way to go about getting an answer.

Presumably you're trying to find out what your ultimate is, but you're doing it by telling what the ultimate is and then backing into it. So, it's pretty circular and often it's difficult to get a good feel for what that loss ratio is or will be. If you knew that, you'd probably be able to do a lot of things better.

Many people I have talked to don't know what their 1989 loss ratios are going to be at the end of this year and it's October already. So, to know that on some other kinds of lines might be a little tricky. The other danger, from a personal development standpoint, is that you're going to miss a lot of things.

If you look at frequencies and at severities and at claims handling practices, and talk to underwriters about pricing, you can learn a lot about the business. You learn a lot about what you're doing, what the company is doing, and all of that knowledge is going to let you be a much more effective actuary or much more effective insurance person.

(Slide 5-1)

So, we put the first slide up. This shows our famous triangle again now rotated back again. Except that we've had a little difference in 1987. The purpose of the slides here are just to show what kinds of answers you can get if you use the expected loss ratio method.

We're expecting a loss ratio of 100 percent incidently, for no good reason other than it's nice and easy to multiply. And you'll notice then that we've also put premiums on the side. So our expected loss ratio, 100 percent, we're expecting that we will have $5 million of losses ultimately, despite the fact that our paids for the year are down.

So, expected loss ratio method, just blindly using it, makes no adjustment for what actually comes in. It could be right. It could be that, in fact, our payments are slowing down and that we're still ultimately going to get out to this 100 percent loss ratio. But we need to look and see why.

The Bornhuetter-Ferguson method, which I assume you've been exposed to by now, would come up with a $4.5 million loss. Straight age to age method would get you 3.8 million. Both of those methods reflecting the fact that you have less paid in and, therefore, you'd expect that your ultimate would be smaller.

(Slide 5-2)

The next slide takes it the other way and says what happens if you've got twice as many in. Well, again, expected loss ratio method is still going to give you 5.0. Almost no matter what you do, (presumably if you get your paids over 5 million you're going to make some adjustment) your just never going to vary your estimate by what comes in.

The Bornhuetter-Ferguson again, partially takes into account this change, and the loss development factor method takes it totally into account, doubling your estimate, giving you significant differences. So, if you have any data at all, the expected loss ratio method is probably not the method you need to use.

Having said that, our next slide says what should we use.

(Slide 5-3)

If I don't want you to use that, what should we use. Well, just as kind of a real fast rule of thumb. If you have some fast closing lines, (physical damage, medical, dental) paid loss development is probably the best thing to use. I like paid loss development. The problem with it is that in many lines you don't have enough paids loss, especially in the early years, to have a nice stable pattern. But if you have the paids, with a nice stable pattern, I would use that and figure that's what I needed.

For a little longer tail, (the short medium tail lines of property, primary auto, primary GL, some of the GL's), using incurred and paid loss developments together will probably get you pretty close, especially if the two of them give you answers that are in the same ballpark. And then as you get to the longer tail lines of excess auto, excess GL umbrella, medical malpractice, you need to try some other things and you can use just regular triangles. You can use a Bornhuetter-Ferguson approach. Try some frequency and severity models.

(Slide 5-4)

So, that leaves me saying why am I standing up here at all and talking about this. Basically there are some times when you're going to need to use it. One is for small immaterial lines. There's no sense spending a lot of time and effort going through a real big process for a line that has very little loss. You might as well say that normally we have about 70 percent loss ratio in that line and the IBNR therefore should be X.

So, if you have things that take two, three, four percent of your losses, it's kind of tough to want to spend the time on them. This isn't a bad approach.

The main reason you're going to use this though is the second one; you can't think of anything else. If you have no claims, you've still got to do something. If you have a brand new line and you have no claims in, there's nothing to use other than, pure judgment. There are no claims to factor off so you can't use other people's factors. So you need to have an idea.

Where do you get the idea of the right loss ratio? Well, you've got to be real careful about picking a percentage. An underwriter may tell you that we priced this to 50 percent. Well, that's fine. You start with that, but go on with that. Look in the industry, see what similar coverage are running at, what loss ratios are being developed in similar coverage.

Look at other major writers or major writers of this particular coverage, how are they writing it and how does your pricing look to their pricing. If they are writing at a 100 percent loss ratio and your prices are about the same, I wouldn't accept the 50 percent. I would put in 100 percent. You also will have to probably be pretty conservative here on setting the IBNR or you set yourself up, especially if it's long tail at all, for a problem.

(Slide 6-1)

The last thing I'm going to deal with is something called EBNR. We've been talking about IBNR all day. EBNR is earned, but not reported premiums. How does that come in? Well, if you have premiums that, for one reason or another, are earning before you actually collect the dollars and if your loss reserves are even partially dependent on premium, this can be factored in. So, it's not that big a problem for most primary companies, but it can become a bigger problem for reinsurers.

But for primary companies, especially work comp, you can get premium audits that are coming in consistently showing development (one company, I know was getting 10 percent additional premiums out of their premium audits at the end of the year). That is stuff that is already earned and it needs to be taken into consideration. Or if you have some special extended premium billing plans where they really are paying at the end of the policy period but your accounting for them as they come in rather than as an earning, you can fall short.

Retrospective rated business, disputed classifications, where they look at the work comp and say that you charged for a certain class but a policyholder argues that they really are in another class and there's a big difference. That's going to go the other way. It's going to be a negative EBNR. They're never going to complain that they owe you a bunch of money.

Or processing lags. If you have a tremendous processing lag due to short staff or huge growth and your pipeline gets longer and longer, you might through processing lags have some earned premium you don't know about.

You basically handle this by trying to figure out what your earned premium should be and you can do that by looking in just a normal triangle type analysis, laying out your earned premium by the ends of the various years and seeing what kind of developments you have.

As I said, the biggest problem is actually the reinsurer.

(Slide 6-2)

That is because reinsurers tend to do their accounting by underwriting year. Underwriting year is a bit like a policy year in a primary situation only more complicated. Instead of a policy year which can cover a couple of accident years, a reinsurers underwriter year can cover three. What they're doing is writing a treaty for a year. At the end of that treaty period you can still pick up the beginning of a policy, which then stretches another 12 months to the end of that loss date. So, you can span three different accident years as this example shows.

(Slide 6-3)

The next slide shows an example from an actual company showing their pro rata reinsurance by underwriting year. And it shows that after 12 months they still have more than twice the earnings that show up at that point coming to that underwriting year. And you can see that there are still developments out four, five, six years. They're not very big once you get past the first three or four years, but they are there.

(Slide 6-4)

And then slide 6.4 just shows the interplay between IBNR and EBNR. The first line is earned premium detail and the second is incurred loss detail. The reported earned premium to date is $800,000, and the ultimate earned premium is $1 million. You know this by some triangularization. You know that ultimately you're going to be at $1 million.

Obviously the difference is $200,000 that would be the EBNR. But you may not, for underwriting year 1986, want to put all of that in '87 because there is still some that is going to earn in '88.

So, let's just say some internal analysis has told us that 60 percent is a good number. 60 percent of that $200,000 then gives us $120,000 of EBNR for 1987. Or a total adjusted earned premium for this year of $920,000.

Similarly on losses we start with $500,000, the reported loss to date. We know, again, by whatever analysis we get, that we're going to end up with $750,000. That means that the ultimate loss ratio is going to be 75 percent. If you take Item 8 divided by Item 2 you get 75 percent. Taking that 75 percent times my adjusted earned premium in column 6 gives me an adjusted incurred loss of $690,000. So, that's saying that my IBNR should be $190,000 if we assume that 60 percent of that EBNR should be put in 1987.

Now, we look down at the bottom in the red there and it shows that if we have no EBNR that the total IBNR would be $100,000. If we decide to put all that EBNR in 1987, the IBNR should be $250,000. Or we can go somewhere in between. You make a judgment, but that's the range. But there is some significant IBNR there because there is some significant earned premium that hasn't been reported. We'll eventually catch up to it, but we'll have inaccuracy during that year.

Those are the six items that we have. We have approximately eight minutes for questions if you have any. You have your choice of asking questions or going to lunch early. If you want to ask a question, please come to the mike and we'll be glad to give you our best shot.

Seeing none, we'll let you go to lunch. Thank you very much.

BASIC PRINCIPLE

LOSS RESERVE DATA SHOULD CONTAIN A LONG, STABLE HISTORY OF HOMOGENOUS CLAIM EXPERIENCE, WITH A SUFFICIENT NUMBER OF CLAIMS TO PRODUCE CREDIBLE LOSS RESERVE PATTERNS.

SLIDE 1-1

CLASSIC ACTUARIAL DILEMMA

THE TYPICAL ACTUARIAL PROBLEM INVOLVES BALANCING BETWEEN STABILITY AND RESPONSIVENESS. THE DIFFERENCES BETWEEN THE BASIC PRINCIPLE (IDEAL) AND THE REAL WORLD WILL BE VERY EVIDENT TO ANYONE WHO DOES LOSS RESERVING.

SLIDE 1-2

CUMULATIVE PAID LOSSES BY ACCIDENT YEAR
(IN MILLIONS)

	EVALUATION MONTH		
ACCIDENT YEAR	12	24	36
1984	2.0	4.0	5.0
1985	2.0	4.0	5.0
1986	2.0	4.0	
1987	2.0		

SLIDE 1-3

CUMULATIVE PAID LOSSES BY TYPE OF CLAIM
BY ACCIDENT YEAR (IN MILLIONS)

	EVALUATION MONTH		
1984-86 MIX	12	24	36
SUBSET A	1.5	1.8	2.0
SUBSET B	0.5	2.2	3.0
TOTAL	2.0	4.0	5.0

SLIDE 1-4

CUMULATIVE PAID LOSSES BY TYPE OF CLAIM
BY ACCIDENT YEAR (IN MILLIONS)

	EVALUATION MONTH		
1984-86 MIX	12	24	36
SUBSET A	1.5	1.8	2.0
SUBSET B	0.5	2.2	3.0
TOTAL	2.0	4.0	5.0
1987 MIX			
SUBSET A	0.5		
SUBSET B	1.5		
TOTAL	2.0		

SLIDE 1-5

CUMULATIVE PAID LOSSES BY TYPE OF CLAIM
BY ACCIDENT YEAR (IN MILLIONS)

	EVALUATION MONTH		
1984-86 MIX	12	24	36
SUBSET A	1.5	1.8	2.0
SUBSET B	0.5	2.2	3.0
TOTAL	2.0	4.0	5.0
1987 MIX			
SUBSET A	0.5	0.6	0.7
SUBSET B	1.5	6.6	9.0
TOTAL	2.0	7.2	9.7

SLIDE 1-6

FURTHER PRINCIPLE

ALWAYS SEARCH FOR SUBDIVISIONS
RELATED TO POSSIBLE CAUSES OF
VARIABLE LOSS DEVELOPMENT.

SLIDE 1-7

SUGGESTED SUBDIVISIONS OF DATA

PRIMARY

1. GEOGRAPHIC
2. PRODUCTION SOURCE
3. SUBLINE
4. LEGAL CHANGES
5. DEDUCTIBLES

REINSURANCE

1. ATTACHMENT POINT
2. PRODUCTION SOURCE
3. SUBLINE

SLIDE 1-8

HOW DO YOU DECIDE?

ASK!

1. UNDERWRITERS
2. AGENTS
3. CLAIMS STAFF
4. ACTUARIES

SLIDE 1-9

CUMULATIVE PAID LOSSES

EVALUATION MONTH	ACCIDENT YEAR 1984	1985	1986	1987
12	2.0	2.0	2.0	2.0
24	4.0	4.0	4.0	
36	5.0	5.0		

2-1

CUMULATIVE PAID LOSSES

EVALUATION MONTH	ACCIDENT YEAR 1984	1985	1986	1987
12	2.0	2.0	2.0	1.5
24	4.0	4.0	3.5	
36	5.0	5.0		

CUMULATIVE CLOSED AS A PERCENT OF CLAIMS REPORTED

EVALUATION MONTH	ACCIDENT YEAR 1984	1985	1986	1987
12	50%	50%	50%	40%
24	90%	90%	80%	
36	100%	100%		

2-3

CUMULATIVE PAID LOSSES AND CLAIMS CLOSED AS PERCENT OF CLAIMS REPORTED

	ACCIDENT YEAR					
EVAL. MONTH	1985 PAID LOSS	1985 % CLOSED	1986 PAID LOSS	1986 % CLOSED	1987 PAID LOSS	1987 % CLOSED
12	2.0	50%	2.0	50%	1.5	40%
24	4.0	90%	3.5	80%		
36	5.0	100%				

2-4

CUMULATIVE PAID LOSSES AND CLAIMS CLOSED AS A PERCENT OF CLAIMS REPORTED

	ACCIDENT YEAR					
EVAL. MONTH	1985 PAID LOSS	1985 % CLOSED	1986 PAID LOSS	1986 % CLOSED	1987 PAID LOSS	1987 % CLOSED
9	1.5	40%	1.5	40%	1.1	30%
12	2.0	50%	2.0	50%	1.5	40%
21	3.5	80%	3.0	70%		
24	4.0	90%	3.5	80%		
36	5.0	100%				

2-5

HOW CAN CHANGES IN PAYMENT PATTERN BE RECOGNIZED?

- LOOK AT MOST RECENT 2 TO 3 ACCIDENT YEARS
- LOOK AT OTHER LINES HANDLED BY SAME CLAIMS STAFF
- ASK CLAIMS STAFF ABOUT CHANGES IN OPENING AND CLOSING PRACTICES

2-6

CUMULATIVE INCURRED LOSSES

EVALUATION MONTH	ACCIDENT YEAR 1984	1985	1986	1987
12	3.0	3.3	3.6	3.3
24	4.7	5.2	5.1	
36	5.0	5.5		

2-7

AVERAGE RESERVE PER OPEN CLAIM

EVALUATION MONTH	ACCIDENT YEAR 1984	1985	1986	1987
12	1,000	1,100	1,210	666
24	2,000	2,200	1,200	
36	0	0		

2-8

RESTATED CUMULATIVE INCURRED LOSSES USING AVERAGE RESERVES ADJUSTED FOR INFLATION

EVALUATION MONTH	ACCIDENT YEAR 1984	1985	1986	1987
12	2.5	2.8	3.0	3.3
24	4.2	4.7	5.1	
36	5.0	5.5		

E.G., ACCIDENT YEAR 1984 AT 12 MONTHS
IS EQUAL TO 2.0 PAID LOSSES
+0.5 RESTATED RESERVE
(1.0 ORIGINAL RESERVE
X 500 AVG/1000 AVG)

2-9

PROJECTED CUMULATIVE INCURRED USING AVERAGE RESERVES ADJUSTED FOR INFLATION

EVALUATION MONTH	ACCIDENT YEAR 1984	1985	1986	1987
12	2.5	2.8	3.0	3.3
24	4.2	4.7	5.1	5.6
36	5.0	5.5	6.1	6.7

2-10

CUMULATIVE INCURRED LOSSES AND CLAIMS CLOSED AS A PERCENT OF CLAIMS REPORTED

	ACCIDENT YEAR					
EVAL. MONTH	1985 INC'D LOSS	1985 % CLOSED	1986 INC'D LOSS	1986 % CLOSED	1987 INC'D LOSS	1987 % CLOSED
12	3.0	50%	3.0	50%	2.5	40%
24	4.7	90%	4.4	80%		
36	5.0	100%				

2-11

CUMULATIVE INCURRED LOSSES AND CLAIMS CLOSED AS A PERCENT OF CLAIMS REPORTED

	ACCIDENT YEAR					
EVAL. MONTH	1985 INC'D LOSS	1985 % CLOSED	1986 INC'D LOSS	1986 % CLOSED	1987 INC'D LOSS	1987 % CLOSED
9	2.5	40%	2.5	40%	2.0	30%
12	3.0	50%	3.0	50%	2.5	40%
21	4.4	80%	4.0	70%		
24	4.7	90%	4.0	80%		
36	5.0	100%				

2-12

SHOULD THE LOSS RESERVE ANALYSIS BE GROSS OR NET OF CEDED REINSURANCE?

ADVANTAGES OF GROSS:

- DATA UNAFFECTED BY CHANGE IN REINSURANCE RETENTION
- GIVES TOTAL LIABILITY IF REINSURANCE PROVES UNCOLLECTABLE

ADVANTAGES OF NET:

- IMPROVES STABILITY OF LOWER LAYER BY LIMITING LARGE LOSSES
- REQUIRED FOR FINANCIAL STATEMENTS
- INTERNAL REINSURANCE USES

3-1

TECHNIQUES TO RESERVE FOR EXCESS LAYER LOSSES

- DEVELOP ACTUAL EXCESS LOSSES
- SUBTRACT DEVELOPED PRIMARY LIMIT LOSSES FROM DEVELOPED TOTAL LIMIT LOSSES
- ESTIMATED EXCESS LOSSES WITH INCREASED LIMIT FACTORS

3-2

ESTIMATING HIGHER LAYER LOSSES WITH INCREASED LIMIT FACTORS

ULTIMATE LOSS LIMITED TO $1 MIL	*AVERAGE $2M/$1M INCREASED LIMIT FACTOR	ULTIMATE LOSS LIMITED TO $2 MIL
$1000	1.333	$1333

(*) INCREASED LIMITS FACTORS AVERAGED OVER ACTUAL POLICY LIMITS DISTRIBUTION

3-3

TECHNIQUES TO DERIVE TAIL FACTORS

- EXAMINE BROADER DATA SOURCES
  ISO, NCCI, RAA, BEST'S
- "BONDY METHOD": LDF From N To Infinity = LDF From (N-1) To N
- CURVE FITTING

4-1

HOW MUCH TAIL CAN THERE BE?
(AGE IN YEARS)

1987 RAA STUDY
CUMULATIVE AGE TO ULTIMATE FACTORS

	15 TO ULT.	20 TO ULT.	25 TO ULT.
W.C	1.241	1.102	1.030
G.L.	1.178	1.057	1.016
A.L	1.003	1.000	1.000

	10 TO 19	15 TO 19
MED. MAL.	2.122	1.463

Assumes Ultimate is 31 years for W.C., G.L. and All Other Liability

4-2

SOME CLAIMS WITH REPORT LAGS GREATER THAN 10 YEARS

LINE	CAUSES
PRODUCTS	Complicated. Uncertain DOL.
PRODUCTS	Multiple claimants. Aggregate deductibles.
PRODUCTS	Delayed manifestation.
MARINE	Ship Collision and Explosions: Reopens.
WORKERS COMP.	Back injury.

4-3

CUMULATIVE PAID LOSSES BY ACCIDENT YEAR
(IN MILLIONS)

	EVALUATION MONTH			
ACCIDENT YEAR	12	24	36	PREMIUMS
1984	2.0	4.0	5.0	5.0
1985	2.0	4.0	5.0	5.0
1986	2.0	3.5		5.0
1987	1.5			5.0

1987 ULTIMATE LOSS USING:	ELR	5.0
	BORNHUETTER-FERGUSON	4.5
	LOSS DEVELOPMENT	3.8

SLIDE 5-1

CUMULATIVE PAID LOSSES BY ACCIDENT YEAR
(IN MILLIONS)

	EVALUATION MONTH			
ACCIDENT YEAR	12	24	36	PREMIUMS
1984	2.0	4.0	5.0	5.0
1985	2.0	4.0	5.0	5.0
1986	2.0	3.5		5.0
1987	4.0			5.0

1987 ULTIMATE LOSS USING:	ELR	5.0
	BORNHUETTER-FERGUSON	8.0
	LOSS DEVELOPMENT	10.0

SLIDE 5-2

WHAT SHOULD YOU USE, AND WHEN?

1. FAST CLOSING LINES
   (MEDICAL, DENTAL, AUTO PHYSICAL DAMAGE)
   PAID LOSS DEVELOPMENT
2. SHORT - MEDIUM TAIL LINES
   (PROPERTY, PRIMARY AUTO & G.L.)
   INCURRED LOSS WITH PAID LOSS DEVELOPMENT
3. LONG TAIL LINES
   (EXCESS AUTO & G.L., UMBRELLA, MEDICAL MAL)
   BORNHUETTER-FERGUSON
   FREQUENCY/SEVERITY METHODS

SLIDE 5-3

WHEN TO USE LOSS RATIO TECHNIQUES

1. FOR SMALL, IMMATERIAL LINES
2. WHEN YOU CAN'T THINK OF ANYTHING ELSE

SLIDE 5-4

WHY IS THERE EBNR PREMIUM?

1. PREMIUM AUDITS
2. EXTENDED PREMIUM BILLING PLANS
3. RETROSPECTIVE RATED BUSINESS
4. DISPUTED CLASSIFICATION
5. PROCESSING LAGS

SLIDE 6-1

REINSURER'S UNDERWRITING YEAR

- COVERS UNDERLYING POLICIES WITH INCEPTION DATES IN 12-MONTH TREATY PERIOD.
- SPANS 3 ACCIDENT YEARS
- EXAMPLE

  TREATY WRITTEN JULY, 1985

  COVERS POLICIES INCEPTING 7/85 TO 6/86

  LAST ACCIDENT JUNE, 1987

SLIDE 6-2

EARNED PREMIUM DEVELOPMENT FACTORS

PRO-RATA REINSURANCE

UNDERWRITING YEAR

24/12	2.254
36/24	1.044
48/36	1.012
60/48	1.008
72/60	1,008
84/72	1.004
96/84	1.002
108/96	1.001

SLIDE 6-3

INTERPLAY OF EBNR AND IBNR
UNDERWRITING YEAR 1986 AT 12/87

(1)	(2)	(3)	(4)	(5)	(6)
REPORTED EP	ULTIMATE EP	DIFF (2-1)	% EBNR TO EARN @ 12/87	EBNR (3X4)	ADJ EP (1+5)
800	1,000	200	60%	120	920

(7)	(8)	(9)	(10)	(11)	(12)
REPORTED IL	ULTIMATE LI	DIFF (2-1)	ULTIMATE LR (8/2)	ADJ LI (10X6)	IBNR (11-7)
500	750	250	75%	690	190

POSSIBLE EBNR

0
120
200

POSSIBLE IBNR

100*
190
250

*100 = (75% X 800) - 500

SLIDE 6-4

1989 CASUALTY LOSS RESERVE SEMINAR

2E: TORT REFORM

Moderator

Frederick O. Kist
Coopers & Lybrand

Panel

Claus S. Metzner
Aetna Life & Casualty

Phillip D. Miller
Insurance Services Office, Inc.

Gail E. Tverberg
Tillinghast/Towers Perrin

MR. KIST: We're ready to start. The flow of people has gone down to a trickle. First of all, good morning. My name is Fred Kist. I'm with Coopers and Lybrand. I'm a partner with Coopers in the Atlanta office.

A few items of housekeeping first. You've probably heard this already since you've been to the initial session or perhaps in the initial session. The entire session this morning will be recorded. Please use the microphone in the middle of the room so that we can record the question. We'll also record the answer. We will try to make sure that we will repeat the question each time to make sure everybody has heard it.

Also, the opinions expressed by the panelists are their opinions rather than those of the American Academy of Actuaries.

With that, I'd like to thank you for coming to the session this morning. This is 2E, Tort Reform and Loss Reserving. I think we need to have an initial element of clarification here.

We're defining tort reform as the legislative actions which modify procedural or substantive parts of a state's code relative to torts. This includes items such as: 1) joint and several liability; 2) damage award caps, punitive or non-economic damage caps; and 3) areas such as collateral source rules, penalties for frivolous suits, and changes in sovereign immunity.

We will not cover specific tort reform changes that are related to a broadening or redefinition of coverage benefits such as no fault or worker's compensation. We're going to deal primarily with tort reform from an overall impact on the industry, primarily in the liability area.

During the period between 1985 and 1987 virtually every state undertook a review of the code relative to torts. Within each state house, changes were proposed, reviewed and hotly debated. The majority of states took it upon themselves to pass some form of tort reform in one or more of the areas that I had just identified.

Often the initial focus of tort reform is to identify cost reductions, if any. There is a secondary concern with loss reserving. We, as auditors, are often asked to make modifications in projections due to consideration of tort reform.

The loss reserve implications of tort reform arise typically at the financial statement point in time. There's a great deal of uncertainty as to the true benefits of tort reform.

This morning we're going to be dealing with looking at what is the impact of tort reform on the underlying data. Our initial speaker here is going to be Phil Miller. Phil is a senior vice-president of ISO. He is also a fellow of the Casualty Actuarial Society and a member of the American Academy of Actuaries. Phil is responsible for the actuarial operations, data management and control and actuarial development departments at ISO.

Over two years, ISO completed two major studies evaluating tort reform changes. These studies were completed both under Phil's direction. He is here today with us to comment on those studies and also provide additional observations on the impact of tort reform on the reserving process. Now I'll turn it over to Phil Miller of ISO.

LOSS RESERVING AFTER TORT REFORM

The Use of Individual Claim File Studies

Philip D. Miller, Senior Vice President & Actuary, ISO

In 1988 ISO completed the second of two high priority claim data projects. During my remarks I will:

- describe our methodology
- present the key findings, and
- highlight their potential uses for loss reserve analysis.

In December 1986, ISO announced its sponsorship of two commercial liability insurance claim data projects -- the Claim Evaluation Project and the Claim File Data Analysis. These studies were designed to:

- provide assistance to those making difficult judgments about the effect of enacted tort reforms, and
- gather data that will be useful in assessing future changes to tort law.

The first study, the Claim Evaluation Project, was completed in May 1987 by the independent public policy and management consulting firm of Hamilton, Rabinovitz and Alschuler. It was designed to provide an early look at the direction and relative size of the effects of various enacted tort reforms on indemnity costs for six typical, but hypothetical, claim situations. The study also reviewed a three part program of tort reform measures that were relatively simple yet comprehensive. This program consisted of the abolition of the rule of joint & several liability, relaxation of the collateral source rule, and a cap of $250,000 on non-economic damages.

The study found that, in many instances, the qualifications and exceptions in many of the enacted tort reform statutes substantially limited their intended effect of reducing claim costs. The study also found that the three point program would produce significant cost reductions in virtually all of the claim situations tested.

The second study, the Claim File Data Analysis, completed in November, 1988, was conducted by ISO DATA, Incorporated, a subsidiary of ISO. It gathered information from over 13,000 actual commercial bodily injury liability claim files. The study analyzed three distinct samples of claims:

- large claims -- both open and closed -- of $25,000 or more from Policy Year 1983
- claims of all sizes closed in August, 1987, and
- governmental entity claims of under $25,000 from Policy Year 1983.

The study produced four major conclusions:

First, compensation received was greater than or equal to the economic loss incurred for the vast majority of claimants.

Second, insurer total claim costs were driven by a small minority of larger, more complex claims.

Third, current application of certain tort law doctrines (such as joint and several liability and the collateral source rule) contributed significantly to higher insurer claim costs; and

Fourth, governmental entities were viewed as "deep pockets" and were more likely than other insureds to pay more than their "fair share" in multi-defendant cases.

While we may not find these four conclusions to be surprising, the study provides factual support for statements that previously were only intuitive or anecdotal. Let me elaborate on the four points.

Regarding the adequacy of compensation:

- Over 90% of claimants received liability insurance compensation that covered at least their fault-adjusted economic loss.
- In the sample of closed claims of all sizes, the average liability compensation was three times the claimant's fault-adjusted economic loss.
- As a group, claimants with small claims tended to receive a higher multiple of their economic loss than claimants with larger claims.
- Many claimants did, in fact, receive double recoveries from collateral sources such as workers' compensation, no-fault and group health plans.

These findings suggest that many claimants are effectively receiving substantial compensation for non-economic injuries, such as pain and suffering.

Regarding the large claims which drive costs, the study found that:

- A relatively small number of large claims accounted for the vast majority of total liability insurance compensation dollars -- fewer than 3% of the claims were responsible for 54% of total compensation paid.
- These large-valued claims typically involved more serious injury, were reported later, required years to resolve after extended litigation, and involved multiple defendants more frequently.

While some critics have discounted the effects of recent tort law trends as only affecting large claims, the findings suggest that tort reforms targeting high value cases can indeed make a difference.

Regarding the effects of current tort law doctrines, the study provides substantial evidence that they do contribute significantly to claim costs:

- With respect to the rule of joint and several liability, insureds paid more than their "fair share," as measured by their percentage at fault, in about 40% of the multi-defendant claim situations. Claimants received, on average, 3.7 times more in multi-defendant situations than in single defendant situations. Legal costs as a percentage of indemnity paid to claimants were 75% greater in multi-defendant cases.
- On the collateral source rule, the widespread availability of collateral sources generally did not lower insurer claim costs. At least 57% of claimants with claims of $25,000 or more had medical collateral sources available. Yet, fewer than 9% of the claims studied yielded a reduction in the amount of settlement or court award because collateral sources were available.
- With respect to punitive damages, despite the limited instances of actual punitive damage awards, claim settlements were estimated to be 10% higher when punitive damages were alleged.

Regarding municipal general liability claims:

- Governmental entities were indeed viewed as "deep pockets." In multi-defendant cases where the insured was a governmental entity, the insured's percentage of settlement exceeded its percentage of fault 46% of the time compared with about 36% in all general liability multi-defendant cases.
- Litigation -- with its associated expense -- occurred more frequently in governmental cases. Lawsuits were filed in 75% of the small governmental claims and in 88% of the large governmental claims, in contrast to only 32% of the claims in the general claim population.
- For governmental claims, average liability insurance compensation was about 3 1/2 times the average fault-adjusted economic loss, while it was only about 2 1/2 times for the general claim population.

Besides obtaining factual information, the study also asked claims personnel for their opinions about the relative effects of recently passed tort laws on a claim by claim basis. The respondents estimated that nearly 15% of the claims studied would have been affected by the tort reforms enacted. These tort reforms generally would have had a greater effect on large claims than on small claims, with the exception of modifications to the collateral source rule, which cut across much of the claim population.

This opinion survey reinforces the finding of the Claim Evaluation Project that many of the legislative actions falling under the category of tort reform were heavily encumbered by exceptions, caveats and qualifications which -- whatever their merits from a public policy perspective -- limited the cost impact of those reforms on bodily injury indemnity. Because of a lack of statistical credibility, in most states no attempt was made to quantify a dollar impact of enacted tort reforms.

We believe that this ISO DATA study is valuable to insurers, regulators, legislators and others debating the merits of tort reform. However, like all claim studies, it does have limitations. These include:

- Some of the key public policy information is only available when a claim actually goes to verdict -- about 2% of the time. Indeed, it is often available only in plaintiff attorney files.
- It essentially only includes data from primary insurers in the admitted market.
- Claim file information does not measure trends or changing conditions or the effect of future changes. A claim study is a snapshot at one point in time.

These limitations, inherent to all claim studies, put certain constraints on the uses of the Claim File Data Analysis. For example, even at a single point in time, a study like the Claim File Data Analysis cannot produce a precise definitive finding on the effects of particular tort law reforms. However, over time, the aggregate effects of tort law changes, -- either expansions of liability that raise costs, or meaningful tort reforms that reduce costs -- will be reflected in insurer claim cost data and in the prices insurers charge.

Long before the effects of tort reform show up in the actual experience used for pricing, insurance companies will have to prepare financial statements. The loss reserves in these financial statements will be expected to reflect all information, including the fact that a tort reform has been enacted.

The problem of estimating loss reserves when a tort reform has recently been enacted has some similarities to other reserving problems in the face of a changing environment. The loss reserve specialist is usually experienced in dealing with the most common "changes" that can affect an analysis. For example, Mssrs. Berquist and Sherman provided a rather detailed technique for dealing with changes in claims closure rates and changes in case reserve adequacy. On a less formal basis, loss reserve specialists have learned to deal with other "standard" types of changes, such as: expansion into (or retirement from) a line or sub-line; or a new team in the claims department. The approaches used are generally developed by analogy to other published techniques.

Tort reform differs from other changes in at least one important way. Generally there is no historical track record. Since most of the tort reforms under consideration weren't enacted until 1986, you will generally have no frame of reference for predicting the effects of such reforms. This differs from the situation where, for example, you are told that the claims department cut back on staff 12 months ago. While each such situation is new, you may have seen this same pattern of facts several times in the past. In this claim department example you might interpret the data in light of both an expected slowdown in payments and less frequent monitoring of case reserves by examiners.

For loss reserving after the enactment of tort reform, we should first consider the types of effects that such reform could have:

First, Reduced Severity - Many tort reform proposals, such as caps on non-economic damages or consideration of collateral sources could be expected to reduce overall severity.

Second, Faster Settlement - Proposals which advocate alternative methods for dispute resolution are intended to reduce court time and therefore, at least according to their advocates, should speed up the process.

Third, Faster Reporting - Changes in statutes of limitation or repose may force faster reporting of claims, or may even eliminate certain late reporting claims.; and

Fourth, Lower Frequency - Some proposals permit a plaintiff to recover only from a defendant whose fault exceeds the plaintiff's fault.

These potential changes that might result from various kinds of tort reform are simplistically categorized in a way most actuaries and other loss reserve specialists deal with regularly. Stated in this fashion, it should be clear that you do not necessarily need brand new reserving methods for dealing with tort reform.

The Claim File Data Analysis contains much information that can assist you in evaluating tort reforms.

If you are evaluating a change to the rule of joint & several liability the Analysis gathered information on:

- Percentage of single and multi-defendant situations.
- Percentage of fault of the claimant, the insured, other defendants and other at-fault parties; and
- Percentage of settlement paid by the insured and other parties.

To help in evaluating a relaxation of the collateral source rule, the CFDA collected:

- The type and amount of benefits available to the claimant;
- Whether or not a lien applied to the award or settlement; and
- Whether or not the existence of collateral sources resulted in a reduction in the settlement amount for the claim, and if so, the amount of reduction.

If a tort reform imposes caps on non-economic damages, the CFDA provides information on the economic and non-economic portion of each claim.

And if the tort reform in question involves punitive damages, the CFDA collected both actual punitive damages paid and the impact of the claims for punitive damages on the amount of settlement (in other words, the "shadow effect".)

However I caution you that information on collateral sources, economic loss, and percentage of fault and settlement is diffcult to gather from claim files and was more frequently left incomplete in the study.

Now that I have described the process of evaluating tort reforms so simply, the question is why is it so difficult to do? What are some of the pitfalls the analyst must address?

First, loss reserving after a tort reform will be an evolutionary process. The first time an analysis is performed, you will have minimal (or no) information and will have to use a heavy dose of judgment. Of course, since there is a great deal of uncertainty associated with a reserve estimate for an immature period in a liability line, the addition of more uncertainty due to tort reform doesn't change the nature of the game -- it just increases the difficulty.

A second concern is each tort reform law is different. There is a tendency to "lump" reforms into neat categories, very much as I just did in describing sources of information. But very few laws within each neat category can be expected to have the same impact. For example consider a modification of the rule of joint & several liability. A precious few, such as laws in Utah, Wyoming and Colorado, eliminate joint & several liability completely and unconditionally. Others, however, eliminate joint & several liability only if the defendant is less than 25% at fault. Others do not change the rule as it applies to economic damages. Still others carve out particular types of actions and keep the rule in effect for them. Some continue to apply joint & several to selected sublines, such as products and pollution. And some have dollar thresholds...As you can see it gets complicated and very few are the same.

Identical tort reforms don't tell the whole story. Even states with similar enacted reform statutes require an analysis of the previously existing tort environment before you can conclude the statutes will have similar impact.

The effective date of a reform poses another problem. The manner in which the effective date is chosen directly affects the degree of impact on reserves. Some reforms are enacted to affect actions filed after a certain date and others address injuries occurring on or after a certain date.

Some additional difficult questions the reserve specialist will have to wrestle with are:

- Is my book of business by line and by class different from the mix used in the CFDA sample?

. What other changes will take place in the new legal environment? For example, how will lawyers, juries, and judges respond to the new tort law?
. Have recent court interpretations affected the results? and
. Will the constitutionality be upheld?

The sources of information are many -- though none are perfect. In addition to the ISO studies I discussed earlier, there are several other sources that may be useful, such as:

. The Texas Liability Insurance Closed Claim Survey,
. Compensation for Automobile Injuries in the United States (AIRAC),
. Ernst & Whinney "Hawaii Study",
. Coopers & Lybrand Georgia Civil Justice Reform Study

among others. For those of you who are interested, I have printed a more complete bibliography. None of the studies I mentioned were specifically designed to evaluate the effect on loss reserves due to tort reform. Therefore, each must be reviewed carefully and used wisely. None is perfect for this purpose. Still, they contain information that can assist you in making informed estimates.

In addition to the published sources I have mentioned, you should not overlook your own company's claim department as a source of information. Remember, the claims department sees the losses first! I think you should interview the insurance company's claims people to determine whether anything has shown up in the actual reported claims that demonstrates changes due to tort reform. Claims personnel should also be asked for their professional evaluation of the ultimate effects of the reform.

As I have said, none of these sources of information will eliminate the need for the specialist to exercise judgment and to use techniques appropriate to the situation. Because of the tremendous uncertainty involved, a larger than normal margin of conservatism is called for.

Over time, the old data will be replaced by experience under the tort reform. This will serve to replace judgmental adjustments with hard facts. Still, considering the length of the tail for liability lines, the burden of reserving after tort reform will lay squarely on the reserve specialist for many, years.

I hope that as a result of my presentation you have a good understanding of what the Claim File Data Analysis is, what its main conclusions are, and how it can help in evaluating the impact of tort reform. I also hope I have alerted you to some pitfalls to avoid in your tort reform analysis. As long as tort reforms are enacted, insurance companies are going to need people to estimate their impact. Insurance companies want their reserves to reflect as much information as possible, including the possible effects of tort reforms. I don't envy your job -- but I know you'll do it well. GOOD LUCK!

TORT REFORM

SOURCES OF INFORMATION

. Claim Evaluation Project
  - Conducted by Hamilton, Rabinovitz, and Alschuler, commissioned by Insurance Services Office, Inc., April 1987.

. Claim File Data Analysis
  - ISO Data, Inc., December 1988.

. Compensation for Automobile Injuries in the United States
  - All-Industry Research Advisory Council, March 1989.

. Georgia Civil Justice Reform Study
  - Prepared by Coopers & Lybrand for the Georgia Insurance Department, June 1989.

. Medical Malpractice Closed Claims, 1975 - 1978
  - National Association of Insurance Commissioners, September 1980.

. Medical Malpractice: Theory, Evidence, and Public Policy
  - Patricia M. Danzon, Harvard University Press, Cambridge, Massachusetts, 1985.

. The Probable Cost Impact of the 1986 Hawaii Tort Law Amendments: A Closed Claim Study
  - Conducted by Hamilton, Rabinovitz, and Alschuler for the Hawaii Insurance Rating Bureau, June 1987.

. Product Liability closed Claim Survey: A Technical Analysis of Survey Results
  - Insurance Services Office, 1977.

. Report to the Hawaii Insurance Rating Bureau, Inc., Re: Hawaii Tort Reform Act, An Actuarial Analysis
  - Prepared by Ernst & Whinney, June 1987 (subsequently updated in May, 1988).

. Special Malpractice Review: 1974 Closed Claim Survey, Technical Analysis of Survey Results
  - Prepared by Insurance Services Office, November, 1976.

. State of Hawaii, 1986 Closed Claim Study
  - Prepared by Towers, Perrin, Forster & Crosby for the Hawaii Insurance Department, December 1987.

. Texas Liability Insurance Closed Claim Survey
  - Texas State Board of Insurance, February 1987.

. The 1988 Texas Liability Insurance Closed Claim Survey
  - Texas State Board of Insurance, March 1989.

MR. KIST: Thank you very much, Phil.

(Applause)

MR. KIST: Our second speaker today is Claus Metzner, Associate Actuary for Aetna Life and Casualty. Claus is a fellow of the Society of Actuaries and is a member of the American Academy of Actuaries. At Aetna, Claus is heavily involved in developing rate making methodologies for Aetna in the worker's compensation and general liability areas.

In addition, he's responsible for developing Aetna's pricing response to tort reform. Claus will overview various of the tort reforms and their impacts on the reserving process.

MR. METZNER: I'm not going to use the podium. I'm just going to grab one of these fine microphones and speak from over here.

I'll be giving a low tech session. You can tell this is so because we're actually not going to deal with numbers. Of course, the usual cautionary note applies -- that I speak for myself as a person experienced in this area -- the tort reform area -- but not for the Aetna. I would like you to keep that in mind during my presentation.

While my primary experience is as a pricing actuary, I think it's a natural migration from the pricing issue to the reserving issue. It's fair to say that perhaps the pricing people have it a little easier than the reserving people when evaluating tort reform. I say this because when we initially do our pricing, we deal with ultimate claims and the impact on those ultimate claims.

At the first evaluation of the tort reform impact we are not necessarily concerned with how the change in ultimate claims manifests itself. The change itself is the important variable. You, as reserving actuaries, obviously have to be concerned immediately with how the change manifests itself; we as pricing people also have to be concerned with the low as we continually update rate evaluations (but that concern can be deferred for at least an additional year).

Now, with the above differentiation as to the importance of how the change manifests itself as background, let's talk a little bit about the kinds of reserving issues that Phil has already alluded to.

Clearly, you always do have to start with the data. I think the ISO study is about the most comprehensive nationwide set of data that you will find for commercial lines. Similarly for the AIRAC study for personal lines.

Other studies that are more state detailed are also very valuable, because these state specific studies really let you get into how an individual state's situation may be different from what you would consider to be a fairly broad based type of approach.

The first important differentiation regarding tort reform is to differentiate between availability oriented and affordability oriented reforms. The tort reforms that are geared towards affordability will have the greatest impact on your aggregate costs. The tort reforms, such as joint and several, that are geared towards availability issues will have a more narrowly defined focus, but may have a lot to do with how the tail factor emerges.

The above statement should be clear when you consider what Phil said, as to the reform impact on large claims, let's say joint and several reform, versus the impact of collateral source reform, which impacts all claims. Timing issues are very important if you believe that large claims may exhibit a different (longer delayed) reporting pattern than small claims.

The above analysis leads directly to the first major issue that we have in the reserving side and that is what is the expected impact of a tort reform. Can we differentiate between claim value impacts and claim number impacts? Depending on what you decide on to the impact the analysis obviously is going to be different.

Perhaps you don't do your reserve analysis on claim severity versus claim frequency. Then you will have to make a judgment call as to how to reflect the impact. Furthermore, most of you probably look at country-wide data rather than by state data. All of the studies that the pricing people have done, all of the ISO studies, of necessity are geared towards the state, because the state that passes tort reform wants to know what the impact of its reform is.

The state's don't care about the impact of reform on your country-wide books, that's your problem, not theirs. The price that's paid by their constituency, the legislative constituency, that the important variable to them.

How then can you utilize an analysis whose primary thrust has been far more specific than what you need?

Well, you can go to the pricing actuaries and presumably you can find out what their estimate of the tort reform impact was and use that analysis to judge in aggregate terms what kind of a phenomenon you think you're going to have to deal with. Are we dealing with five percent reductions, ten percent, one percent, or is the impact minimal based upon your book of business? The answer for any given reform can vary because everybody has their own book of business. So, that's the first step: determine the order of magnitude of the impact and whether you're dealing with frequency or severity, large or small claims impacts.

The second step, or the second issue, is a very important one. When is the impact going to become apparent? Clearly, you can have a whole range of situations. Much of the timing of the impact is going to depend upon the skill of your claim people in how they interpret and negotiate under a changed legal situation. Different companies have different training programs and therefore different rates at which a changed external environment manifests itself in reported claim values.

In other words, claims adjusters, may, in fact, react more quickly or less quickly than you expect. Reaction time is an important issue, because you have to determine whether the values, the current claim values you're seeing, as well as number of claims reported, are reflective of the new law and whether or not normal development patterns thereafter will hold. Or is most of the impact going to be apparent at the time the claim is closed?

Given that closure dates vary between large and small claims, it's important to have an understanding of where you expect the impact to be so you can set up some working hypothesis in order to test your assumptions. When you're dealing with a series of unknowns, your best approach is to clearly define your working hypothesis and then look for those early warning indicators as to whether something is going right for you or

wrong for you. At that point you're in a position to make a correction to your original assumption. I emphasize this process because you're not ever going to operate with certainty in the tort reform scenario.

Now, what's the third issue? I submit it's the specific line of business impacted. If you recall, based on the ISO study, Phil talked about the fact that governmental entities are so called "deep pocket" entities. Well, if your business is heavily weighted towards governmental entities where there has been a significant change in tort relating to governmental entities, guess what, you're going to see something happening to your claims. You're going to have to determine what it is you're seeing because it is not clear what will happen during the period prior to final settlement.

Perhaps you're going to observe an acceleration of claims reported to beat the new law, a phenomenon that is totally contradictory to what you'd expect. Or is it? After the initial accelerated reporting, you might see a drop off in reported claims. Now, you're going to have to interpret those numbers and you just have that additional layer of uncertainty as to whether you're looking at random fluctuation, a change in reporting patterns of a one-time distortion. Medical malpractice, for example has had a number of tort law changes implemented over the years; changes which mean totally different loss development characteristics may be emerging. You have to be aware of such changes as part of your loss reserve evaluation.

General liability is not necessary general liability. I mean you have products liability, you have Owner, Landlords & Tenants liability, you have manufacturers and contractors liability. Each exhibit different types of claims, different reporting patterns, and it's difficult to understand where and how things are going to change.

Consider these situation where you have non-specific lines, you have a very aggregated, broad based book of business over the entire country. Who knows how that's going to be impacted by tort reform? If you are doing some reserving work for a regional carrier or for an insurer (perhaps a self insured) who specializes in certain lines of business, perhaps it becomes much more apparent what has happened. The differentiation is important as you proceed with your analysis.

Having gone over the three major issues, let's get into some of the things that we ought to look for on the specific reforms that have been enacted.

We'll start with collateral sources. The first thing you should ask yourself and your claims people is if we had a situation where collateral sources weren't recognized, by statute but were used in the negotiating process. We all know there's a time value to money. The time value to money exists for the plaintiff as well as for the company. Perhaps as part of the negotiating process, one recognizes that collateral sources existed and negotiates for a speedy settlement on that basis. The initial claim valuation is based on recognition of collateral sources and the offer is deemed reasonable or acceptable and is taken.

If you've been operating under the above scenario, how much has your negotiating posture been changed once you have a statutory right to either recognition of collateral sources or to an offset. Can you assume that the full value of the offset is available?

Another question to ask is whether liens exist or could be brought. How have those liens impacted net settlement to the plaintiff under a general liability claim or auto liability claim? In fact, are we dealing with double counting if you allow the full offset for the tort reform? I don't know the answer to that question because I don't know what your

business looks like. You have to ask that question and provide that answer in order to provide a reasonable understanding and valuation.

Another factual question arises if the tort reform impact varies by size of loss and you need to assess the impact of reinsurance. Clearly a company that reinsures all cases in excess of $500,000 versus one that reinsures all cases in excess of $100,000 will have a much different pattern in net reserving and tort reform impact. If no per diem reinsurance exists, the impacts could be even greater -- let's say the company only carries catastrophic reinsurance. This is an important consideration since you are responsible for valuing net liabilities.

In view of the varied impacts on net values due to reinsurance you need to consider whether you are going to get the tort reform benefit directly or is your reinsurer getting the benefit. If the reinsurer is getting the benefit, I might suggest that your net reserves may not change. Of course, you might also want to consider whether or not this benefit to the reinsurer is really going to happen and what conclusion you might draw regarding your current reinsurance program. Just recognize that opinions in this area can differ.

Of course, another issue is whether the current value versus the final payment shows the impact and how the impact is going to manifest itself on your loss development factors. And that's a very, very difficult issue to assess, because case basis loss reserves don't necessarily always mean the same at each stage of development anyway. In essence, you have another layer of uncertainty to evaluate.

Next, let's consider joint and several reforms and a few things to be aware of. How critical is this reform for evaluating your company's liabilities? It may not be very critical at all. It's a judgment call as to materiality. I expect your judgement will be heavily impacted by the mix of business you have, whether you are characterized by a book of business with many deep pocket defendants, and what kind of limits of liability you are selling.

If you're selling primarily low limits of liability, joint and several reform will probably not have much of an impact. If you're selling high limits, you may be the deep pocket defendant and the impact can be significant. Again, you want to keep your book of business structure in mind. People differ in the limits they purchase and the profile that they present to a potential plaintiff.

Statute of limitations reforms also have been enacted. Is there a practical impact? Will the reform accelerate the claim reports? Will the reform serve to eliminate some of the nuisance claims? Again, it's hard to tell. Different lines of insurance will show different impacts. You will need to make some decisions on the impact and hope you're reasonably close to the real situation.

Punitive damage reform is generally characterized by the shadow effect that Phil alluded to. The fact that punitive damage allegations, may impact the claim settlement value is an important issue. How does your claim department react to those allegations in their claim valuation? Maybe quite different from the way my claim department reacts. Different impacts on claim results for your company versus mine due to the same statutory change result for that reason.

Having performed the above kinds of analyses, you still must explore some other valuation issues, e.g. maybe there are changes in the effective date of the law among the various states. Such differences just muddy the water. This is especially true when you have some laws taking effect April 1st, some laws taking effect July 1st, some October

1st, some June 22nd, etc. If you're a national company with exposures in every state, this multiplicity of effective dates creates a problem in assessing the aggregate impact.

As with all actuarial calculations, a prior estimate of the maximum dollar impact by line is useful. Your pricing actuaries ought to be able to prepare this information for you. The pricing actuaries have an independent review, initially at least, of what the impact of the reform is on your book of business. Their analysis doesn't absolve you from your own review of the impact but at least gives you a good starting point. The pricing estimate is especially valuable since having an estimate of the maximum dollar impact by line directly relates to materiality. Clearly, you are concerned with materiality and perhaps within the context of materiality, you may decide that you don't have to take specific recognition of the enacted tort reforms.

Let me caution you, however, that even though you may feel you may not need to take specific recognition of a reform's impacts because it is not material to your aggregate reserves, you need to consider it material within the context of the pricing process for a particular state. The differentiation between the impact of a reform on an aggregate valuation and the state specific pricing materiality of the same reform should be carefully delineated so that you do not minimize the political accomplishments reforms represent.

The impact of tort reform has to be concerned with the changed loss development patterns that you are going to be faced with in the future. I think that should be your key element of concern. We are all participating in evaluating a dynamic system; a system where there are going to be changes and discontinuities. You have to evaluate those impacts discontinuities even though the date and techniques are less certain than you would like.

Obviously, if you are conservative in your reserve setting you may feel that the total impact that you would expect from tort reform is going to be well covered by the margins for conservatism you would otherwise feel comfortable with. Clearly, under those conditions you would not make a direct reduction in your valuation for the reforms. Again, subject to the caveat that the processes that lead you to your answer will be the important considerations, the above answer may be the most realistic for you.

To summarize, what are some conclusions that arise out of what I just said. I'll discuss those conclusions, and the comments on the last slide, and then Gail will touch on a few other issues.

(Slide)

Clearly you are faced with a major discontinuity whenever you have something that is called tort reform. Any legislature that passes tort reform, even with all of the political compromises that take place, feels they have instituted a major change. From a pricing perspective, one always is conscious of that feeling because one gets beaten over the head with that concept of major change. You may as well be conscious of the same reality from the reserving side.

The reformed law, however, may have some unintended side effects. As a trial attorney once told me, we are dealing with a system that is based upon greed. This comment wa made at the ratemaking seminar several years ago, the Philadelphia seminar. Essentially, his point was that if any of you (the actuaries) forget that the system, the tort system, is based on greed you are going to be way off the mark in any of your

Tort Reform

Reserving Issues

1

Issue I

What Is The Impact

value of claim

number of claims

Issue II

When Will Impact Become Apparent

3

Issue III

Is A Specific Line of Business Targeted

What to Look For

Collateral Sources

Claim settlement practices

Liens

Large vs Small (impact of reinsurance)

Current value vs final payment (ldf pattern)

5

What to Look For

Joint & Several Reform

How critical

Mix of business/limits

What to Look For

Statute of Limitations

Practical impact

Acceleration of Reports

Punitive Damage Reform

Shadow effect

7

Valuation Issues

Mid year change in law

Maximum dollar impact by line

Materiality

Loss development patterns

Conservatism

Conclusions

Major Discontinuity

Exercise Caution

Question Assumptions (and again)

Dynamics Important

valuations." So, therefore, while we have major discontinuities, we still have to be somewhat skeptical as to what the net effect on our claims costs will be.

Just remember that trial lawyers and plaintiffs have vivid imaginations. They use there imaginations in pursuit of their own self-interest. Presumably, if we were on the other side, we would be behaving in exactly the same fashion. You just don't want to leave that particular concept of self interest out of your own evaluation of a reform's impact. You want to exercise caution. Clearly within the reserving process and liability valuation process, you're dealing with a company's solvency and you want to be cautious about overestimating the financial impact of possible good news.

Pricing actuaries also are concerned about overestimating good news. Of course if we're wrong, we can always shrug our shoulders and raise the price next year (we hope). If you're grossly wrong, on the liability valuation we have a different problem; perhaps, we may not be around next year.

You need to question your assumptions. Set up your working hypothesis, test the hypothesis, question the answer. After you go through that process, question everything again, because you're probably going to find that what looked good on the surface perhaps isn't quite as good.

Finally, you ought to be very, very cautious. In evaluating tort reform you're dealing in an area that has a high degree of uncertainty. Dynamics are so fluid and change so rapidly that you don't want to get yourself locked in to a set of assumptions, a set of techniques, that when all are said and done are yielding you what would be a potentially misleading answer. Such misleading answers don't serve us well.

I thank you very much.

(Applause)

MR. KIST: The hard copies of the slides for these sessions are located in the back. If there aren't any left, feel free to come back up here and give me a copy of your business card, and I'll make sure that you get copies.

Our last speaker this morning is Gail Tverberg. Gail is a principal of Tillinghast a Towers Perrin company. She's a fellow of the Casualty Actuarial Society and a member of the American Academy of Actuaries. Gail has been heavily involved in a number of the Tillinghast studies evaluating tort reforms, particularly the ones in the medical malpractice area. She will present her observations and some observations relative to actual impacts of tort reform on medical malpractice data and loss reserving.

And now, I'll turn it over to Gail.

Impact of Tort Reforms on Loss Reserves
Lessons From Medical Malpractice

by Gail E. Tverberg, FCAS, MAAA

Casualty Loss Reserve Seminar - Session 2E

September 18, 1989

Good Morning! Today I'd like to talk to you about the types of changes we have been seeing in actuarial data when medical malpractice tort reforms have been enacted. The changes are somewhat different than an actuary might expect. By looking at the medical malpractice changes, I hope to give you an idea of the changes to look for in the data for other liability lines.

Malpractice reforms of 1975 and 1986-87 provide insight as to impacts on other lines.

Medical malpractice differs from other liability lines in that there has been a long history of reforms. Reforms were enacted in nearly every state in 1975. There was a lull in legislation between 1975 and 1986, although a few states enacted reforms during this period. Then in the 1986-87 period when other lines were subject to reforms, numerous reforms affecting medical malpractice were again enacted.

Besides the long history of reforms, medical malpractice differs from other lines in the types of data available. There are a large number of one-line, one-state companies, so data is available on an individual state basis. Also, because of the delay in the reporting of claims and the frequent use of claims-made coverage, both accident year and notice year (or report year) data is often available to the actuary. With data on these bases, it is possible to get a more complete picture of the types of changes that are occurring than when only countrywide accident year developments are available.

Savings are difficult to predict because of unintended effects and indirect impacts.

One thing we learn from malpractice reforms is that the amount of savings a given reform will produce is very difficult to predict because of unintended effects and indirect impacts. The system for resolving liability claims is very complex. There are a large number of individuals involved, including judges, juries, trial lawyers, defense lawyers, in-house claims adjusters, and claimants, each with their own agendas.

For example, a plaintiff's attorney will want to pursue claims for which he has a reasonable chance of success and for which the time he spends will be adequately compensated. If a reform makes it more difficult to pursue a particular type of claim, or if the amount of the lawyer's compensation is reduced, the lawyer may decide to pursue other types of claims which better reward his efforts.

Another type of impact relates to the uncertainty surrounding a new law. When legislation is first enacted, it is not entirely clear how the courts will interpret the new law. Additional time and effort will be required to pursue a suit, until precedents have been set. As a result, there may be a temporary period during which lawyers are less willing to file suits than they will be once the workings of the new law are clearly established.

Another type of indirect impact relates to public awareness of the tort reforms. At the time reforms are enacted, there is considerable press coverage relating to the plight of those purchasing insurance. Juries may temporarily make fewer or smaller awards, in response to this new awareness.

A situation which seems to be an example of the effect of this type of public awareness is the decrease in claim costs which can occur in a state which has not enacted tort reforms, when other states have made changes to their laws. For example, we were recently reviewing some data in the state of Tennessee and noted that it showed a frequency pattern similar to that in other states, one which we thought to be associated with tort reforms. Tennessee, however, has not had tort reforms in recent years. Therefore, if the impacts are those of tort reforms, they must be indirect impacts from reforms in other states.

When we consider all of these indirect impacts, it is clear that predicting the effect of a tort reform is a very inexact science. The predictions of the amounts of savings made prior to the enactment of legislation may prove to be quite inaccurate. Furthermore, the amount of the savings may change over time, as the result of these indirect impacts.

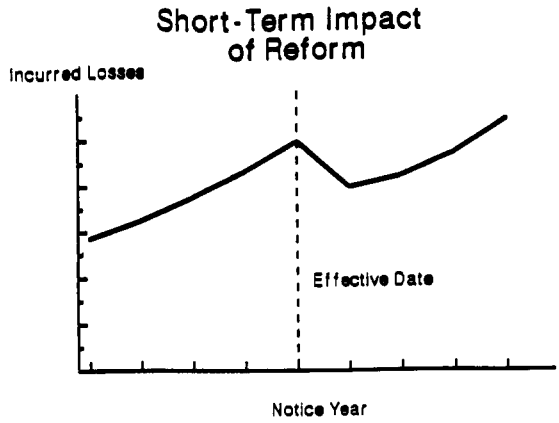
Timing issues are very important.

This brings me to my next point, "Timing issues are very important." Reserving is quite different from pricing in this regard. With pricing, the primary concern is the amount of the long-term change. With reserving, the impact on the loss development triangle, and how this changes over time, is far more important. Theoretically, a tort reform could reduce the ultimate losses by 5% and reduce every element in the loss development triangle by 5%. If this were the only impact, most reserving specialists would be relatively unconcerned.

The data relating to the medical malpractice tort reforms strongly suggests that the impact of the reforms varies over time. Thus, as you will see in the upcoming slides, the reforms can have a significant impact on loss development triangles.

Reforms are often effective on a notice year basis.

Reforms are often effective on a notice year basis. Very often, we find that malpractice reforms are effective for all suits filed after a certain date. Suits filed after a certain date correspond quite closely to all claims reported after a certain date. The change thus applies on a notice year (or report year) basis, rather on an accident year basis. If an actuary automatically assumes that a reform is effective on an accident year basis, he could be misled when looking at the data for evidence of the reform.



On this slide, I show the expected impact of a tort reform on a notice year basis. Prior to the effective date of the reform, costs are typically escalating very rapidly. Part of the reason for this high increase in cost prior to the date of the reform relates to the fact that tort reforms are most commonly enacted on lines of insurance where the annual trend factor is very high.

Also contributing to the escalation is costs, especially during the last six months or so before the reform becomes effective, is a spurt in claims being filed in anticipation of the law change. Plaintiff's lawyers will be aware of legislation which will soon be effective, and will search their files for suits which can be filed prior to the effective date of the reform. A few suits may even be filed that with more thorough investigation would be found to be without merit. Thus, the suits filed prior to the effective date of the reform may be inflated above their normal levels.

After the reform's effective date, there is likely to be a significant dip in the number of claims filed. To some extent, this decrease reflects the fact that the "pipeline" is not very full, because of the accelerated filing of suits just discussed. Also, as I mentioned earlier, no lawyer wants to be first to try a suit under the new system, because of the time and expense involved in setting the first precedents. In addition, public awareness of the problems leading to the need for the new legislation will be greatest during the first year or so after the reform becomes effective.

There is a major question as to the slope of the trend line two or more years after the effective date of the reform. To a significant extent, the slope of this line will depend on the effectiveness of the reform. If the reform is truly effective, the slope of the incurred losses, that is the trend rate, may be significantly lower than prior to the reform. If the reform is less than effective, there may be a rebound effect as lawyers learn to work within the new system, and as claims which were initially delayed are filed.

Many tort reforms took effect in 1986 and 1987. On our graph, we would expect that the incurred losses for 1986 and 1987 and perhaps 1988 to be significantly lower than would be projected based upon fitting a trend line to the historical incurred losses prior to the effective date of the tort reform. Let's look now at how this expected impact would appear when viewing accident year loss development triangles.

INCURRED LOSS
DEVELOPMENT TRIANGLE

Acc. Year	12	24	36	48	60
83				X	X
84			X	X	X
85		X	X	X	
86	X	X	X		
87	X	X			
88	X				

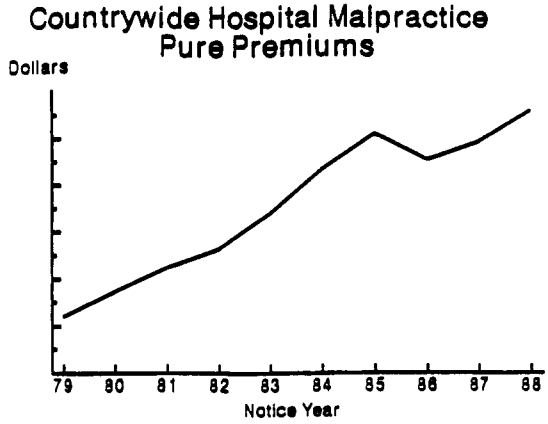
On the notice year graph, the 1986 losses were low in relationship to the 1985 losses. On the incurred loss development triangle, this corresponds to the diagonal of factors applicable to the 1986 year being depressed. An accident year loss development factor is the ratio of reported losses at one point to the corresponding amount one year earlier. When you are looking at the time when reforms are becoming effective, a comparison is being made between the incurred losses after the dip as they relate to a point prior to the dip.

Thus, the impact of a tort reform will typically be a diagonal effect. This effect will be greatest for the 1986 and 1987 calendar years, but will also exist to some extent for calendar year 1988.

Accident year development factors may be depressed.

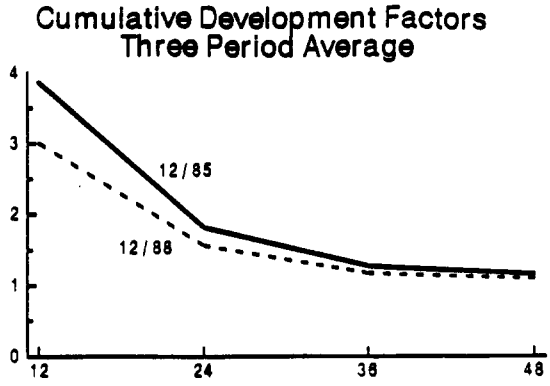
On a line such as medical malpractice, where significant reforms have been enacted, these tort reforms and the various indirect impacts related to the tort reforms may result in accident year development factors significantly lower than would have been expected based on prior experience. On lines where reforms are

less significant, the impact on the accident year loss development factors may be less extreme.



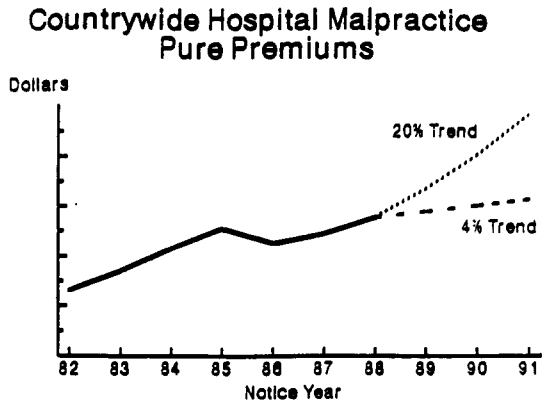
To determine what the impact of these reforms looked like on some actual data, I analyzed some countrywide hospital professional liability data. The pure premium trend looks like this. 1985 is the high year for pure premiums, with a dip in 1986. The pure premium starts increasing again in 1987 and 1988.

To see what the impact of the dip in notice year pure premiums would be on the accident year development factors, I calculated the accident year development factors using the accident year data corresponding to the notice year data.



In this particular case, there was a substantial drop in the three-period average development factors between 12/85 and 12/88. The 12/85 factors were developed using data prior to the reforms. The 12/88 factors used data which reflected the impact of reforms. As you can see, the cumulative development factors at 12/88 are significantly lower than those at 12/85.

So, what we are seeing in medical malpractice is actually a decrease in the accident year development factors. On some of the other liability lines where the reforms are less extreme, the change may be more of a flattening in development patterns, if they would otherwise be increasing. The reserving specialist should be aware that this kind of change may be taking place.



One thing I did with the malpractice data was try to determine what type of accident year loss development factors could be expected in the future, under various assumptions about the trend in notice year losses after 1988. (To do this, I constructed a model in which notice year losses were distributed to accident year, based upon the historical pattern. I then calculated indicated loss development factors with various assumptions regarding the annual increase in costs on a notice year basis after 1988.)

I discovered that if I used a 4% trend in the future, the modeled future accident year loss development factors corresponded quite closely to the 12/88 historical development factors. Thus, the 12/88 loss development factors calculated from the accident year data correspond to the assumption that losses will continue to increase at about a 4% trend, which is approximately the trend for the period 1985 to 1988.

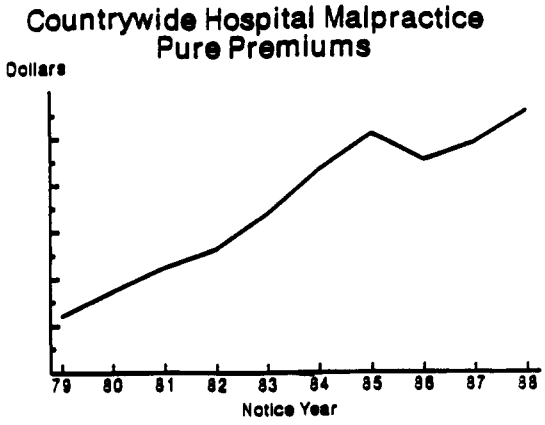
On the other hand, if I used a 20% trend in notice year losses after 1988, the modeled future accident year development factors corresponded very closely to the 12/85 development factors. The 12/85 factors relate to a period in time in which the trend for medical malpractice was approximately 20% a year, so this is consistent with the indication from the model.

Thus, the level of the accident year loss development factors on a long tail line of business seems to be closely tied to the trend in notice year loss costs. If the trend in notice year loss costs returns to pre-reform levels, we may find the accident

year loss development factors calculated shortly after the reforms to be very misleading. A person analyzing loss reserves should be aware of this possibility, and temper his selections accordingly.

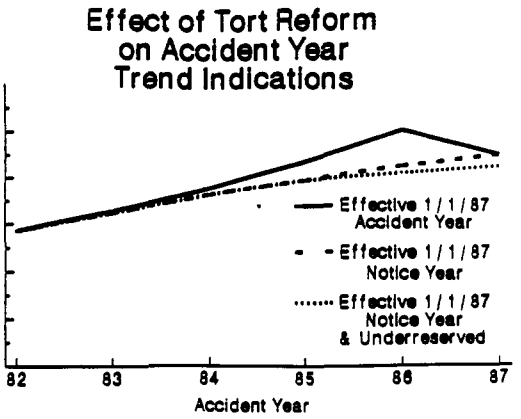
Accident year trend factors may be distorted.

Accident year trend factors also may be distorted. We've been talking about the potential distortion of accident year loss development factors, but accident year trend factors may also be distorted. This is really a separate issue. Let's go back a couple of slides.



This is the notice year data. You can tell from looking at the graph that there will be a problem fitting a trend line to the data. The trend indications will be vastly different depending upon whether a person is using 1985-88 data or 1981-88 data or 1981-85 data. And if a person assumes that the frequency will increase in the future, the indications from these various fitted values could be quite misleading.

One thing I might mention is that in some of the preliminary data we've been seeing this year, there are indications that the malpractice frequency may be starting to increase again. An increase in frequency could increase the pure premium trend significantly.



If we look at data on an accident year basis, the trend indications are quite different. With the notice year data, we found a definite bend in the graph of the incurred loss data at the time the reform became effective. With accident year data, the impact of the reform is far less apparent. (This assumes that the reform is effective for suits filed after a certain date, so the impact is really on a notice year, rather than accident year, basis. If the reform is effective for occurrences after a date, which corresponds to an accident year basis, there may be a definite bend in the accident year pure premium graph. This is shown by the solid line in the graph.)

If a reform is effective on a notice year basis, and the analysis relates to a long tail line of business, then each of the older accident years that is still having new claims reported will be impacted by the tort reform. Those older accident years, which you may have thought were before the effective date of the reform, will develop better than previously expected during the years immediately after the reform legislation. Thus, the tort reform may affect several years by reducing the reported losses on all of them a little bit.

So far, we have been talking about the effect on reported claims. We discussed earlier, however, that tort reforms have a tendency to temporarily depress accident year loss development factors. If a person mistakenly applies too low a loss development factor to the reported losses, the indicated ultimate losses could also be inadvertently understated.

On the graph, I show what happens if the analyst selects loss development factors that are a little bit too low. If this happens, accident year losses will look even better than they might have otherwise looked. I have shown a fairly small difference on my graph. It is possible that this difference could be significantly greater than indicated in my example.

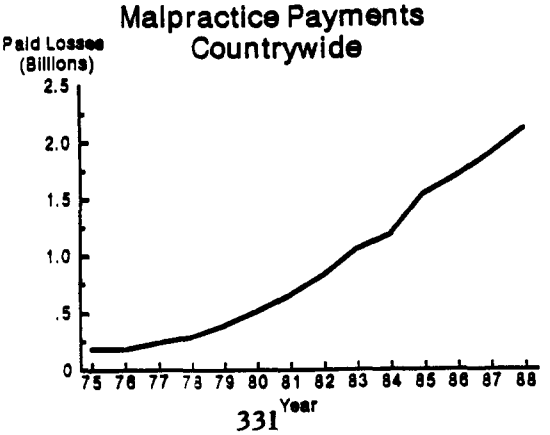
If I am analyzing this accident year data, which looks so nice and smooth, and with lower development factors, may be smoother yet, the trend indications will be quite different than with the notice year data. With the notice year data, it is likely that I will be on guard that the sudden decrease in costs will not be repeated in the future, and that there may be a return to the trends prior to the reform. With the accident year data, it would be easy to get a misleadingly low indication as to the expected trend in the future. It would also be easy to miss the fact that any unusual impact was occurring.

Claim counts may be distorted.

Let's talk now about the impact of tort reforms on claim counts. We mentioned earlier that there may be a tendency for some claimants to file suits early, so as to avoid having the suit adjudicated under the new law. Some of the reforms that are enacted make it more difficult for the lawyer to file a suit. For example, there may be a requirement that a certificate of merit prepared by an expert witness be filed whenever a suit is filed. These requirements may tend to eliminate some of the smaller claims and some of the claims which would otherwise be closed without payment.

Reforms may not work.

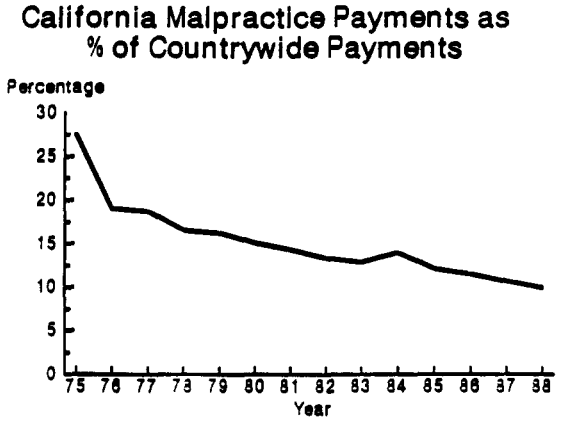
One of the things we've noticed with medical malpractice is that while a significant number of reforms were enacted in 1975, not all of these reforms worked.



On this slide, I show countrywide medical malpractice claim payments using data from Best's Executive Data Service. The amounts shown are calendar year paid losses, as reported by insurance companies. The graph shows that the 1976 payments remained relatively flat, compared to 1975. 1975 was the year when most of the reforms were enacted. Between 1976 and 1986, medical malpractice loss payments were increasing at over 20% per year. This high trend is consistent with the trend factor actuaries were seeing in the incurred loss data. The amounts shown on this graph are countrywide data, so there will be some differences from state to state. In total, however, it appears that the tort reforms did not significantly reduce medical malpractice costs.

Long term effects can be truly long term.

On the other hand, we have seen some situations where malpractice reforms truly appear to have had a long-term effect.



For example, in California a fairly tight package of tort reforms was enacted in 1975. The graph shows the ratio of California medical malpractice payments to countrywide malpractice payments, using data from Best's Executive Data Service.

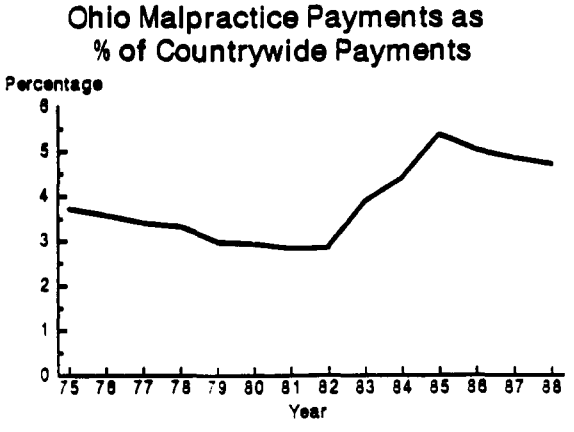
Back in 1975, California malpractice payments accounted for 27% of total countrywide payments. Since then, the ratio of California payments to countrywide payments has decreased every year, with only one exception. If you look at California malpractice

data in terms of the pure premium trend, the California trend is very much lower than that in most other states.

Because of this long-term difference between California and other states, it seems likely that the tort reforms are having a long-term impact in California. Of course, there are other factors which make California different from other states, which may also be affecting the trend. For example, the private passenger auto situation in California gives lawyers opportunities that they don't have in most other states.

Beware if an effective reform disappears.

You should also be aware that an effective reform may disappear. This may happen either because the reform is overturned in the courts or because of some other change. A situation I am familiar with is one in Ohio.



Ohio passed a cap of $200,000 on non-economic loss in 1975, and this cap was used for several years. Ohio payments as a percentage of countrywide payments dropped for several years, as the legislation was implemented. About 1982, several much more liberal judges were elected. I don't think that there was any major overturning of the laws in the courts. Instead, the laws were no longer enforced in the same way as they had been in the past. Insurance companies were unwilling to take any test case to the highest court for fear the cap would be overturned.

So, until some later reform measures were enacted, malpractice loss payments increased rapidly. You can imagine what happened to the loss development factors in that state when the payment

trend changed. The older accident years and older claims-made years suddenly had far worse experience than was previously believed. The companies in that state had to work quickly to make up the rate deficit that suddenly appeared.

In summary, there are many ways in which tort reforms can have an impact on loss reserves. The changes that we have seen with respect to medical malpractice make it clear that the loss reserve specialist needs to be very careful. There may be changes affecting the data which are quite subtle, including distortions in the loss development factors and in the trend factors. You need to be aware that if you assume that nothing is happening, when, in fact, distortions in loss development and trend factors are occurring, you may be misstating your needed reserves.

Thank You.

(Applause)

MR. KIST: We have about 15 minutes left for questions. Feel free to stand up at the microphone and ask a question. If not, I've got at least one or two questions. Questions?

QUESTION: I have a question about the availability of the ISO studies and the availability of the data underlying the studies. Can anybody obtain that information?

ANSWER: The answer is yes. The studies themselves are readily available. If I were smart, I would have brought all the order forms with me and everything. But if anybody is interested, leave me a card, I'll send you an order form along with complete price listing of some various products from the study.

QUESTION: Suppose one wanted to buy the data file, though, on tape, for example, so we could do our own study? Is that possible?

ANSWER: On the reports, that's possible. The data files themselves, which display the individual claim amounts, have not been made generally available. It principly has to do with the contractual agreement we made with the companies participating to protect the privacy of their information.

These were not just closed claims. In many cases these were open claims, especially with the policy year 1983 information. Even if you do things like blanking out the names and blanking out the claim numbers, very often just due to the amount of the detail in the file concerning the million dollar accident occurring in the State of Kansas on January the 5th you effectively give away the claim to the knowledgeable person.

MR. KIST: A thought that came to mind with respect to tort reform is the fact that rate making at the ISO level has a delay of two or three years before the data gets into the rate making process. How ISO will react as some of these tort reform changes materialize in the data base? How will ISO be looking at making changes to the evaluation of loss development on that data?

Secondly, and as importantly, as the implications for frequency, some tort reform changes may reduce the frequency of small claims therefore pushing up severities. We have a situation where we can see distortions occurring in each of frequency and severity. Phil you're the right person for these questions.

MR. MILLER: I think some of Gail's charts kind of make it obvious that something happens immediately after the effective date, which doesn't necessarily continue in a nice smooth pattern.

If we began a trend line immediately after the effective date, projecting continued declines forever, we would have gotten very misleading answers as you could see from some of the charts. After a time the trend is reversed.

I think we're going to have to be conscious of potential points of discontinuity especially in analyzing individual state data immediately after the tort reform has been enacted. We've got some experience in doing that under no fault laws, which have been enacted much earlier for private passenger auto. We're probably going to have to use analogous techniques of excluding some of the most severely effected states from country-wide information for a period of time until it stabilizes. We're going to have to look at the individual state data very, carefully.

QUESTION: My name is Pat Crowe and I've got two questions for Gail. I'm probably going to show my ignorance of malpractice. My first question is on the development factors. You showed some factors for 12/85 and you showed factors for 12/88, and they differ initially and then they converge together. If you go the next step and do 12/91, are you trying to say that the effect of tort reform is temporary? At 12/91, do the factors look more like the 12/85 factors?

QUESTION: The next question is just that you showed premiums by notice year and you show a nice little hump in them. You show the accident year with the hump in the trend, but the notice year being flat. I didn't understand that.

ANSWER: Your first question was on the development factors -- the 12/85, 12/88.

QUESTION: Right.

ANSWER: When I wrote this data, I had developed a little model, looking at it and saying: If the losses in future notice years are going up at a certain rate, assume that certain portions of those went back to each of the individual accident years. I sat down and modeled the situation to see what kind of development factors I would have, say, at 1991. What I found was that if the trend factor went back to the pre-reform level, then I very quickly got back to the development factors that were at the pre-reform levels, the 12/85 factors.

If the trend factor stayed down at four percent from now on, then I could use those 12/88 factors. So, that gives you a little clue that those 12/88 factors may not be conservative if the trend line going ahead is more than four percent.

Your second question was on that exhibit where I was trying to say that the tort reform affects accident year trend indications. If the reform were effective on an accident year basis, then you would get a hump in accident year data.

In fact, in many situations, the reform isn't effective on an accident year basis, it's effective on a notice year basis. During 1986 and 1987 you are getting claims reported on '83 and '84 and '85, and so those years are being effected on a notice year -- with the reform effective on a notice year basis. So, it's bringing down the development factors. Or bringing down the ultimate losses in each of those years.

What happens is there is the least effect back in '83 and '84, and progressively more effect as you're getting closer and closer to the effective date of the reform. What happens is you get a fairly smooth pattern and that can be misleading, because you assume that there has been no effect of the reform.

QUESTION: A question for Phil. You mentioned that tort reform may affect both claim severity and claim frequency. For instance, the collateral source rule may lower the average severity of claims, but it may also affect claim frequency in that plaintiffs are less willing to file suits when they don't expect a recovery because there's a collateral source.

In fact, the Rand Corporation expects that the effective collateral source will be greater on claim frequency because many small claims will no longer be pressed.

My question is, how do we quantify the effects of these effects on frequency? In AIWAC, we looked at a similar question of the effects of attorney involvement on claim payments. It was easy to quantify the effects of attorney involvement on claim severity.

ANSWER: There's very little in our study that can give you a handle on impacts on claim frequencies. You can't capture how many claims didn't get filed by such a study.

The only thing I would suggest there is much the same way as Gail carefully plotted same of the severity trends. You'd carefully plot some of the frequency trends and look for sharp changes. There were some in here as well.

MS. TVERBERG: I might mention that the big changes are the frequency changes. It's much more frequency driven than severity driven in the data we've looked at.

QUESTION: Another question for Mr. Miller. You've talked about something that was noticed years ago in auto insurance. For small claims, the recovery is much greater in the economic loss in proportion to the large claims. Yet at the same time you're talking about how the vast majority of the losses that are driving the system are the large claims. On the large claims, especially those three percent of the largest you found, how much of the economic damages are plaintiffs getting?

ANSWER: Well, as I said, there's a tendency for the ratio of economic loss to recovery to increase as the value increased, but I didn't necessarily say it inverts.

QUESTION: I'm sure it doesn't invert.

ANSWER: For the claims under 25,000, I believe the ratio is in the range of three and a half times economic loss to four times economic loss, whereas for claims over 25,000 the ratio tends to decline to around two to one. There is still an "imbalance," if you will. What you have to remember is things vary very much on a case by case basis.

You're talking about lumping everything even if you're in a category where there's a one to one ratio for all claims in that category. It doesn't mean a law which limits the economic losses isn't going to affect that category because there may well be individual claims in there where the ratio is way out of balance.

QUESTION: Did you just use 25,000 as a breaking point or did you have larger points?

ANSWER: $25,000 is the one I remember. We do have in the report, itself, distributions by both size of award, as well as by size of economic loss where the ratios are available.

MR. METZNER: Let me add a little bit to that issue from the pricing perspective. First of all, we don't have information as to what the plaintiff's attorneys receive. So, out of any given award, we can separate that award between economic costs as best we can determine them and total award. So, clearly the plaintiff's attorney gets something. Does that vary by size? We don't know. So, that's issue number one.

The second issue is that we were dealing primarily with the limits from the primary insurer. There could very well have been excess insurers involved on some of the large cases. And so, therefore, our data set is incomplete in that area. That's always going to be a problem. There may also have been contributions from the actual tort feasor, because they ran out of insurance coverage, but had other assets to help pay for that claim. Again, we have no knowledge in that area.

So, while we observe a particular phenomenon and we believe that phenomenon is probably a real phenomenon, the magnitude of it, that is to say whether it's a two to one

recovery at, let's say, a $500,000 claim, we don't really know that. We're pretty sure it's less than four to one reported for the small cases for the reasons I have mentioned.

QUESTION: In New York, we've been required to collect that kind of data on the very largest cases for the last several years, and needless to say it is difficult because the insurers do not have all the information and maybe in malpractice there might be some information on what the attorneys are getting now, that there are some states that have schedules on the contingency fees. Maybe we'll see something in a few years on that.

MR. KIST: One last question. I'll ask that to the panel here. The question to the panel is with respect to your observations going forward. Do you view tort reform being over for the time being? If not, where and what areas and the types of tort reform, or perhaps lines of business? Gail, you might want to focus on medical malpractice.

MR. MILLER: I guess, I would hope that legislatures continue to look at the need and the wisdom of tort reform, particularly because it has been so effective in certain instances. On the other hand, making predictions that I wouldn't want to be quoted for, I would say that it's clear that the steam in the commercial lines of availability and affordability, which have generated many of the state actions in large measure, has now cooled down and no longer seems to be driving the picture. So, I would anticipate that that would no longer be a catalyst for the next several years.

On the other hand, the attention and focus does seem to have shifted to the personal lines of insurance in large measure where so far the solutions of tort reform, particularly no fault, haven't been carefully studied. There has been a lot more attention over the side issues, antitrust and pricing. I've got to believe that with stress that line is under, there is going to be a renewed focus in tort reform. It may be a different kind of tort reform than we've been generally talking about this morning and maybe more focused on alternative no fault type systems.

MS. TVERBERG: I think right now the kinds of reforms that we've seen in the '86-87 period are pretty much past. I think in 1988 what we saw was a number of states adopting immunity laws for particular segments of coverage and I suppose there may be a few of those things still going through. You know, the little league coaches, but then there are also certain kinds of municipalities. There are certain segments where they just say that unless there's some sort of gross negligence they are going to be exempt from suit all together. So, we've seen some of that kind of thing.

But without the pressure being there from the industry and from the purchasers of insurance, more importantly, I don't think we're going to be seeing reforms. If we see a return to the trend lines that we had prior to the last set of reforms and then the continued cost pressures, we're probably going to see another round of reforms and this round will be somewhat different. We may be getting more of the worker's compensation system type reforms.

In private passenger, that's a whole different situation. In the states that haven't adopted no fault, there may be some specific situations where that changes.

MR. METZNER: I think the kind of broad based reforms we've seen did arise out of the cost issues that the consumers, primarily business consumers, were facing. Those cost pressure haven't really abated all that much, although I think the rate of price changes within commercial lines certainly has decreased. Trends in price increases seem to be down at least temporarily, so the immediacy of some of that cost issue has gone away.

I think you'll see an emphasis on procedural reforms. There's still quite a bit that can be done in that area. It's not nearly an issue that has the pizzazz of what we have been faced with recently, but can be extremely important in controlling growth of future costs. I think it will be a more quiet effort.

At what point do you get a confluence of events that suggest we need to, as a society, take a very close look at who is being compensated on what basis? It is hard to say when that whole process gets started again.

I would point out, however, that the senate appears to be very close to passing some product liability reform. We'll see how far that goes in the house and whether that gets enacted into law. So, I think there is still movement there.

I think the kind of frantic movement that we have seen is not going to continue. But certainly, there is still desire for more reform. There is still a need. We need to think about where we want to go, and how many dollars are available. Frankly, the transaction costs within the current system are horrendous.

I think you can look at the ISO study and do some calculations. How much of the premium dollar eventually goes to actually indemnify for a net economic loss? I think you'd be rather surprised. It's not a very large figure. That's an issue I think people will have to deal with as they go down the road.

MR. KIST: We're about out of time. Before closing this session, I'd like you to do two things for me. First of all, please complete the evaluation form that you have in your package on this session. secondly, I'd like you to join me in showing the panel a sign of appreciation for the hard work they've put in.

(Applause)

1989 CASUALTY LOSS RESERVE SEMINAR

2G: MODELS OF CLAIM REPORTING PATTERNS

Moderator

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Panel

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Todd J. Hess
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MR. ACCOMANDO: We're ready to start. If we can keep it down a little. This is Session 2G, Models of Claim Reporting. I'm Frank Accomando. I work for Munich American Reinsurance Company.

What we're going to try to do today with the panel is discuss the use of probability models to estimate IBNR. We're actually going to focus on two aspects. First we're going to emphasize the practical aspects of estimating IBNR, kind of how it works if you will. And the second thing the panel is going to emphasize is to compare and contrast this report lag methodology to some of the more traditional or more common methods of estimating IBNR you may be familiar with.

Before we do that, last night at dinner, I was drafted to do a couple of quick exhibits for an overview. So, I'm going to do that right now.

(Slide)

Everybody can hear me with this microphone? In the back? Everything is okay.

The report lag methodology. I'm going to try to do this real quickly in two minutes and we're going to show how you do it in three easy steps.

Overview, the first step. You graph your data. So, what we have here is a histogram, along the X axis we have the lag in months, what we call the report lag, and that is the delay in months from the date of loss until the day the claim is reported. And then along the Y axis what you have is the frequency, simply the number of claims.

Now, of course, since this is for a given accident year, you can see the last claim out there at 120 months, think of that as today. And what our goal is, when we come back to this seminar next year to figure out how many claims are going to be to the right of that last one. So, that's step one.

(Slide)

Step two, once you've graphed the data, you fit a curve to the data. So, here you see we have this example. Can you read it? We've fit a Weibull distribution in this case, to this data. Lots of distributions are available. You can use Weibulls and Log Normals and Paretos and so on and so forth. Lots of ways to fit also. Maximum likelihood, least squares, as a method of last resort, you can pull out your French curve I guess. So, there's lots of ways to do that. So, step two, you fit a curve to the data. See, I said this was easy.

(Slide)

And step three. You then use that fitted curve to estimate the IBNR. So, very quickly, if N is the number of known claims, I is the number of IBNR claims, U is the number of ultimate, TP is the percent unreported. Therefore, 1 minus TP would be the percent reported.

You can write down a couple of simple algebraic equations. The number of ultimate claims equal the number of known divided by 1 minus TP or the percent unreported and the IBNR is equal to the percent unreported times that number of ultimate claims.

And we show an example here with 50 known claims and 40 percent being reported based on that fitted distribution. We just crank out the numbers and for that simple example, the number of IBNR claims would be 33.

So, that's the quick overview. And the panel will now give you the finer points.

Our first speaker is Todd Hess. Todd has a BA in mathematics, which he received in 1983 from Yale University. He worked for a time at Prudential Reinsurance as an actuarial student and currently is at Underwriters Reinsurance Company in California where he is assistant vice-president and associate actuary. He received his ACAS designation in 1989.

MR. HESS: My purpose today is to tie in the report lag method to some of the methods you might be more used to. We come from a lot of different backgrounds. A lot of us on this panel came from Pru Re where we used the report lag methodology extensively. And when we used it we got used to calculating IBNR by fitting curves and selecting accident periods.

I know a lot of you use a Bornhuetter-Ferguson type calculation or similar expected loss method. Also, many people are using a straighforward loss development method.

My purpose is to show you how something I call a finite or a discrete report lag methodology is really similar to the Bornhuetter-Ferguson method. Additionally, in some specific cases, it is also the loss development method.

The purpose of this is to make some of the report lag methodology's interesting features more accessible. Bob and Ernie will discuss the interesting features.

(Exhibit 1)

I want to start with report lag method assumptions and in particular go through reasons for each of these assumptions for the report lag method that Frank briefly overviewed. A few of these assumptions are saying we need to have a common underlying process. One of the things that you need for that is a homogeneous group. If the group is not homogeneous, the relative number of different kinds of contracts should be stable over time.

Let me get out my fancy pointer so you can see where I am on the exhibit.

Assumption Two: case reserves are adequate. The reason that that is necessary in the report lag methodology is that it is a count times amount method. It is not necessarily an overly restrictive condition since there are a lot of adjustments you can make to your known case reserves to make them adequate. For example, you can adjust case reserves using report year triangles before selecting a severity.

Assumption Three: there exists an exposure base with a constant underlying average loss ratio for the group. This assumption helps insure that the data you have for an accident period is generated by a common underlying process. We're calling the process an average loss ratio. Note that although "loss ratio" suggests you're using premium as your exposure base you very well may use some other base.

Assumption Four: there exists a common underlying claim reporting pattern.

Assumption Five: size of claim and report lag are independent. The reason that that is important is that otherwise the report lag and the case reserves will be correlated and you'll have a lot of problems with statistical properties of the tail distribution.

Now consider the assumptioons underlying the discrete report lag methodology. Perhaps some of you have heard of this as the Cape Cod method. The roots pre-date references I've seen to Cape Cod, however. We will develop this method from the report lag assumptions by dropping two assumptions and generalizing others.

We still need homogeneous groups. But we drop assumption two, the case reserves being adequate, and five, size of claim and report lag being independent. Instead we make the development assumption more general. Specifically, assume there is a common underlying development pattern that applies to all the years.

So, even if there is case development, it is reflected in the overall development pattern. It's no longer just a report lag pattern. This also handles the situations of larger losses coming in later or sooner than other losses.

The third assumption regarding a common underlying loss ratio is used for this method. In my experience with a reinsurance company, our exposure base is virtually always premium. And so we adjust it with something I call a market index factor. The common underlying loss ratio, then, is possible because losses are measured against this adjusted premium to make the premium a more consistent exposure base.

Turn to Exhibit 2.

(Exhibit 2)

A Bornhuetter-Ferguson type estimate. I am going to go through this to remind you of how this method works. Try not to be bothered by the simplistic selections -- the examples is for illustrative purposes only.

We start off with earned premium in column one. That's just historic premium. Column two is the initial loss ratios. This is one of the two most important fields. Initial loss ratio can be viewed as your a priori estimate of how the ultimate losses will come in. It does not necessarily include any consideration for losses already reported.

There are several ways to estimate an initial loss ratio. You might use a prior estimate from the same group or company-wide data. Even with other adjustments there is the risk that that can be too arbitrary.

The second key field is the reporting pattern seen in Column 3. The reporting patterns typically come from an age to age triangle, but there's nothing that precludes the reporting pattern coming from a count triangle or maximum likelihood estimate of report lags where you mix in something for severity.

Oftentimes, expected loss IBNR methods are used when you don't have enough credible data. This often occurs for low frequency business. The reporting pattern cannot be determined from historical development and industry type data like RAA must be used.

And, in fact, even if you have a lot of experience, you typically might use RAA data to pick a tail factor.

Expected Incurred in column 4 is equal to the earned premium times the initial loss ratio times the percent reported. That's what you would have expected if your initial loss ratio were going to be your ultimate loss ratio, rather than your initial just being used for the IBNR part.

You'll notice that the expected incurred doesn't match the known incurred in column 5, either by year or even in total, in this particular case. You might say, "Are we happy with that?" and the answer is, "It depends, do you trust your initial loss ratios, and do you trust your reporting pattern." If you trust either of them enough, you could adjust the other one to make it work out by year.

In a loss development method, for example, you believe your reporting pattern for every year, then you can take your known incurred and your reporting pattern to develop ultimate. Your expected loss equals your known incurred and you could come up with your actual projected ultimate loss ratio to use as your initial loss ratios.

But they don't match by year. And another way of viewing that is that you're not giving credibility to the known experience. Instead you believe your initial loss ratios and your reporting pattern.

The IBNR, column 6, is just a calculation that Frank was showing earlier. Namely you take your initial loss ratio times earned premium times tail probability. Earned premium times initial loss ratio is a view of ultimate which multiplied times the percent unreported (or tail probability) leaves IBNR. Ultimate incurred, column 7, equals known incurred plus IBNR.

Column 8, ultimate loss ratio equals ultimate incurred divided by earned premium.

(Exhibit 3)

Now, the contrast. Here is the report lag type estimate. It starts off with earned premiums. Column 2 is the key field called market index. It is necessary to achieve our condition that we have a common underlying process. If we're going to estimate it using a loss ratio, we have to adjust the premium so that it is reflective of a consistent exposure base.

My claim here is that this is more objective than picking an initial loss ratio. You're going through the same of steps, but I think that you can be more objective in getting a market index. Details of estimating a market index is beyond the scope of my talk, but some things that are useful are looking at historic pricing information or having a rate relativity index. In fact, those things are probably worth doing even if you're not using it for reserving, just to have a good idea of where your business is.

Secondly, I'd argue that even if the market index is subjective, it will be to some extent, the fact that it is independent from the ultimate loss ratio makes it a meaningful thing to calculate. It gives a little more reliability to your reserve estimates because you're not picking a market index factor knowing exactly how it will affect the results. So, independence is an important feature of the market index.

Adjusted earned premium in column 3 equals premium times market index. Adjusted earned premium is the exposure base that lets me have a common underlying loss ratio.

Column 4, percent reported is the same as seen earlier. In a pure report lag method, we would have picked this through a count triangle with adjustments for the severity. Column 5, exposure weight. This is just an intermediate calculation to get an average percent reported. Field seven is just equal to the average percent reported weighted by these adjusted earned premiums. See the total of column 4.

The IBNR calculation then is the known incurred divided by this average percent reported to get ultimate and then multiply it times the percent unreported to see what the IBNR is. The key is that you must believe that the known incurred is fully credible for picking IBNR for this group of accident years.

Even though we group all the accident years together we're still developing them. We're developing them using an average percent reported, but we're getting our IBNR purely as a function of the reporting pattern weighted accorded to some appropriate adjustments and the known incurred.

We've achieved two things at this stage. One, we've estimated ultimate incurred from which we can backout the IBNR. Two, we've determined the average adjusted loss ratio that underlies this business. Because we're claiming that the process is random, no individual year is likely to hit that exact loss ratio. Results will be higher and lower. But on average that's what it would be.

Turn to Exhibit 4, columns 11 and 12, expected incurred versus known incurred. Expected incurred is different from the expected incurred on Exhibit 2, Bornhuetter-Ferguson. We don't use an initial loss ratio per se. Instead we use the overall loss ratio of 92.9 percent times adjusted earned premium. Otherwise, it's the same. Restating, we use adjusted earned premium now instead of historic premium, and we use the common underlying loss ratio instead of initial loss ratios. Expected incurred, column 11, equals column 5 times column 4 times field 10.

Notice that column 11 and column 12 are still different by year, but in total they are identical. They had to be equal because we forced the expected incurred to equal the known incurred based on how we picked the 92.9. loss ratio. We had total IBNR from the previous page and we now do an allocation. The allocation can be viewed in the same way as a Bornhuetter-Ferguson expected loss calculation, namely we take our adjusted earned premium times this overall loss ratio, the 92.9 percent, times the percent unreported for each year.

If you separate the adjusted premium step, you could view the market index factor times the 92.9 overall accident period loss ratio as what an initial loss ratios would have had to have been to produce the identical results. And that's really what the key connection is, market index times average adjusted loss ratios. To summarize, this average loss ratio for all years is what produces an initial loss ratio that makes the two estimates equivalent.

You see, in column 5 that there is a big range in ultimate loss ratios. I should say, first of all, that they are calculated using actual earned premium instead of adjusted earned premium. Column 16 shows the ratios against adjusted earned premium. The variance between years is much smaller. In addition, you can believe from column 16 that a common underlying process may be at work. The spread around 91.9 is fairly tight and could well be random.

On the other hand, the last two years are bigger than the others, particularly the last one. Perhaps this accident period does not exhibit one underlying process. That is a question you need to decide for yourselves.

One solution is to separate the periods into accident periods that you think do have the same underlying process. I'll zip through that on Exhibits 5 and 6.

(Exhibit 5)

These calculations are identical to the calculations that we just did, except now instead of doing it for all four years combined, we do it for two years combined. We still start with earned premium. The market index is identical. The main reason it can afford to be identical is because it's a relative index. It's relative to some base year, but you the base year does not matter for reserving purposes.

For other reasons you'd probably like to know the base year. The relativity carries through, the adjusted earned premiums are the same, but in this case we're averaging the two factors for '84 and '85, and the for '86 and '87 separately. We calculate a separate underlying average loss ratio by period.

This loss ratio, gives us losses that are a lot worse for '84 and '85. Because we're adjusting it, the average adjusted loss ratio fro 84 and 85 looks like it is a lot smaller than 86/87 even though our final loss ratios against historic premium are much bigger in the earlier period.

It is important to keep clear in your mind the distinction between things we're dividing by the adjusted earned premium instead of the actual earned premium. Here, we're saying there are different processes. One implies an 87% loss ratio against our adjusted exposure base. The other implies about 110%.

One other thing while I'm still on this page that I meant to mention earlier regarding the market index: You notice here our earned premium was going up from 10,000, 15,000 up to 27,000. By the time we put in our market index, the actual exposure has gone down.

If that makes sense, then you're okay. But that's another way to test the reasonableness of your market index. If it doesn't make sense you better be careful that your market index factors are not themselves too arbitrary in the same way initial loss ratios from Bornhuetter-Ferguson might have been.

(Exhibit 6)

Using the initial loss ratios from before, we do the allocation by accident period again. Our expected incurred for '84/'85 ties in, '86/'87 ties in. We get our IBNR the same way. Ultimate loss ratios, calculated using the adjusted earned premium (column 16) are close to the 87%. The other two are close to the 110% That is the key point here.

It is possible to go too far in dividing the total into accident periods. If we used this method and let each year be a separate accident period so that each year generates its own loss ratio, we get exactly a loss development method IBNR. If that's appropriate, and you have enough data for that, then that's all right, but it would probably have been easier to just calculate IBNR straight from the triangle.

	Report Lag As Intended *	As compromise with Bornhuetter-Ferguson technique
1)	Group of contracts is homogenous	same
2)	Case Reserves are adequate	dropped **
3)	There exists an exposure base (perhaps adjusted) with a constant underlying average Loss Ratio for the group	same, but exposure base of EP must be adjusted with Market Index factors
4)	There exists a common underlying claim reporting pattern	more general: there exists a common underlying incurred development pattern--not just claim reporting but case development also
5)	Size of claim and report lag are independent	dropped **

* *Ed Weissner, "Evaluation of IBNR on a Low Frequency Book where the Report Development pattern is still incomplete." CLRS 1981*

** *Dropping these two assumptions kills the interesting statistical properties of the report lag method. Although one still assumes a random process in the loss development, there is no longer independence of development with prior development. One is left with a usable, but less statistically defensible reserve estimate.*

A Bornhuetter-Ferguson type estimate

Accident Year	(1) Earned Premium	(2) Initial LR	(3) % Rept'd	(4) Expected Incurred	(5) Known Incurred
1984	10,000	1.750	0.735	12,863	14,684
1985	15,000	1.000	0.617	9,255	11,720
1986	24,000	0.650	0.441	6,880	6,016
1987	27,000	0.600	0.272	4,406	6,309
Total	76,000	0.846		33,404	38,729

Accident Year	(6) IBNR	(7) Ultimate Incurred	(8) ULR
1984	4,638	19,322	1.932
1985	5,745	17,465	1.164
1986	8,720	14,736	0.614
1987	11,794	18,103	0.670
Total	30,897	69,626	0.916

(2) A priori selection, no credibility given to actual loss experience. Often based on similar company or industry loss ratios or prior estimates of same group.
(3) From Loss Development Triangle or related industry or company development.
(4) = (1)x(2)x(3)
(6) = (1)x(2)x(1-(3))
(7) = (5)+(6)
(8) = (7)/(1)

A Report Lag type estimate

Accident Year	(1) Earned Premium	(2) Market Index	(3) Adjusted EP	(4) % Reported	(5) Exposure Weight
1984	10,000	2.250	22,500	0.735	16,538
1985	15,000	1.500	22,500	0.617	13,883
1986	24,000	0.650	15,600	0.441	6,880
1987	27,000	0.600	16,200	0.272	4,406
Total	76,000	1.011	76,800	0.543	41,706

(6)	Known Incurred	KI	38,729
(7)	Average Percent reported	1-W	0.543
(8)	Total IBNR	KI*W/(1-W)	32,589
(9)	Projected Ultimate		71,318
(10)	Average Adjusted Loss Ratio		0.929

(2) Market Index is fundamental to preserving assumption 3 that requires the group to have a constant average underlying loss ratio against the exposure base. By adjusting EP with these index factors, one can calculate the average loss ratio as above.

The relativity of the indices is all that matters. Although current rate adequacy is the base in the example, one could easily normalize them to average 1.000.

(3) = (1)x(2)

(4) From Loss Development Triangle, industry development, report lag MLE adjusted for Case development, etc.

(5) = (3)x(4)

(7) = Total (5)/Total (3)

Accident Year	(11) Expected Incurred	(12) Known Incurred	(13) IBNR	(14) Ultimate Incurred	(15) ULR	(16) LR to Adj. EP
1984	15,357	14,684	5,537	20,221	2.022	0.899
1985	12,892	11,720	8,002	19,722	1.315	0.877
1986	6,389	6,016	8,098	14,114	0.588	0.905
1987	4,092	6,309	10,952	17,261	0.639	1.065
Total	38,729	38,729	32,589	71,318	0.938	0.929

(11) = (5)x(10)
(12) Although it varies by year, Total Known equals Total Expected.
(13) = (3)*(1-(4))*(10)
(14) = (12)+(13)
(15) = (14)/(1)
(16) = (14)/(3)

A Report Lag type estimate

Grouping Accident Years 84-85, 86-87

Accident Year	(1) Earned Premium	(2) Market Index	(3) Adjusted EP	(4) % Reported	(5) Exposure Weight
1984	10,000	2.250	22,500	0.735	16,538
1985	15,000	1.500	22,500	0.617	13,883
1986	24,000	0.650	15,600	0.441	6,880
1987	27,000	0.600	16,200	0.272	4,406
84-85	25,000	1.800	45,000	0.676	30,420
86-87	51,000	0.624	31,800	0.355	11,286
Total	76,000	1.011	76,800	0.543	41,706

			84-85	86-87
(6)	Known Incurred	KI	26,404	12,325
(7)	Average Percent reported	1-W	0.676	0.355
(8)	Total IBNR	KI*W/(1-W)	12,655	22,403
(9)	Projected Ultimate		39,059	34,728
(10)	Average Adjusted Loss Ratio		0.868	1.092

(3) = (1)x(2)
(5) = (3)x(4)
(7) = Subtotal (5)/Subtotal (3)

Grouping Accident Years 84-85, 86-87

Accident Year	(11) Expected Incurred	(12) Known Incurred	(13) IBNR	(14) Ultimate Incurred	(15) ULR	(16) LR to Adj. EP
1984	14,354	14,684	5,175	19,859	1.986	0.883
1985	12,050	11,720	7,480	19,200	1.280	0.853
1986	7,513	6,016	9,523	15,539	0.647	0.996
1987	4,812	6,309	12,879	19,188	0.711	1.184
84-85	26,404	26,404	12,655	39,059	1.562	0.868
86-87	12,325	12,325	22,403	34,728	0.681	1.092
Total	38,729	38,729	35,058	73,787	0.971	0.961

(11) = (5)x(10)
(13) = (3)*(1-(4))*(10)
(14) = (12)+(13)
(15) = (14)/(1)
(16) = (14)/(3)

Comparison of Bornhuetter-Ferguson and Report Lag Reserving Methods

1. Development Pattern

A. Report Lag methodology

- Claim count maximum likelihood estimate
- Severity separately using report year development triangle applied directly by accident period or as function of expected emergence pattern
- Tail factor automatic (MLE of theta conditional on maximum observable lag is same as unconditional theta)
- Continuous development pattern based monthly data

B. Bornhuetter-Ferguson (Expected loss methods)

- Typically use loss develpment triangle for total incurred
- Can do count separately from amount--usually with age to age analysis
- Tail factor through curve fitting, industry development, or other methods
- Discrete development pattern

2. IBNR calculation

A. Report Lag methodology

- Divide data into accident periods to preserve integrity of assumptions
- Calculate an average tail factor W
  W=sum(EPi*MIi*TPi)/sum(EPi*MIi)
  EP=earned premium for year i
  MI=market index for year i
  TP=tail probability (percent unreported) for year i
  Note: EPi*MIi used for exposure rather than the more general EXi
- IBNR count by accident period=known count * W/(1-W)
- IBNR count by year = IBNR count for accident period * (EPi*MIi*TPi)/sum(EPi*MIi)
- Let FR=(known count/(1-W))/sum(EPi*MIi) then IBNR count = EPi*MIi*TPi*FR

- If assume a fixed severity S, then IBNR dollars = IBNR count*S
  and FR*S=LR, therefore IBNR dollars = EPi*Mli*TPi*LR
- Mli can be estimated using several sources such as survey
  of underwriters, historic price monitoring, review of
  historic price adequacy, or industry loss ratios

B. Bornhuetter-Ferguson (Expected loss methods)

- Select expected loss ratios (LRi) by year
- IBNRi = EPi*LRi*TPi
- LRi (from BF) can easily be viewed as Mli*LR (from RL)
- One could group accident years using BF or LDF methods
  and calculate a W

3. Additional comments

- Reporting pattern of when losses are reported makes
  severity as a function of report date easy to apply
- Easy to project expected emergence, test runoff
- Monthly IBNR updates: Mli*LR for newly earned premium,
  take down IBNR either as losses were expected to emerge
  or as they actually emerge, continuous develpment pattern
  so no need to interpolate for expected reported

4. Conclusion

- The report lag methodology is nice theoretically.
  It may not be worth the effort to develop the systems
  and fit report lags for many IBNR studies. However, the model
  provides a very convenient framework for handling a lot of
  reserving issues. Because the Bornhuetter-Ferguson method
  that many of us use is so similar to the report lag
  model, we can benefit from many of the extensions that are
  obvious in the report lag context.

With the report lag method there is a risk that you're going to come up with unreasonable answers. In particular, you need to be careful of immature years. You also need to be careful of the accident period split. With the immature years there's a tendency to give too much credibility to good experience. The IBNR will be too small that way.

A good reasonableness test is to use other methods. A second important thing to do is to look at the ultimate loss ratios against the actual premium, not just against the adjusted premium, and see if they make sense or not.

One other important extension of the report lag here is that it makes it fairly easy to combine an initial loss ratio into the result using a credibility formula.

This is literally a compromise of the two methods. We say IBNR equals the credibility that we're giving the known losses, times the known incurred over our average percent reported (1-W in the literature) to give ultimate times our percent unreported (W). This is an average for an accident period times our percent unreported, plus a compliment of credibility times the earned premium times whatever you think your initial loss ratio should be times the percent unreported. IBNR = Z x KI x W/(1-W) + (1-Z) x EP x LR x W

The left hand side excluding the Z, is equal to the report lag estimate. And the right hand side could be viewed as the Bornheutter-Ferguson type estimate. And there we get our compromise.

So, the other two exhibits (7 + 8) are for reference and they discuss a pure report lag method that preserves several statistical properties. That's all I have to say. My goal was to make it so that the stuff that Bob and Ernie have to say will feel a little more accessible if you're not from a report lag background.

Questions will be put off until the end if there are any.

MR. ACCOMANDO: Okay. Thanks, Todd. Our next speaker is Ernie Wilson. Ernie received his bachelors in French and Mathematics in 1981 from Trinity College. He has an MS in Mathematics from Emory University in Atlanta. He has worked at Hartford Insurance Group, Prudential Reinsurance Group. Currently he is an actuarial director at Reliance National Risk Specialists where his responsibilities though are mainly in the pricing area. He does from time-to-time work on the reserving. And Ernie received his ACAS designation in 1987. Ernie?

MR. WILSON: The main purpose of this section is to cover the report lag methodology, not from an analytical perspective, but rather to use -- once the parameters have been determined -- the methodology to calculate the IBNR. Many items fall out easily from this method to make comparisons between expected emergence of the IBNR and the actual emergence simpler. We will look at simulated data evaluated as of June 30, 1989 and compare the estimate of IBNR to emerge in the year subsequent to June 30, 1989 with the amount actually emerging from the simulation.

First, let's briefly describe the exhibits. Exhibit I describes the coverage being offered and the assumptions which underlie the analysis. Exhibit II lists all the losses known at June 30, 1989 with the date of loss, the report date (actually the date when the loss exceeded the retention of the treaty as evaluated by the reinsurer) and the amount of that loss. We assume, for ease of later computations, that the incurred loss will neither develop upward nor downward. Later, you will see all the claims which will emerge since the data has been simulated. Exhibit III provides traditional incurred, count, and severity triangles. Respective age-to-age (ATA) factors are shown at the bottom of each exhibit. The next exhibit contains the parameter selection process. Exhibit V both describes the selected process and provides the IBNR estimate. The comparison between the expected and actual emergence between June 30, 1989 and July 1, 1990 is located in Exhibit VI. Exhibit VII provides the underlying

process used to generate the claims along with age-to-age factors implied by the process. The final exhibit compares "actual IBNR claims" with what we have predicted from this example.

The example contains 122 claims for accident years 1984 through 1987 evaluated at June 30, 1989. The reserve to be calculated is for the layer: $750,000 xs $250,000. Loss adjustment expense is excluded from this analysis.

Now, let's see if the example here meets the assumption criteria of the Report Lag Method presented by Todd. The group being reinsured is premises/operation risks, all having $1,000,000 policy limits and a common reinsurance attachment point. Therefore, we have homogeneity. We have said that reserves were adequate. We will make the assumption that the exposure base over the four year period is constant. We have assumed that claim's size and report lag are independent. Finally we assume that there is a common claim reporting pattern for each accident period.

Since known claims reserves put up by the claims department are assumed to be correct, we are estimating pure IBNR. Further analysis of the reported claims may be performed to true up the known loss reserve if the reserves are either inadequate or redundant. The purpose in making sure that the known claims have proper valuations is that this group of claims will be used to calculate an average claim size for the layer, which will then be

multiplied by the IBNR claim count to obtain the IBNR loss reserve.

Todd mentioned that the loss ratio needs to be constant for the Report Lag Method to work properly. Since claim size is assumed independent of report lag for a policy period, the requirement for a constant loss ratio is equivalent to requiring the claim frequency to be constant per unit of exposure. One can adjust the actual exposure to obtain constant frequency via the market index factors. In addition, since the loss reserves are assumed adequate and there is independence between the size of loss and the report lag, the frequency triangle and incurred loss triangle in Exhibit III should then produce identical results.

We are now ready to begin the parameter selection process. First, let us look at the histograms of report lags on page 1 of Exhibit IV. Remember that the report lag, in months, is the distance in time between the accident date and the report date. The lags are arranged into intervals of three months (page 1a) or six months (page 1b). To the left of the dark solid vertical line no further change in the histogram will be observed. For example, all occurrences in accident year 1984 not reported at June 30, 1989 will have report lags in excess of 54 months. For accident year 1985, there will be no additional claims having lags of 42 or fewer months. There is a similar point for the remaining two accident years.

The purpose of the histograms is to notice visually if any changes occur from accident year to accident year. When the claims are divided up into intervals of three months, one notices that for accident years 1984 and 1985, no claims are reported to the reinsurer within three months of their occurrence. However, the final two accident years show significant reporting activity within three months of claims' occurrence dates. If we look at the claims divided into intervals of six months in length, one starts to see another type of difference. For the first two accident periods, there appear to be hump in the data although at different times. It should also concern us that accident year 1985 shows two major humps: one found for report lags between 30 and 36 months and the other for lags between 42 and 48 months. But, the final two years show a relatively slow descent in the number of claims being reported as the report date moves away from the accident date. This is particularly true of accident year 1987. It would now appear that we might wish to divide the four year accident period into two periods for the claim development analysis.

What we have noticed is that the report lag distribution for accident years 1984 and 1985 is defined well by either a lognormal distribution or a Weibull distribution with shape parameter greater than one. The remaining accident years, 1986 and 1987, would appear to have been generated by a process defined by an exponential report lag distribution or a Weibull report lag distribution with shape parameter less than unity. The histograms

seem to indicate at least two different processes and we should, at a minimum, try to fit a distribution to each of these two accident periods -- period one being accident years 1984 and 1985 and period two being accident years 1986 and 1987.

Page 2 of Exhibit IV lists the selected lags for each of the accident periods. The claims occurring in the first period, accident years 1984 and 1985, fit a Weibull distribution with a 47 month average lag. The latter two years fit an exponential distribution having an average lag of 42 months. Now that we have each, we may see how the fitted distributions compare to the actual known lags by overlaying the fitted curve with the actual data in page 3 of Exhibit IV. Accident year 1984 appears reasonably well behaved whereas the next year is rather bizarre. The final two accident years do, however, seem to fit closely to the fitted distribution. You will be able to see just how well these selections were at the end of this presentation. You will be given the distributions which were used to generate the simulated data.

The purpose of fitting the known data is to provide a report lag distribution which will then be used to generate the IBNR claims for the group. Once we have this count, we will multiply it by the average claim size for the layer to arrive at the IBNR dollar amount.

The next step is, and I will go over it quickly, to calculate the average claim size. If you look at the severity triangle in

Exhibit III, you will notice that the average claim size for the four period combined is $317,000. As you go around the triangle you will observe very erratic results. I prefer selecting an average severity which comes close to the overall average, unless I happen to know the policy limits distribution for the various accident years.

For this example, I chose an average claim size of $320,000. Now getting ahead of myself, you will see at the end of the group of exhibits that the actual process generates an average claim size of $325,000. Thus, we will underestimate the IBNR since we understated the average severity.

Exhibit V lists a lot of information which is generated from the selected report lag distributions. Let w be the percent of an accident year's claims which are unreported per the selected report lag distribution, the quantity, 1 - w, is the percent reported. The age-to-ultimate (ATU) factor equals:

$$\text{ATU} = \frac{1}{\% \text{ Reported}} = \frac{1}{1 - w} .$$

The ATU factor gives you the ultimate claim count when it is multiplied by the known claim count. Multiplying the ATU factor by w provides you with that portion of known claims which is unreported. Define this product at the IBNR factor:

$$\frac{1}{1 - w} \times w = \frac{w}{1 - w}.$$

Page 1 of Exhibit V furnishes for the first accident period at each month of development in the first column: the quantity, 1 - w (column 2), w (column 3), the appropriate ATU factor (column 4), and the resultant ATA factor (column 5), which is the ATU factor to the left of the ATA factor divided by the ATU factor from the row just below. Page 2 provides the same information for the second accident period.

Now let's calculate the IBNR claim count. The appropriate months of development are 66 for accident year 1984, 54 for accident year 1985; 42 and 30 for the final two accident years in order. For this example I assume that exposure is constant. Further, I assume that the market index factors are unity. Thus, the true exposure to loss for the reinsurer is constant over all accident years.

Now let's see how we arrive at the percent unreported for accident year 1985 as found on page 3a of Exhibit V. Accident year 1985 is matured 54 months. The percent unreported, sometimes called the tail probability, for that level of development is 42.4% as found on page one. We will combine the first two accident years into one accident period, and, likewise, the final two accident years. We will then come up with the percent unreported for each of the two periods by weighing the w factor for the accident year with the level of exposure to the reinsurer. How may we do this? Another way to look at this is on page 3b of Exhibit V. First it

defines the reinsurer's exposure for any year to be that year's earned premium (EP) multiplied by that year's market index factor (MI). Then w is defined as a weighted average of each year's tail probability (TP) which is also that year's w.

The factor, w, in the first accident period equals 0.3572. It is the sum of the following two products divided by the sum of the products of each year's earned premium ($25,000,000 in each case) and its market index factor (unity in each case):

For accident year 1984: Earned premium ($25,000,000) times Market Index Factor (1.00) times w (0.2906)

For accident year 1985: Earned premium ($25,000,000) times Market Index Factor (1.00) times w (0.4239)

The weighted average of the percent unreported for the first accident period is 35.7% at June 30, 1989. Remember that the IBNR factors will be applied to known claim counts, i.e.,

$$\frac{w}{1 - w} \cdot$$

The known claim count for the first accident period is 76, found on page 3a of Exhibit V. The IBNR factor is .5557. This results in an IBNR claim count for the first accident period of 42.24. Multiplying this quantity by the selected severity of $320,000, the IBNR dollar amount is $13,500,000. Total IBNR for all four accident years is $28,300,000. One can then allocate the IBNR back

to accident year based on the weighting of the tail probabilities found in column 6 of page 3a.

As an aside, I want to touch upon a sensitive issue in this analysis. We have made an assumption about the market index factors. We assumed them to be unity in each year. This means that the expected frequency per unit of earned premium adjusted by the market index factors is constant. However, one may test the sensitivity of the IBNR to the market index factors. Suppose that the market index factors are:

Year	MI
1984	0.500
1985	1.000
1986	1.500
1987	1.000

As an example, this would mean that the frequency per unit of earned premium would double between accident years 1984 and 1985 and triple between accident years 1984 and 1986. Page 4 of Exhibit V shows that the IBNR increases approximately $550,000 out of an amount in excess of $28,000,000 by changing this assumption and keeping the same group of known claims. The purpose of this aside is to show you that for this simulation and selected accident year grouping of claims, the choice of the market index factor does not impact the final answer appreciably. However, the factor becomes much more important for data which extends to periods which are less mature than those found here.

Pages 5 through 8 of Exhibit V provide, by quarter end in the future, anticipated IBNR count emerging by quarter (column 4), the IBNR dollars emerging by quarter (column 5) and the cumulative totals of each of the above two quantities as measured from June 30, 1989 (columns 6 and 7). The final page of Exhibit V shows a triangle of incurred losses along with the ATA and ATU factors implied by the fitted distributions.

Now let's go to Exhibit VI. We have now arrived at the point where we monitor the emergence of the IBNR. For the first accident period, we have combined the cumulative expected claim count and amount emergence at the end of each quarter subsequent to the IBNR evaluation date of June 30, 1989. These items are found in the second and third columns of the exhibit. The final two columns show the actual cumulative emergence of the IBNR at June 30, 1989.

On June 30, 1990, we expect 13.9 claims and $4,440,000 to emerge from the IBNR at June 30, 1989 for the first accident period. At June 30, 1990, fifteen claims have emerged from the first accident period and they have a value of $5,280,000. Although we were successful in anticipating the actual claim count emergence, the average severity appears to have been significantly underestimated. This problem also occurs in the second accident period as shown on page 2 of Exhibit VI. Overall, for both accident periods, the expected IBNR claim count emergence in the year subsequent to June 30, 1989 is practically identical with the

actual IBNR claim count emergence. However, the dollar amount is off by over $1,700,000. The average claim size of the actual emerged claims is $390,000, or 22% above the average severity used to calculate the IBNR.

The true underlying severity distribution, predicts an average claim size to the layer of $325,000. Looking at distributions most often used for severity estimation, you will notice that the results are not reasonable. If this particular case is a process which follows a single parameter pareto, the value of the parameter would have had to have been less than unity to yield an average claim size of $390,000 to the layer of $750,000 xs $250,000. If the process were lognormal, the coefficient of variation would need to exceed 40. Given the risks reinsured, premises/operations general liability, neither the lognormal nor the single parameter pareto mentioned seem reasonable. We may deduce that the poor results in predicting this emergence are due merely to chance and not reflective of the actual underlying process.

The final exhibits in the package deal with the underlying process and the actual simulated emergence. Exhibit VII lists the true underlying process used to simulate each claim's report lag and severity, and compares this set of development factors with the development factors implied by the fitted distribution. Page 4 of this exhibit shows the IBNR amount which would have been generated if we had used the distributions used to generate the lags and the

same average claim size as was chosen earlier. This would have yielded an even greater underestimation of the actual emergence.

Finally, Exhibit VIII, page 1 lists all of the IBNR claims, their date of actual emergence in the future and their incurred amount to the layer reinsured. The second page of this exhibit lists the true IBNR count and amounts to emerge.

This completes my presentation. Thank you.

Exhibit I

C L R S E X A M P L E

DETAILS

1.	Group reinsured:	Premises/operations risks
2.	Layer reinsured:	$750,000 xs $250,000, excludes ALAE
3.	Coverage Period:	Accident years 1984 through 1987
4.	Simulation:	Process simulated includes: 1. Claim counts for accident years 2. Occurrence dates 3. Report dates, as function of accident year 4. Claim size, excluding ALAE

ASSUMPTIONS

1.	Frequency:	The expected exposure to loss, i.e., the expected claim count above the retention, for the layer reinsured is constant over the coverage period and constant within each accident period
2.	Severity:	Size of loss distribution remains fixed throughout the coverage period
3.	Reporting Patterns:	Process for a given accident year, although unknown, is fixed
4.	Reserves:	Losses are reserved at ultimate level when first reported

CLRS EXAMPLE

DATE OF LOSS	REPORT DATE	INCURRED LOSS
January 1984	April 1985	$676,635
August 1984	April 1985	266,214
December 1984	July 1985	750,000
February 1984	August 1985	750,000
April 1984	August 1985	24,025
October 1984	August 1985	198,154
June 1985	August 1985	750,000
February 1984	September 1985	18,312
February 1985	January 1986	254,758
April 1984	February 1986	44,066
July 1984	February 1986	144,960
November 1984	February 1986	750,000
October 1985	February 1986	30,571
July 1984	March 1986	618,531
August 1984	March 1986	112,013
November 1985	March 1986	750,000
March 1985	April 1986	52,522
July 1985	April 1986	22,583
November 1985	April 1986	750,000
January 1984	May 1986	192,434
April 1984	May 1986	651,211
May 1986	May 1986	3,646
August 1984	June 1986	167,245
October 1984	June 1986	750,000
December 1985	June 1986	54,990
June 1984	July 1986	6,490
November 1984	July 1986	144,093
July 1986	July 1986	6,534
May 1985	August 1986	750,000
July 1986	October 1986	131,507
November 1984	November 1986	750,000
April 1985	November 1986	147,353
May 1985	November 1986	11,884
August 1985	November 1986	603,841
November 1986	November 1986	750,000
May 1984	December 1986	8,338
March 1984	January 1987	748,771
September 1984	January 1987	16,416
March 1986	January 1987	72,492
April 1984	February 1987	118,436
December 1984	February 1987	248,681
December 1986	February 1987	320,776
January 1985	March 1987	282,886
August 1986	May 1987	169,120
May 1987	May 1987	750,000
March 1984	June 1987	137,979
August 1984	June 1987	351,352
November 1986	June 1987	50,425
August 1984	July 1987	367,293
January 1986	July 1987	528,546

DATE OF LOSS	REPORT DATE	INCURRED LOSS
September 1986	July 1987	$750,000
December 1984	August 1987	278,752
March 1986	August 1987	14,812
June 1986	August 1987	425,209
February 1987	August 1987	125,528
February 1987	August 1987	48,892
August 1984	October 1987	464,380
June 1986	October 1987	145,200
September 1987	October 1987	95,921
March 1984	November 1987	608,098
August 1984	November 1987	150,995
April 1985	November 1987	78,280
September 1985	November 1987	83,350
January 1986	November 1987	12,316
October 1987	November 1987	750,000
October 1987	November 1987	15,267
January 1985	December 1987	693,028
April 1985	December 1987	447,278
April 1985	December 1987	45,136
January 1986	December 1987	194,127
April 1985	January 1988	750,000
December 1986	January 1988	750,000
May 1987	February 1988	449,862
June 1987	February 1988	48,671
September 1987	February 1988	319,377
December 1987	February 1988	750,000
March 1984	March 1988	358,524
July 1984	March 1988	185,898
September 1984	March 1988	62,499
October 1984	March 1988	137,578
September 1985	March 1988	20,816
September 1986	March 1988	122,077
November 1987	March 1988	37,967
June 1984	April 1988	146,106
October 1984	April 1988	12,373
June 1985	April 1988	169,535
November 1986	April 1988	21,879
March 1984	May 1988	750,000
May 1985	June 1988	320,542
October 1985	June 1988	441,706
December 1987	June 1988	51,445
October 1984	July 1988	750,000
February 1986	July 1988	45,233
September 1987	July 1988	175,299
January 1984	August 1988	202,371
January 1985	August 1988	254,483
October 1986	August 1988	42,232
July 1987	August 1988	196,725
March 1987	September 1988	7,880
September 1987	September 1988	57,282

CLRS EXAMPLE

DATE OF LOSS	REPORT DATE	INCURRED LOSS
September 1985	November 1988	$750,000
October 1985	November 1988	750,000
March 1987	November 1988	637,113
September 1987	November 1988	308,106
May 1984	December 1988	383,184
April 1986	December 1988	335,920
July 1987	December 1988	129,236
April 1985	January 1989	188,743
May 1985	January 1989	45,261
April 1987	January 1989	555,765
May 1985	February 1989	368,504
May 1986	February 1989	22,476
November 1987	February 1989	681,274
April 1984	March 1989	750,000
April 1985	March 1989	58,537
May 1985	March 1989	724,831
January 1987	March 1989	117,299
February 1984	May 1989	432,120
July 1985	May 1989	318,967
November 1985	May 1989	750,000
February 1986	June 1989	750,000
July 1986	June 1989	351,541

CLRS Example

Year	Exposure	Claim Count @ 6/30/89	Incurred Losses(000's) 6 mos	12 mos	18 mos	24 mos	30 mos	36 mos	42 mos	48 mos	54 mos	60 mos	@ 6/30/89
1984	25,000,000	43	0	0	943	2,683	6,114	7,023	8,664	10,514	12,167	13,502	14,685
1985	25,000,000	33	0	750	2,665	4,179	4,461	5,805	7,511	9,266	11,720		11,720
1986	25,000,000	24	4	892	1,505	3,575	4,469	4,892	6,016				6,016
1987	25,000,000	22	750	1,786	3,443	4,955	6,309						6,309

Age-to-Age Factors

Year	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	60-66
1984	***	***	2.845	2.279	1.149	1.234	1.214	1.157	1.110	1.088
1985	***	3.553	1.568	1.067	1.301	1.294	1.234	1.265		
1986	223.000	1.687	2.375	1.250	1.095	1.230				
1987	2.381	1.928	1.439	1.273						

Age-to-Age Factors

	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	60-66
Unweighted										
All Year Ave	112.691	2.389	2.057	1.467	1.182	1.252	1.224	1.211	1.110	1.088
3 Year Ave	112.691	2.389	1.794	1.197	1.182	1.252	1.224	1.211		
Middle Ave	***	2.620	1.972	1.262	1.149	1.234				
Weighted										
All Year Ave	4.546	2.496	1.799	1.387	1.178	1.252	1.223	1.208	1.110	1.088
3 Year Ave	3.552	2.221	1.669	1.199	1.178	1.252	1.223	1.208		
Middle Ave	***	2.540	1.859	1.264						

CLRS Example

Year	Exposure	Claim Count @ 6/30/89	Counts 6 mos	12 mos	18 mos	24 mos	30 mos	36 mos	42 mos	48 mos	54 mos	60 mos	@ 6/30/89
1984	25,000,000	43	0	0	2	8	16	20	26	31	38	41	43
1985	25,000,000	33	0	1	8	12	13	18	23	26	33		33
1986	25,000,000	24	1	4	8	15	18	21	24				24
1987	25,000,000	22	1	6	12	19	22						22

Year	Age-to-Age Factors 6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	60-66
1984	***	***	4.000	2.000	1.250	1.300	1.192	1.226	1.079	1.049
1985	***	8.000	1.500	1.083	1.385	1.278	1.130	1.269		
1986	4.000	2.000	1.875	1.200	1.167	1.143				
1987	6.000	2.000	1.583	1.158						

	Age-to-Age Factors 6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	60-66
Unweighted										
All Year Ave	5.000	4.000	2.240	1.360	1.267	1.240	1.161	1.248	1.079	1.049
3 Year Ave	5.000	4.000	1.653	1.147	1.267	1.240	1.161	1.248		
Middle Ave	***	5.000	1.688	1.179	1.250	1.300				
Weighted										
All Year Ave	5.500	2.727	1.800	1.278	1.255	1.237	1.163	1.246	1.079	1.049
3 Year Ave	5.000	2.545	1.643	1.152	1.255	1.237	1.163	1.246		
Middle Ave	***	3.200	1.688	1.176						

CLRS Example

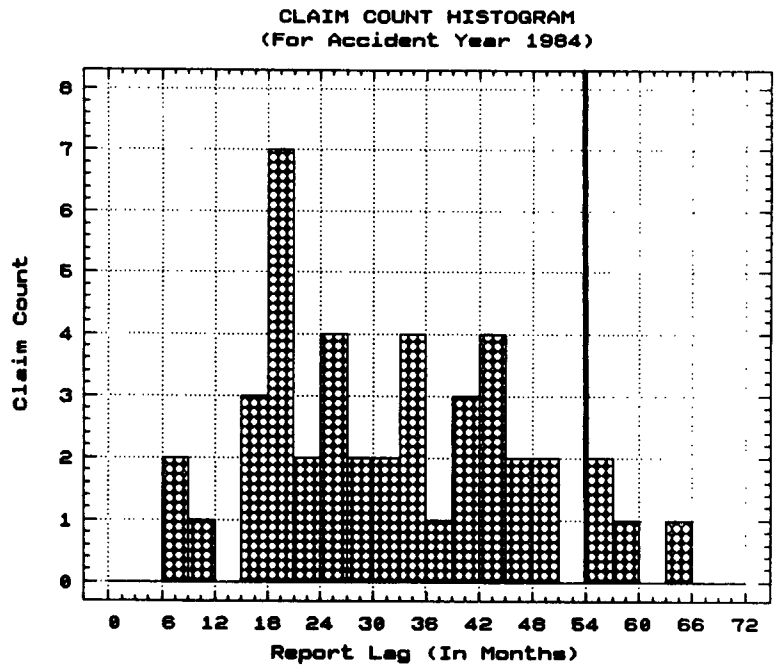
Year	Exposure	Claim Count @ 6/30/89	Severities (000's) 6 mos	12 mos	18 mos	24 mos	30 mos	36 mos	42 mos	48 mos	54 mos	60 mos	@ 6/30/89
1984	25,000,000	43	***	***	472	335	382	351	333	339	320	329	342
1985	25,000,000	26	***	750	333	348	343	323	327	356	355		355
1986	25,000,000	21	4	223	188	238	248	233	251				251
1987	25,000,000	19	750	298	287	261	287						287
												Average	317

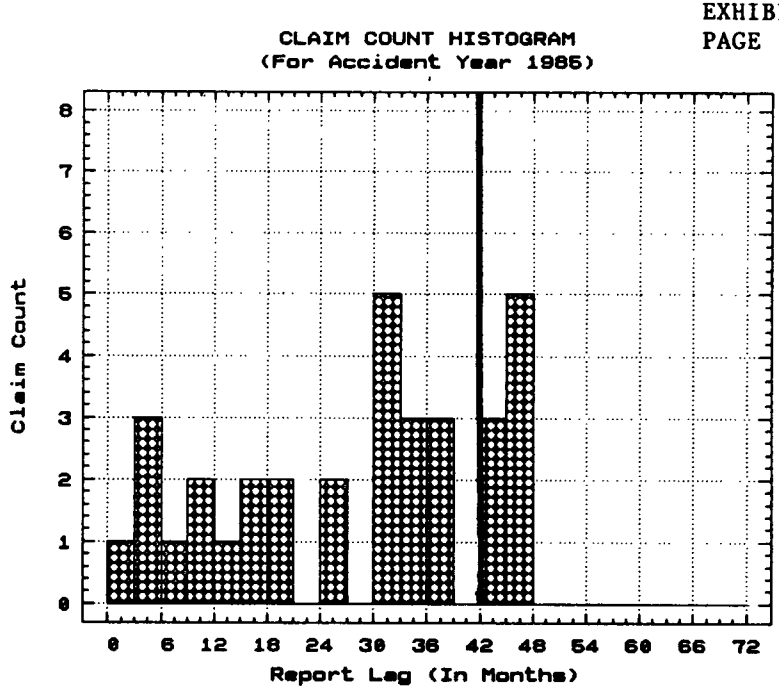
Age-to-Age Factors

Year	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	60-66
1984	***	***	0.711	1.139	0.919	0.949	1.018	0.944	1.029	1.037
1985	***	0.444	1.045	0.985	0.940	1.013	1.091	0.997		
1986	55.750	0.844	1.267	1.042	0.938	1.076				
1987	0.397	0.964	0.909	1.100						

Age-to-Age Factors

	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	60-66
Unweighted										
All Year Ave	28.073	0.751	0.983	1.067	0.932	1.013	1.055	0.970	1.029	1.037
3 Year Ave	28.073	0.751	1.074	1.042	0.932	1.013	1.055	0.970		
Middle Ave	***	0.644	1.156	1.071	0.919	0.949				
Weighted										
All Year Ave	1.685	1.007	0.924	1.066	0.931	1.004	1.054	0.971	1.029	1.037
3 Year Ave	0.691	0.636	1.049	1.036	0.931	1.004	1.054	0.971		
Middle Ave	***	0.536	1.125	1.072						


CLAIM COUNT HISTOGRAM
(For Accident Year 1984)
Claim Count
0 1 2 3 4 5 6 7 8
0 6 12 18 24 30 36 42 48 54 60 66 72
Report Lag (In Months)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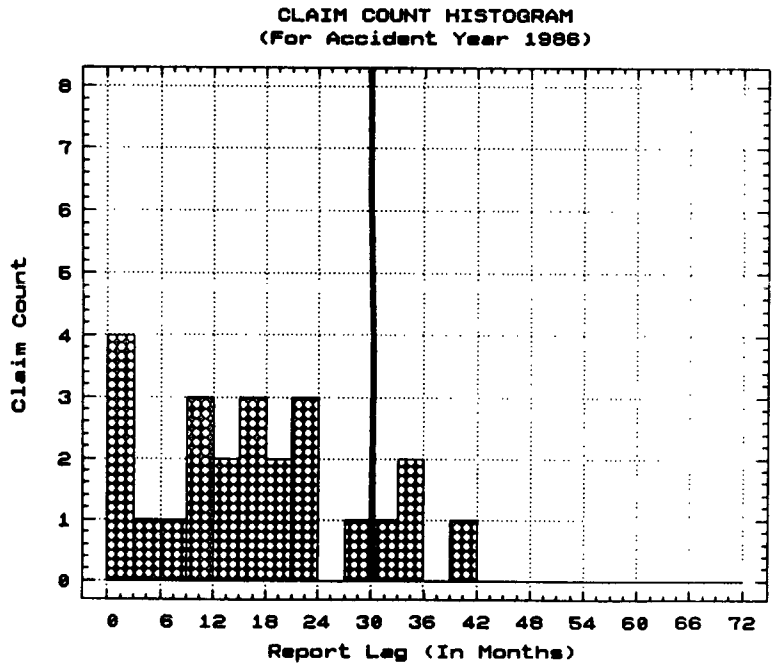
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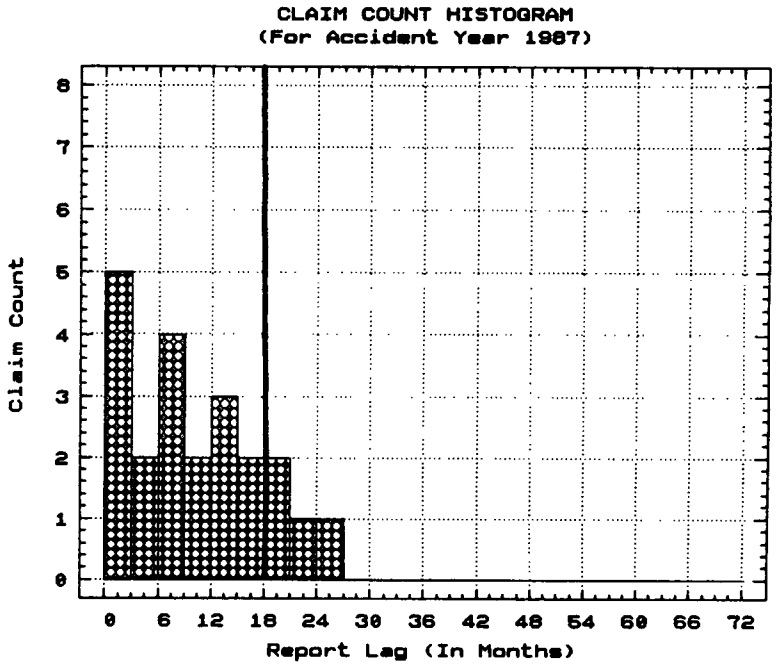
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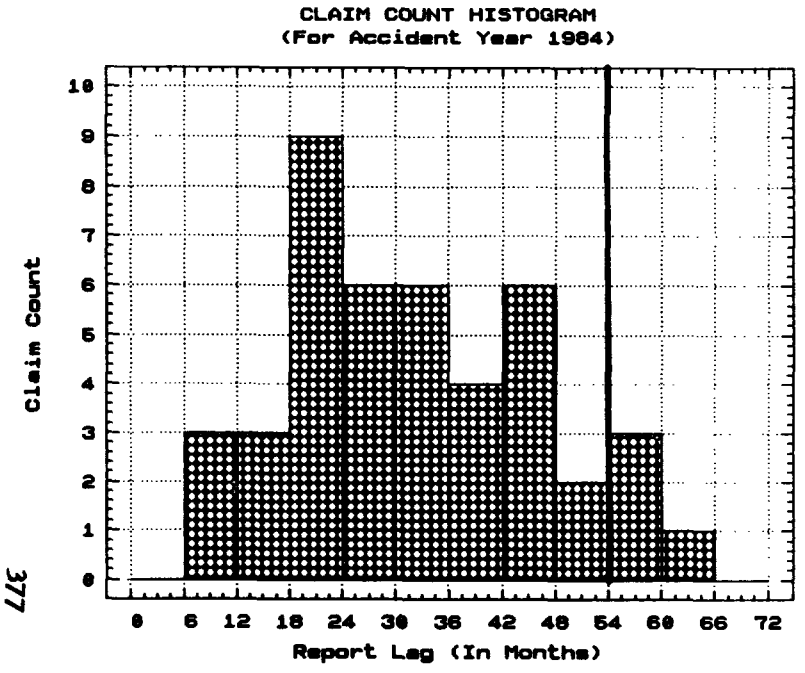
CLAIM COUNT HISTOGRAM
(For Accident Year 1984)
Claim Count
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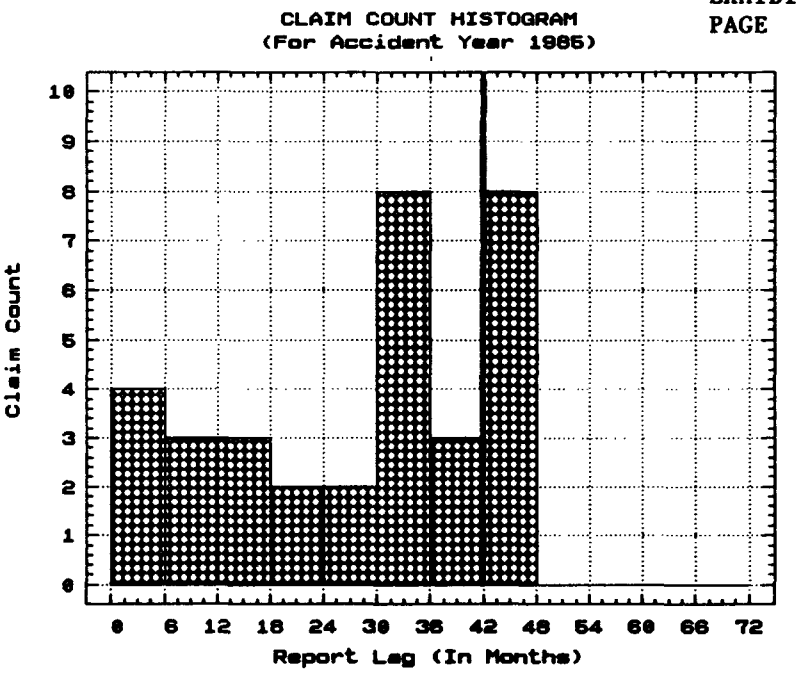
0 6 12 18 24 30 36 42 48 54 60 66 72
Report Lag (In Months)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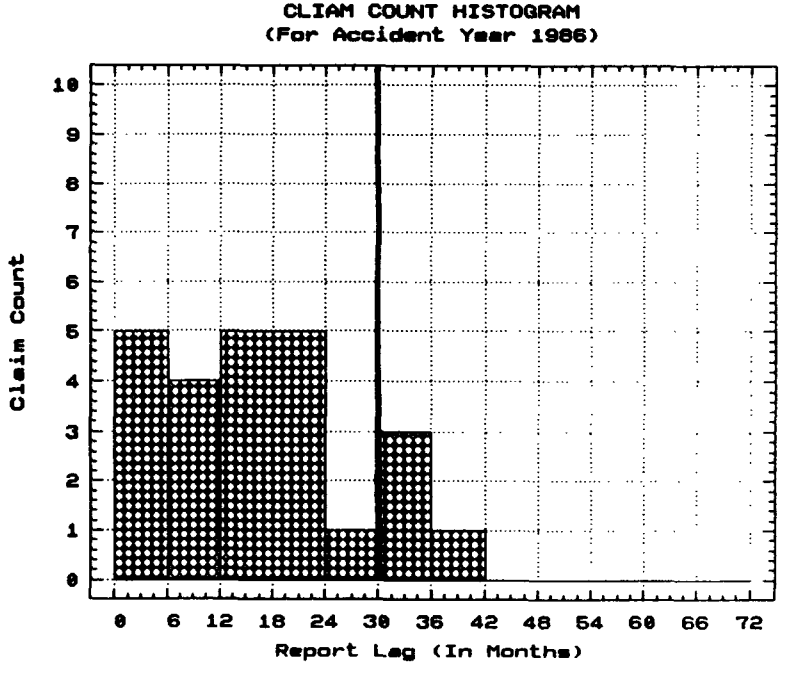
CLIAM COUNT HISTOGRAM
(For Accident Year 1986)
Claim Count
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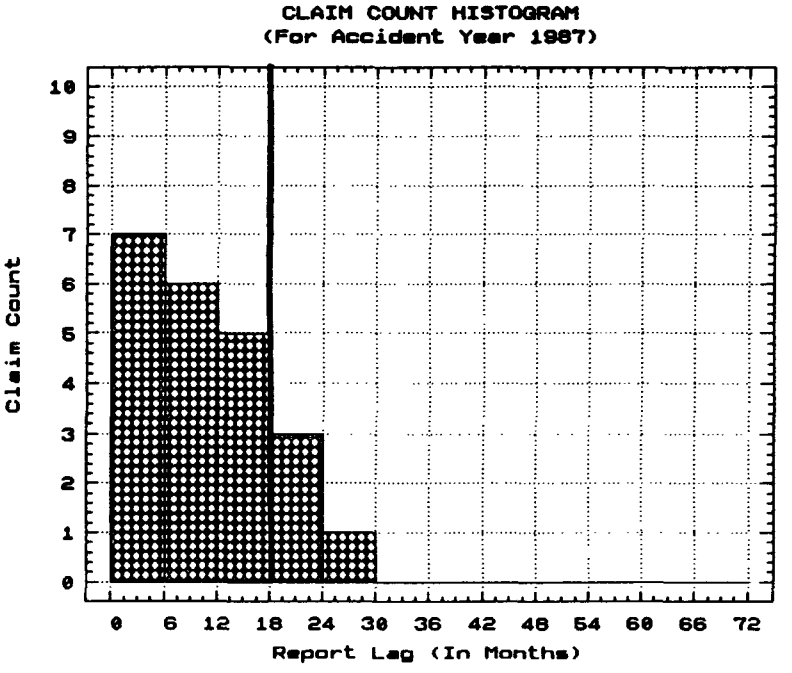
0 6 12 18 24 30 36 42 48 54 60 66 72
Report Lag (In Months)


CLAIM COUNT HISTOGRAM
(For Accident Year 1987)
Claim Count
0 1 2 3 4 5 6 7 8 9 10
0 6 12 18 24 30 36 42 48 54 60 66 72
Report Lag (In Months)

C L R S E X A M P L E

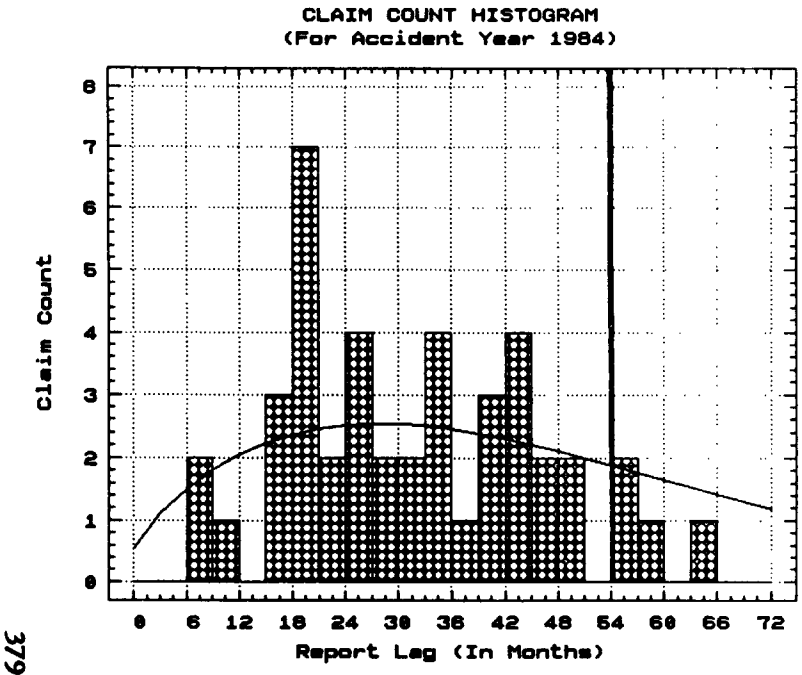
Parameter Estimates

Frequency

Accident Periods	Distributions	Mean Average Lag
1984 & 1985	Weibull B = 55.595 S = 1.6359	47.06
1986 & 1987	Exponential theta = 0.0235 shift = 0	42.64

Severity

Accident Periods	Average Claim Size
1984 & 1985	$ 320,000
1986 & 1987	$ 320,000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Claim Count
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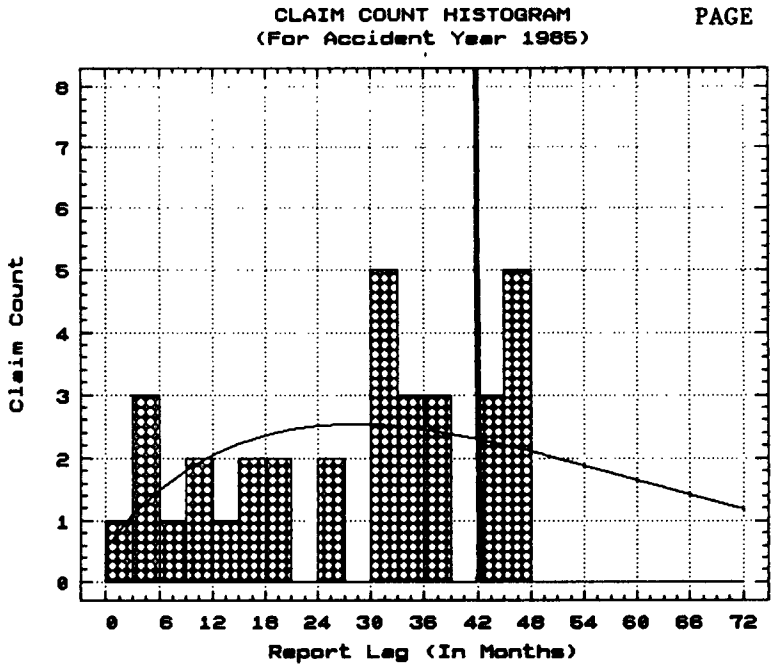
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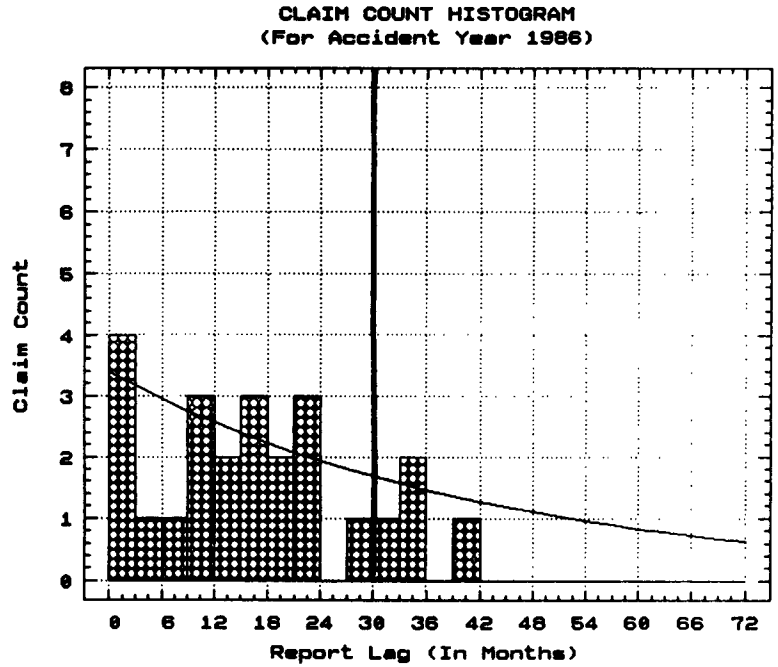
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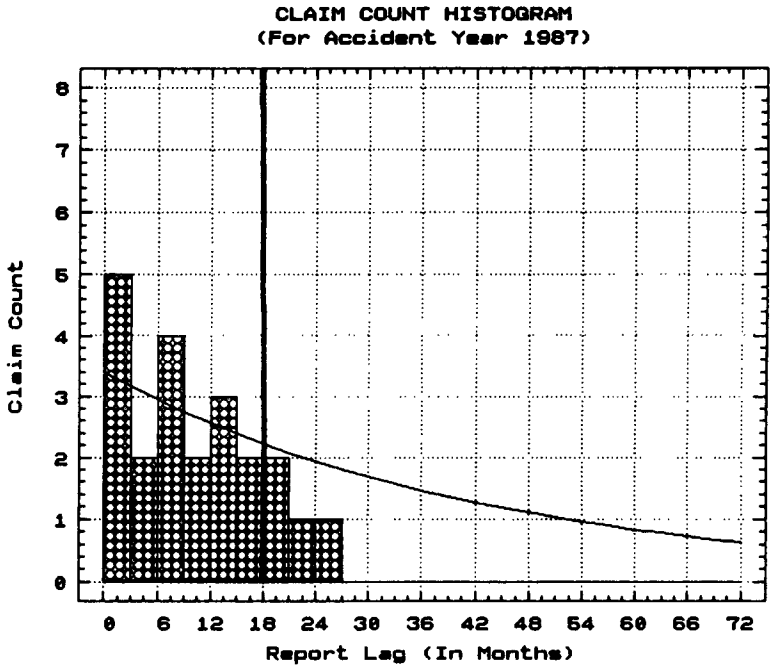
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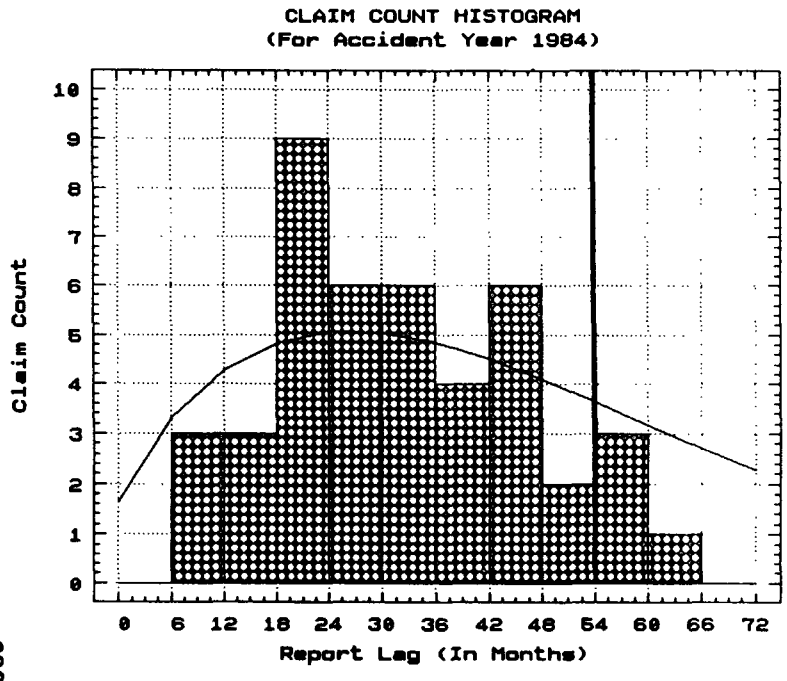
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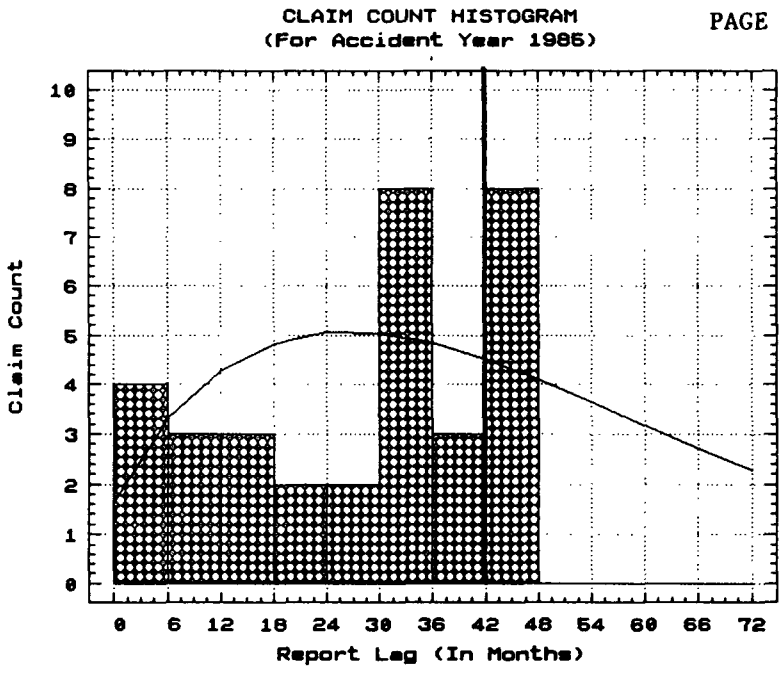
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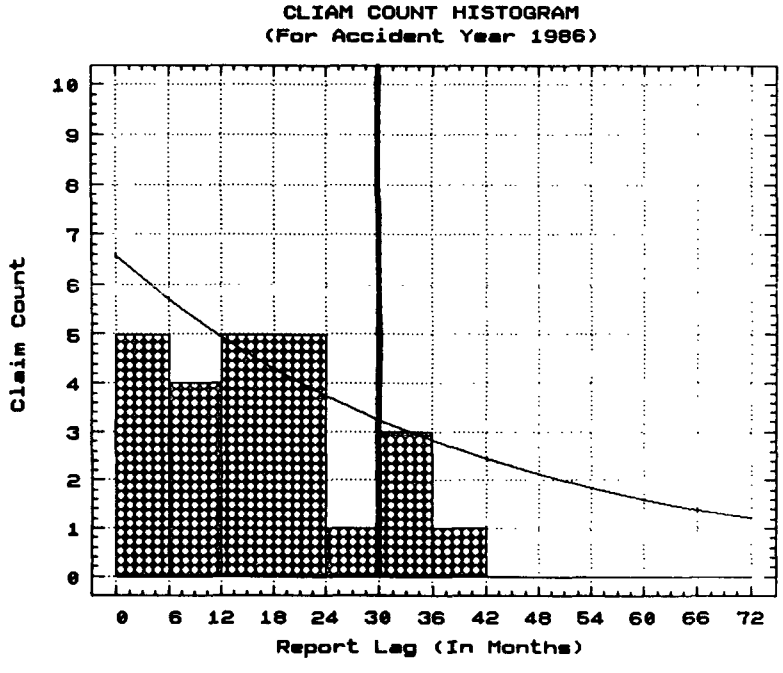
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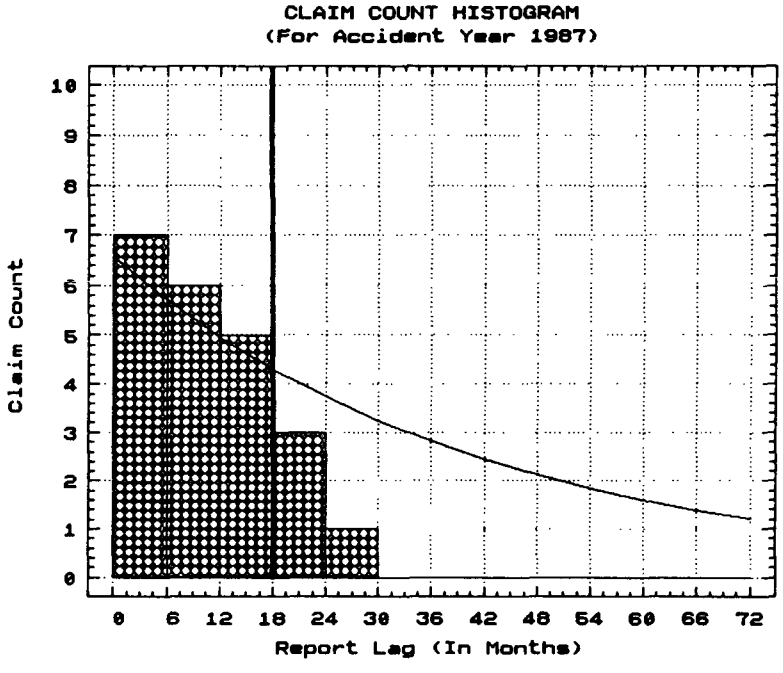

CLAIM COUNT HISTOGRAM
(For Accident Year 1987)
Claim Count
0 1 2 3 4 5 6 7 8 9 10
0 6 12 18 24 30 36 42 48 54 60 66 72
Report Lag (In Months)

CLRS EXAMPLE FITTED VALUES WEIBULL -- 47.064 MONTH LAG

MONTH	% REPORTED	% UNREPORTED	ATU	ATA
6	0.00537	0.99463	186.26267	6.12338
12	0.03287	0.96713	30.41826	2.67757
18	0.08803	0.91197	11.36039	1.82304
24	0.16047	0.83953	6.23155	1.51215
30	0.24266	0.75734	4.12100	1.35608
36	0.32906	0.67094	3.03891	1.26245
42	0.41543	0.58457	2.40715	1.20006
48	0.49854	0.50146	2.00585	1.15560
54	0.57612	0.42388	1.73576	1.12246
60	0.64667	0.35333	1.54639	1.09701
66	0.70940	0.29060	1.40964	1.07705
72	0.76406	0.23594	1.30880	1.06118
78	0.81080	0.18920	1.23334	1.04848
84	0.85011	0.14989	1.17632	1.03826
90	0.88263	0.11737	1.13297	1.03003
96	0.90914	0.09086	1.09994	1.02343
102	0.93044	0.06956	1.07476	1.01814
108	0.94732	0.05268	1.05561	1.01394
114	0.96053	0.03947	1.04109	1.01062
120	0.97073	0.02927	1.03015	1.00802
126	0.97852	0.02148	1.02196	1.00600
132	0.98439	0.01561	1.01586	1.00445
138	0.98877	0.01123	1.01136	1.00326
144	0.99199	0.00801	1.00807	1.00237
150	0.99435	0.00565	1.00568	1.00171
156	0.99605	0.00395	1.00397	1.00122
162	0.99726	0.00274	1.00275	1.00086
168	0.99812	0.00188	1.00188	1.00060
174	0.99872	0.00128	1.00128	1.00042
180	0.99914	0.00086	1.00086	1.00029
186	0.99942	0.00058	1.00058	1.00019
192	0.99962	0.00038	1.00038	1.00013
198	0.99975	0.00025	1.00025	1.00009
204	0.99984	0.00016	1.00016	1.00006
210	0.99989	0.00011	1.00011	1.00004
216	0.99993	0.00007	1.00007	1.00002
222	0.99996	0.00004	1.00004	1.00002
228	0.99997	0.00003	1.00003	1.00001
234	0.99998	0.00002	1.00002	1.00001
240	0.99999	0.00001	1.00001	1.00000
246	0.99999	0.00001	1.00001	1.00000
252	1.00000	0.00000	1.00000	1.00000
258	1.00000	0.00000	1.00000	1.00000
264	1.00000	0.00000	1.00000	1.00000
270	1.00000	0.00000	1.00000	1.00000

September 18,1989

CLRS EXAMPLE FITTED VALUES EXPONENTIAL -- 42.64 MONTH LAG

MONTH	% REPORTED	% UNREPORTED	ATU	ATA
6	0.03360	0.96640	29.76601	3.82230
12	0.12841	0.87159	7.78746	1.89093
18	0.24282	0.75718	4.11832	1.40931
24	0.34221	0.65779	2.92221	1.25231
30	0.42855	0.57145	2.33345	1.17503
36	0.50356	0.49644	1.98587	1.12941
42	0.56872	0.43128	1.75833	1.09954
48	0.62533	0.37467	1.59915	1.07865
54	0.67451	0.32549	1.48255	1.06334
60	0.71724	0.28276	1.39424	1.05175
66	0.75435	0.24565	1.32564	1.04274
72	0.78660	0.21340	1.27130	1.03561
78	0.81461	0.18539	1.22758	1.02987
84	0.83894	0.16106	1.19198	1.02520
90	0.86008	0.13992	1.16268	1.02135
96	0.87845	0.12155	1.13837	1.01816
102	0.89440	0.10560	1.11806	1.01550
108	0.90826	0.09174	1.10100	1.01326
114	0.92031	0.07969	1.08660	1.01137
120	0.93077	0.06923	1.07438	1.00976
126	0.93985	0.06015	1.06399	1.00840
132	0.94775	0.05225	1.05513	1.00724
138	0.95461	0.04539	1.04755	1.00624
144	0.96057	0.03943	1.04105	1.00539
150	0.96574	0.03426	1.03547	1.00466
156	0.97024	0.02976	1.03067	1.00403
162	0.97415	0.02585	1.02654	1.00348
168	0.97754	0.02246	1.02298	1.00302
174	0.98049	0.01951	1.01990	1.00261
180	0.98305	0.01695	1.01724	1.00226
186	0.98527	0.01473	1.01495	1.00196
192	0.98721	0.01279	1.01296	1.00170
198	0.98889	0.01111	1.01124	1.00148
204	0.99034	0.00966	1.00975	1.00128
210	0.99161	0.00839	1.00846	1.00111
216	0.99271	0.00729	1.00734	1.00096
222	0.99367	0.00633	1.00637	1.00084
228	0.99450	0.00550	1.00553	1.00073
234	0.99522	0.00478	1.00480	1.00063
240	0.99585	0.00415	1.00417	1.00055
246	0.99639	0.00361	1.00362	1.00048
252	0.99687	0.00313	1.00314	1.00041
258	0.99728	0.00272	1.00273	1.00036
264	0.99764	0.00236	1.00237	1.00031
270	0.99795	0.00205	1.00206	1.00206

September 18,1989

CLRS Example - IBNR Calculation Based on Lag Distributions

Accident Periods	Year	Months of Dev. @6/30/89	Earned Premium (EP)	Market Index (MI)	Fitted Tail Probability (TP)	w	w/(1-w)	Known Count	IBNR Count	Severity	IBNR Based on Fit'd Distr.	IBNR Based on Fitted Distribution Count	IBNR Based on Fitted Distribution Amount
	1984	66	25,000,000	1.000	29.060%							17.18	5,497,708
1						0.3572	0.5557	76	42.24	320,000	13,516,963		
	1985	54	25,000,000	1.000	42.388%							25.06	8,019,255
	1986	42	25,000,000	1.000	43.128%							19.89	6,365,780
2						0.5013	1.0054	46	46.25	320,000	14,800,552		
	1987	30	25,000,000	1.000	57.145%							26.36	8,434,772
							TOTAL	122	88.49	320,000	28,317,515		

PERCENT UNREPORTED

$$w = \frac{\sum TP_i \times EP_i \times MI_i}{\sum EP_i \times MI_i}$$

$$= \frac{.290606 \times 25,000,000 \times 1 + .42388 \times 25,000,000 \times 1}{25,000,000 \times 1 + 25,000,000 \times 1} \star$$

$$= \frac{7,265,000 + 10,597,000}{50,000,000} = \frac{17,862,000}{50,000,000}$$

$$= .35724$$

$\star$ – FOR ACCIDENT PERIOD 1

CLRS Example - IBNR Calculation Based on Lag Distributions

Accident Periods	Year	Months of Dev. @6/30/89	Earned Premium (EP)	Market Index (MI)	Fitted Tail Probability (TP)	w	w/(1-w)	Known Count	IBNR Count	Severity	IBNR Based on Fit'd Distr.	IBNR Based on Fitted Distribution Count	IBNR Based on Fitted Distribution Amount
	1984	66	25,000,000	0.500	29.060%							11.86	3,796,343
1						0.3794	0.6114	76	46.47	320,000	14,871,445		
	1985	54	25,000,000	1.000	42.388%							34.61	11,075,102
	1986	42	25,000,000	1.500	43.128%							23.22	7,430,067
2						0.4873	0.9506	46	43.73	320,000	13,993,381		
	1987	30	25,000,000	1.000	57.145%							20.51	6,563,314
							TOTAL	122	90.20	320,000	28,864,827		

ACCIDENT YEAR 1984

Quarter Ending	w	Percent of IBNR to emerge in quarter	IBNR count in qtr.	IBNR in qtr.	Cumulative IBNR count	Cumulative IBNR
September 1989	0.262264	9.7508%	1.6752	$536,068	1.6752	$ 536,068
December 1989	0.235943	9.0575	1.5561	497,953	3.2313	1,034,021
March 1990	0.211604	8.3755	1.4389	460,460	4.6702	1,494,481
June 1990	0.189195	7.7112	1.3248	423,940	5.9950	1,918,421
September 1990	0.168650	7.0699	1.2146	388,682	7.2096	2,307,103
December 1990	0.149890	6.4556	1.1091	354,912	8.3187	2,662,015
March 1991	0.132827	5.8716	1.0088	322,804	9.3275	2,984,819
June 1991	0.117367	5.3201	0.9140	292,481	10.2415	3,277,300
September 1991	0.103411	4.8024	0.8251	264,024	11.0666	3,541,324
December 1991	0.090859	4.3195	0.7421	237,474	11.8087	3,778,798
March 1992	0.079608	3.8715	0.6651	212,842	12.4738	3,991,640
June 1992	0.069560	3.4579	0.5941	190,107	13.0679	4,181,747
September 1992	0.060614	3.0782	0.5288	169,229	13.5967	4,350,976
December 1992	0.052678	2.7311	0.4692	150,146	14.0659	4,501,122
March 1993	0.045659	2.4153	0.4150	132,784	14.4809	4,633,906
June 1993	0.039472	2.1292	0.3658	117,058	14.8467	4,750,964
September 1993	0.034034	1.8712	0.3215	102,872	15.1682	4,853,836
December 1993	0.029270	1.6394	0.2817	90,128	15.4499	4,943,964
March 1994	0.025109	1.4320	0.2460	78,726	15.6959	5,022,690
June 1994	0.021485	1.2471	0.2143	68,562	15.9102	5,091,252
September 1994	0.018338	1.0829	0.1860	59,535	16.0962	5,150,787
December 1994	0.015613	0.9376	0.1611	51,549	16.2573	5,202,336
March 1995	0.013260	0.8096	0.1391	44,507	16.3964	5,246,843
June 1995	0.011235	0.6970	0.1197	38,320	16.5161	5,285,163
September 1995	0.009496	0.5985	0.1028	32,901	16.6189	5,318,064
December 1995	0.008007	0.5124	0.0880	28,172	16.7069	5,346,236
March 1996	0.006735	0.4376	0.0752	24,058	16.7821	5,370,294
June 1996	0.005652	0.3727	0.0640	20,489	16.8461	5,390,783
September 1996	0.004732	0.3166	0.0544	17,405	16.9005	5,408,188
December 1996	0.003953	0.2682	0.0461	14,746	16.9466	5,422,934
March 1997	0.003294	0.2267	0.0389	12,461	16.9855	5,435,395
June 1997	0.002739	0.1910	0.0328	10,503	17.0183	5,445,898
September 1997	0.002272	0.1606	0.0276	8,831	17.0459	5,454,729
December 1997	0.001880	0.1347	0.0231	7,406	17.0690	5,462,135
March 1998	0.001553	0.1127	0.0194	6,196	17.0884	5,468,331
June 1998	0.001280	0.0941	0.0162	5,171	17.1046	5,473,502
September 1998	0.001052	0.0783	0.0135	4,305	17.1181	5,477,807
December 1998	0.000863	0.0650	0.0112	3,575	17.1293	5,481,382
March 1999	0.000706	0.0539	0.0093	2,962	17.1386	5,484,344
June 1999	0.000577	0.0445	0.0077	2,449	17.1463	5,486,793
September 1999	0.000470	0.0367	0.0063	2,019	17.1526	5,488,812
December 1999	0.000382	0.0302	0.0052	1,661	17.1578	5,490,473
March 2000	0.000310	0.0248	0.0043	1,364	17.1621	5,491,837
June 2000	0.000251	0.0203	0.0035	1,117	17.1656	5,492,954
September 2000	0.000203	0.0166	0.0029	913	17.1685	5,493,867
December 2000	0.000164	0.0135	0.0023	744	17.1708	5,494,611

ACCIDENT YEAR 1984

Quarter Ending	w	Percent of IBNR to emerge in quarter	IBNR count in qtr.	IBNR in qtr.	Cumulative IBNR count	Cumulative IBNR
March 2001	0.000132	0.0110%	0.0019	$ 605	17.1727	$5,495,216
June 2001	0.000106	0.0089	0.0015	491	17.1742	5,495,707
September 2001	0.000085	0.0072	0.0012	398	17.1754	5,496,105
December 2001	0.000068	0.0058	0.0010	321	17.1764	5,496,426
March 2002	0.000054	0.0047	0.0008	259	17.1772	5,496,685
June 2002	0.000043	0.0038	0.0007	208	17.1779	5,496,893
September 2002	0.000034	0.0030	0.0005	167	17.1784	5,497,060
December 2002	0.000027	0.0024	0.0004	134	17.1788	5,497,194
March 2003	0.000022	0.0019	0.0003	107	17.1791	5,497,301
June 2003	0.000017	0.0016	0.0003	86	17.1794	5,497,387
September 2003	0.000013	0.0012	0.0002	68	17.1796	5,497,455
December 2003	0.000011	0.0010	0.0002	54	17.1798	5,497,509
March 2004	0.000008	0.0008	0.0001	43	17.1799	5,497,552
June 2004	0.000007	0.0006	0.0001	34	17.1800	5,497,586
September 2004	0.000005	0.0005	0.0001	27	17.1801	5,497,613
December 2004	0.000004	0.0004	0.0001	21	17.1802	5,497,634
March 2005	0.000003	0.0003	0.0001	17	17.1803	5,497,651
June 2005	0.000002	0.0002	0.0000	13	17.1803	5,497,664
September 2005	0.000002	0.0002	0.0000	10	17.1803	5,497,674
December 2005	0.000001	0.0001	0.0000	8	17.1803	5,497,682
March 2006	0.000001	0.0001	0.0000	6	17.1803	5,497,688
June 2006	0.000001	0.0001	0.0000	5	17.1803	5,497,693
September 2006	0.000000	0.0003	0.0001	16	17.1804	5,497,709
December 2006	0.000000	0.0000	0.0000	0	17.1804	5,497,709
Subsequent to 2006	0.000000	0.0000	0.0000	0	17.1804	5,497,709

ACCIDENT YEAR 1985

Quarter Ending	w	Percent of IBNR to emerge in quarter	IBNR count in qtr.	IBNR in qtr.	Cumulative IBNR count	Cumulative IBNR
September 1989	0.387666	8.5445%	2.1413	$685,201	2.1413	$ 685,201
December 1989	0.353331	8.1000	2.0299	649,559	4.1712	1,334,760
March 1990	0.320961	7.6367	1.9138	612,403	6.0850	1,947,163
June 1990	0.290600	7.1625	1.7949	574,383	7.8799	2,521,546
September 1990	0.262264	6.6848	1.6752	536,068	9.5551	3,057,614
December 1990	0.235943	6.2095	1.5561	497,953	11.1112	3,555,567
March 1991	0.211604	5.7419	1.4389	460,460	12.5501	4,016,027
June 1991	0.189195	5.2865	1.3248	423,940	13.8749	4,439,967
September 1991	0.168650	4.8469	1.2146	388,682	15.0895	4,828,649
December 1991	0.149890	4.4257	1.1091	354,912	16.1986	5,183,561
March 1992	0.132827	4.0254	1.0088	322,804	17.2074	5,506,365
June 1992	0.117367	3.6472	0.9140	292,481	18.1214	5,798,846
September 1992	0.103411	3.2924	0.8251	264,024	18.9465	6,062,870
December 1992	0.090859	2.9613	0.7421	237,474	19.6886	6,300,344
March 1993	0.079608	2.6541	0.6651	212,842	20.3537	6,513,186
June 1993	0.069560	2.3706	0.5941	190,107	20.9478	6,703,293
September 1993	0.060614	2.1103	0.5288	169,229	21.4766	6,872,522
December 1993	0.052678	1.8723	0.4692	150,146	21.9458	7,022,668
March 1994	0.045659	1.6558	0.4150	132,784	22.3608	7,155,452
June 1994	0.039472	1.4597	0.3658	117,058	22.7266	7,272,510
September 1994	0.034034	1.2828	0.3215	102,872	23.0481	7,375,382
December 1994	0.029270	1.1239	0.2817	90,128	23.3298	7,465,510
March 1995	0.025109	0.9817	0.2460	78,726	23.5758	7,544,236
June 1995	0.021485	0.8550	0.2143	68,562	23.7901	7,612,798
September 1995	0.018338	0.7424	0.1860	59,535	23.9761	7,672,333
December 1995	0.015613	0.6428	0.1611	51,549	24.1372	7,723,882
March 1996	0.013260	0.5550	0.1391	44,507	24.2763	7,768,389
June 1996	0.011235	0.4778	0.1197	38,320	24.3960	7,806,709
September 1996	0.009496	0.4103	0.1028	32,901	24.4988	7,839,610
December 1996	0.008007	0.3513	0.0880	28,172	24.5868	7,867,782
March 1997	0.006735	0.3000	0.0752	24,058	24.6620	7,891,840
June 1997	0.005652	0.2555	0.0640	20,489	24.7260	7,912,329
September 1997	0.004732	0.2170	0.0544	17,405	24.7804	7,929,734
December 1997	0.003953	0.1839	0.0461	14,746	24.8265	7,944,480
March 1998	0.003294	0.1554	0.0389	12,461	24.8654	7,956,941
June 1998	0.002739	0.1310	0.0328	10,503	24.8982	7,967,444
September 1998	0.002272	0.1101	0.0276	8,831	24.9258	7,976,275
December 1998	0.001880	0.0924	0.0231	7,406	24.9489	7,983,681
March 1999	0.001553	0.0773	0.0194	6,196	24.9683	7,989,877
June 1999	0.001280	0.0645	0.0162	5,171	24.9845	7,995,048
September 1999	0.001052	0.0537	0.0135	4,305	24.9980	7,999,353
December 1999	0.000863	0.0446	0.0112	3,575	25.0092	8,002,928
March 2000	0.000706	0.0369	0.0093	2,962	25.0185	8,005,890
June 2000	0.000577	0.0305	0.0077	2,449	25.0262	8,008,339
September 2000	0.000470	0.0252	0.0063	2,019	25.0325	8,010,358
December 2000	0.000382	0.0207	0.0052	1,661	25.0377	8,012,019

ACCIDENT YEAR 1985

Quarter Ending	w	Percent of IBNR to emerge in quarter	IBNR count in qtr.	IBNR in qtr.	Cumulative IBNR count	Cumulative IBNR
March 2001	0.000310	0.0170%	0.0043	$ 1,364	25.0420	$8,013,383
June 2001	0.000251	0.0139	0.0035	1,117	25.0455	8,014,500
September 2001	0.000203	0.0114	0.0029	913	25.0484	8,015,413
December 2001	0.000164	0.0093	0.0023	744	25.0507	8,016,157
March 2002	0.000132	0.0075	0.0019	605	25.0526	8,016,762
June 2002	0.000106	0.0061	0.0015	491	25.0541	8,017,253
September 2002	0.000085	0.0050	0.0012	398	25.0553	8,017,651
December 2002	0.000068	0.0040	0.0010	321	25.0563	8,017,972
March 2003	0.000054	0.0032	0.0008	259	25.0571	8,018,231
June 2003	0.000043	0.0026	0.0007	208	25.0578	8,018,439
September 2003	0.000034	0.0021	0.0005	167	25.0583	8,018,606
December 2003	0.000027	0.0017	0.0004	134	25.0587	8,018,740
March 2004	0.000022	0.0013	0.0003	107	25.0590	8,018,847
June 2004	0.000017	0.0011	0.0003	86	25.0593	8,018,933
September 2004	0.000013	0.0008	0.0002	68	25.0595	8,019,001
December 2004	0.000011	0.0007	0.0002	54	25.0597	8,019,055
March 2005	0.000008	0.0005	0.0001	43	25.0598	8,019,098
June 2005	0.000007	0.0004	0.0001	34	25.0599	8,019,132
September 2005	0.000005	0.0003	0.0001	27	25.0600	8,019,159
December 2005	0.000004	0.0003	0.0001	21	25.0601	8,019,180
March 2006	0.000003	0.0002	0.0001	17	25.0602	8,019,197
June 2006	0.000002	0.0002	0.0000	13	25.0602	8,019,210
September 2006	0.000002	0.0001	0.0000	10	25.0602	8,019,220
December 2006	0.000001	0.0001	0.0000	8	25.0602	8,019,228
Subsequent to 2006	0.000002	0.0003	0.0001	27	25.0603	8,019,255

ACCIDENT YEAR 1986

Quarter Ending	w	Percent of IBNR to emerge in quarter	IBNR count in qtr.	IBNR in qtr.	Cumulative IBNR count	Cumulative IBNR
September 1989	0.401977	6.7938%	1.3515	$432,482	1.3515	$ 432,482
December 1989	0.374668	6.3323	1.2597	403,099	2.6112	835,581
March 1990	0.349213	5.9021	1.1741	375,713	3.7853	1,211,294
June 1990	0.325488	5.5011	1.0943	350,188	4.8796	1,561,482
September 1990	0.303375	5.1274	1.0200	326,397	5.8996	1,887,879
December 1990	0.282764	4.7790	0.9507	304,222	6.8503	2,192,101
March 1991	0.263554	4.4543	0.8861	283,553	7.7364	2,475,654
June 1991	0.245648	4.1517	0.8259	264,289	8.5623	2,739,943
September 1991	0.228959	3.8697	0.7698	246,334	9.3321	2,986,277
December 1991	0.213404	3.6068	0.7175	229,598	10.0496	3,215,875
March 1992	0.198906	3.3617	0.6687	214,000	10.7183	3,429,875
June 1992	0.185392	3.1333	0.6233	199,461	11.3416	3,629,336
September 1992	0.172797	2.9205	0.5810	185,910	11.9226	3,815,246
December 1992	0.161058	2.7220	0.5415	173,279	12.4641	3,988,525
March 1993	0.150116	2.5371	0.5047	161,507	12.9688	4,150,032
June 1993	0.139917	2.3647	0.4704	150,535	13.4392	4,300,567
September 1993	0.130411	2.2041	0.4385	140,307	13.8777	4,440,874
December 1993	0.121551	2.0543	0.4087	130,775	14.2864	4,571,649
March 1994	0.113293	1.9148	0.3809	121,890	14.6673	4,693,539
June 1994	0.105596	1.7847	0.3550	113,609	15.0223	4,807,148
September 1994	0.098422	1.6634	0.3309	105,891	15.3532	4,913,039
December 1994	0.091736	1.5504	0.3084	98,697	15.6616	5,011,736
March 1995	0.085503	1.4451	0.2875	91,992	15.9491	5,103,728
June 1995	0.079694	1.3469	0.2679	85,742	16.2170	5,189,470
September 1995	0.074280	1.2554	0.2497	79,917	16.4667	5,269,387
December 1995	0.069233	1.1701	0.2328	74,487	16.6995	5,343,874
March 1996	0.064530	1.0906	0.2170	69,427	16.9165	5,413,301
June 1996	0.060146	1.0165	0.2022	64,710	17.1187	5,478,011
September 1996	0.056060	0.9475	0.1885	60,314	17.3072	5,538,325
December 1996	0.052251	0.8831	0.1757	56,216	17.4829	5,594,541
March 1997	0.048701	0.8231	0.1637	52,397	17.6466	5,646,938
June 1997	0.045392	0.7672	0.1526	48,837	17.7992	5,695,775
September 1997	0.042309	0.7151	0.1422	45,519	17.9414	5,741,294
December 1997	0.039434	0.6665	0.1326	42,427	18.0740	5,783,721
March 1998	0.036755	0.6212	0.1236	39,544	18.1976	5,823,265
June 1998	0.034258	0.5790	0.1152	36,858	18.3128	5,860,123
September 1998	0.031931	0.5397	0.1074	34,354	18.4202	5,894,477
December 1998	0.029761	0.5030	0.1001	32,020	18.5203	5,926,497
March 1999	0.027739	0.4688	0.0933	29,844	18.6136	5,956,341
June 1999	0.025855	0.4370	0.0869	27,817	18.7005	5,984,158
September 1999	0.024098	0.4073	0.0810	25,927	18.7815	6,010,085
December 1999	0.022461	0.3796	0.0755	24,165	18.8570	6,034,250
March 2000	0.020935	0.3538	0.0704	22,524	18.9274	6,056,774
June 2000	0.019513	0.3298	0.0656	20,993	18.9930	6,077,767
September 2000	0.018187	0.3074	0.0611	19,567	19.0541	6,097,334
December 2000	0.016951	0.2865	0.0570	18,238	19.1111	6,115,572

ACCIDENT YEAR 1986

Quarter Ending	w	Percent of IBNR to emerge in quarter	IBNR count in qtr.	IBNR in qtr.	Cumulative IBNR count	Cumulative IBNR
March 2001	0.015800	0.2670%	0.0531	$ 16,999	19.1642	$6,132,571
June 2001	0.014726	0.2489	0.0495	15,844	19.2137	6,148,415
September 2001	0.013726	0.2320	0.0461	14,768	19.2598	6,163,183
December 2001	0.012793	0.2162	0.0430	13,764	19.3028	6,176,947
March 2002	0.011924	0.2015	0.0401	12,829	19.3429	6,189,776
June 2002	0.011114	0.1878	0.0374	11,958	19.3803	6,201,734
September 2002	0.010359	0.1751	0.0348	11,145	19.4151	6,212,879
December 2002	0.009655	0.1632	0.0325	10,388	19.4476	6,223,267
March 2003	0.008999	0.1521	0.0303	9,682	19.4779	6,232,949
June 2003	0.008388	0.1418	0.0282	9,024	19.5061	6,241,973
September 2003	0.007818	0.1321	0.0263	8,411	19.5324	6,250,384
December 2003	0.007287	0.1232	0.0245	7,840	19.5569	6,258,224
March 2004	0.006792	0.1148	0.0228	7,307	19.5797	6,265,531
June 2004	0.006330	0.1070	0.0213	6,811	19.6010	6,272,342
September 2004	0.005900	0.0997	0.0198	6,348	19.6208	6,278,690
December 2004	0.005499	0.0929	0.0185	5,917	19.6393	6,284,607
March 2005	0.005126	0.0866	0.0172	5,515	19.6565	6,290,122
June 2005	0.004778	0.0807	0.0161	5,140	19.6726	6,295,262
September 2005	0.004453	0.0753	0.0150	4,791	19.6876	6,300,053
December 2005	0.004150	0.0701	0.0140	4,465	19.7016	6,304,518
March 2006	0.003869	0.0654	0.0130	4,162	19.7146	6,308,680
June 2006	0.003606	0.0609	0.0121	3,879	19.7267	6,312,559
September 2006	0.003361	0.0568	0.0113	3,616	19.7380	6,316,175
December 2006	0.003132	0.0529	0.0105	3,370	19.7485	6,319,545
Subsequent to 2006	0.014798	0.7263	0.1445	46,235	19.8930	6,365,780

ACCIDENT YEAR 1987

Quarter Ending	w	Percent of IBNR to emerge in quarter	IBNR count in qtr.	IBNR in qtr.	Cumulative IBNR count	Cumulative IBNR
September 1989	0.532627	6.7938%	1.7908	$573,046	1.7908	$ 573,046
December 1989	0.496441	6.3323	1.6691	534,114	3.4599	1,107,160
March 1990	0.462714	5.9021	1.5557	497,827	5.0156	1,604,987
June 1990	0.431278	5.5011	1.4500	464,005	6.4656	2,068,992
September 1990	0.401977	5.1274	1.3515	432,482	7.8171	2,501,474
December 1990	0.374668	4.7790	1.2597	403,099	9.0768	2,904,573
March 1991	0.349213	4.4543	1.1741	375,713	10.2509	3,280,286
June 1991	0.325488	4.1517	1.0943	350,188	11.3452	3,630,474
September 1991	0.303375	3.8697	1.0200	326,397	12.3652	3,956,871
December 1991	0.282764	3.6068	0.9507	304,222	13.3159	4,261,093
March 1992	0.263554	3.3617	0.8861	283,553	14.2020	4,544,646
June 1992	0.245648	3.1333	0.8259	264,289	15.0279	4,808,935
September 1992	0.228959	2.9205	0.7698	246,334	15.7977	5,055,269
December 1992	0.213404	2.7220	0.7175	229,598	16.5152	5,284,867
March 1993	0.198906	2.5371	0.6687	214,000	17.1839	5,498,867
June 1993	0.185392	2.3647	0.6233	199,461	17.8072	5,698,328
September 1993	0.172797	2.2041	0.5810	185,910	18.3882	5,884,238
December 1993	0.161058	2.0543	0.5415	173,279	18.9297	6,057,517
March 1994	0.150116	1.9148	0.5047	161,507	19.4344	6,219,024
June 1994	0.139917	1.7847	0.4704	150,535	19.9048	6,369,559
September 1994	0.130411	1.6634	0.4385	140,307	20.3433	6,509,866
December 1994	0.121551	1.5504	0.4087	130,775	20.7520	6,640,641
March 1995	0.113293	1.4451	0.3809	121,890	21.1329	6,762,531
June 1995	0.105596	1.3469	0.3550	113,609	21.4879	6,876,140
September 1995	0.098422	1.2554	0.3309	105,891	21.8188	6,982,031
December 1995	0.091736	1.1701	0.3084	98,697	22.1272	7,080,728
March 1996	0.085503	1.0906	0.2875	91,992	22.4147	7,172,720
June 1996	0.079694	1.0165	0.2679	85,742	22.6826	7,258,462
September 1996	0.074280	0.9475	0.2497	79,917	22.9323	7,338,379
December 1996	0.069233	0.8831	0.2328	74,487	23.1651	7,412,866
March 1997	0.064530	0.8231	0.2170	69,427	23.3821	7,482,293
June 1997	0.060146	0.7672	0.2022	64,710	23.5843	7,547,003
September 1997	0.056060	0.7151	0.1885	60,314	23.7728	7,607,317
December 1997	0.052251	0.6665	0.1757	56,216	23.9485	7,663,533
March 1998	0.048701	0.6212	0.1637	52,397	24.1122	7,715,930
June 1998	0.045392	0.5790	0.1526	48,837	24.2648	7,764,767
September 1998	0.042309	0.5397	0.1422	45,519	24.4070	7,810,286
December 1998	0.039434	0.5030	0.1326	42,427	24.5396	7,852,713
March 1999	0.036755	0.4688	0.1236	39,544	24.6632	7,892,257
June 1999	0.034258	0.4370	0.1152	36,858	24.7784	7,929,115
September 1999	0.031931	0.4073	0.1074	34,354	24.8858	7,963,469
December 1999	0.029761	0.3796	0.1001	32,020	24.9859	7,995,489
March 2000	0.027739	0.3538	0.0933	29,844	25.0792	8,025,333
June 2000	0.025855	0.3298	0.0869	27,817	25.1661	8,053,150
September 2000	0.024098	0.3074	0.0810	25,927	25.2471	8,079,077
December 2000	0.022461	0.2865	0.0755	24,165	25.3226	8,103,242

ACCIDENT YEAR 1987

Quarter Ending	w	Percent of IBNR to emerge in quarter	IBNR count in qtr.	IBNR in qtr.	--- Cumulative --- IBNR count	IBNR
March 2001	0.020935	0.2670%	0.0704	$ 22,524	25.3930	$8,125,766
June 2001	0.019513	0.2489	0.0656	20,993	25.4586	8,146,759
September 2001	0.018187	0.2320	0.0611	19,567	25.5197	8,166,326
December 2001	0.016951	0.2162	0.0570	18,238	25.5767	8,184,564
March 2002	0.015800	0.2015	0.0531	16,999	25.6298	8,201,563
June 2002	0.014726	0.1878	0.0495	15,844	25.6793	8,217,407
September 2002	0.013726	0.1751	0.0461	14,768	25.7254	8,232,175
December 2002	0.012793	0.1632	0.0430	13,764	25.7684	8,245,939
March 2003	0.011924	0.1521	0.0401	12,829	25.8085	8,258,768
June 2003	0.011114	0.1418	0.0374	11,958	25.8459	8,270,726
September 2003	0.010359	0.1321	0.0348	11,145	25.8807	8,281,871
December 2003	0.009655	0.1232	0.0325	10,388	25.9132	8,292,259
March 2004	0.008999	0.1148	0.0303	9,682	25.9435	8,301,941
June 2004	0.008388	0.1070	0.0282	9,024	25.9717	8,310,965
September 2004	0.007818	0.0997	0.0263	8,411	25.9980	8,319,376
December 2004	0.007287	0.0929	0.0245	7,840	26.0225	8,327,216
March 2005	0.006792	0.0866	0.0228	7,307	26.0453	8,334,523
June 2005	0.006330	0.0807	0.0213	6,811	26.0666	8,341,334
September 2005	0.005900	0.0753	0.0198	6,348	26.0864	8,347,682
December 2005	0.005499	0.0701	0.0185	5,917	26.1049	8,353,599
March 2006	0.005126	0.0654	0.0172	5,515	26.1221	8,359,114
June 2006	0.004778	0.0609	0.0161	5,140	26.1382	8,364,254
September 2006	0.004453	0.0568	0.0150	4,791	26.1532	8,369,045
December 2006	0.004150	0.0529	0.0140	4,465	26.1672	8,373,510
Subsequent to 2006	0.028766	0.7263	0.1914	61,262	26.3586	8,434,772

CLRS Example

Year	Exposure	Claim Count @ 6/30/89	Incurred Losses(000's) 6 mos	12 mos	18 mos	24 mos	30 mos	36 mos	42 mos	48 mos	54 mos	60 mos	@ 6/30/89
1984	25,000,000	43	0	0	943	2,683	6,114	7,023	8,664	10,514	12,167	13,502	14,685
1985	25,000,000	33	0	750	2,665	4,179	4,461	5,805	7,511	9,266	11,720		11,720
1986	25,000,000	24	4	892	1,505	3,575	4,469	4,892	6,016				6,016
1987	25,000,000	22	750	1,786	3,443	4,955	6,309						6,309

Age-to-Age Factors

Year	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	60-66
1984	***	***	2.845	2.279	1.149	1.234	1.214	1.157	1.110	1.088
1985	***	3.553	1.568	1.067	1.301	1.294	1.234	1.265		
1986	223.000	1.687	2.375	1.250	1.095	1.230				
1987	2.381	1.928	1.439	1.273						

Age-to-Age Factors

	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	60-66
Unweighted										
All Year Ave	112.691	2.389	2.057	1.467	1.182	1.252	1.224	1.211	1.110	1.088
3 Year Ave	112.691	2.389	1.794	1.197	1.182	1.252	1.224	1.211		
Middle Ave	***	2.620	1.972	1.262	1.149	1.234				
Weighted										
All Year Ave	4.546	2.496	1.799	1.387	1.178	1.252	1.223	1.208	1.110	1.088
3 Year Ave	3.552	2.221	1.669	1.199	1.178	1.252	1.223	1.208		
Middle Ave	***	2.540	1.859	1.264						

Age-to-Age Factors

		6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	60-66	66-ult
FITTED --	First 2 yrs	6.123	2.678	1.823	1.512	1.356	1.262	1.200	1.156	1.122	1.097	1.410
	Last 2 yrs	3.822	1.891	1.409	1.252	1.175	1.129	1.100	1.079	1.063	1.052	1.326

ACCIDENT YEARS 1984 & 1985

	IBNR			
	Expected		Actual	
Quarter Ending	Emerged Count	Emerged Amount	Emerged Count	Emerged Amount
September 1989	3.8165	$ 1,221,269	5.0000	$ 1,731,577
December 1989	7.4025	2,368,781	10.0000	4,050,038
March 1990	10.7552	3,441,644	12.0000	4,512,059
June 1990	13.8749	4,439,967	15.0000	5,281,563
September 1990	16.7647	5,364,717		
December 1990	19.4299	6,217,582		
March 1991	21.8776	7,000,846		
June 1991	24.1164	7,717,267		
September 1991	26.1561	8,369,973		
December 1991	28.0073	8,962,359		
March 1992	29.6812	9,498,005		
June 1992	31.1893	9,980,593		
September 1992	32.5432	10,413,846		
December 1992	33.7545	10,801,466		
March 1993	34.8346	11,147,092		
June 1993	35.7945	11,454,257		
September 1993	36.6448	11,726,358		
December 1993	37.3957	11,966,632		
March 1994	38.0567	12,178,142		
June 1994	38.6368	12,363,762		
September 1994	39.1443	12,526,169		
December 1994	39.5871	12,667,846		
March 1995	39.9722	12,791,079		
June 1995	40.3062	12,897,961		
September 1995	40.5950	12,990,397		
December 1995	40.8441	13,070,118		
March 1996	41.0584	13,138,683		
June 1996	41.2421	13,197,492		
September 1996	41.3993	13,247,798		
December 1996	41.5334	13,290,716		
March 1997	41.6475	13,327,235		
June 1997	41.7443	13,358,227		
September 1997	41.8263	13,384,463		
December 1997	41.8955	13,406,615		
March 1998	41.9538	13,425,272		
June 1998	42.0028	13,440,946		
September 1998	42.0439	13,454,082		
December 1998	42.0782	13,465,063		
March 1999	42.1069	13,474,221		
June 1999	42.1308	13,481,841		
September 1999	42.1506	13,488,165		
December 1999	42.1670	13,493,401		
March 2000	42.1806	13,497,727		
June 2000	42.1918	13,501,293		
September 2000	42.2010	13,504,225		
December 2000	42.2085	13,506,630		

ACCIDENT YEARS 1984 & 1985

	IBNR			
	Expected		Actual	
Quarter Ending	Emerged Count	Emerged Amount	Emerged Count	Emerged Amount
March 2001	42.2147	$13,508,599		
June 2001	42.2197	13,510,207		
September 2001	42.2238	13,511,518		
December 2001	42.2271	13,512,583		
March 2002	42.2298	13,513,447		
June 2002	42.2320	13,514,146		
September 2002	42.2337	13,514,711		
December 2002	42.2351	13,515,166		
March 2003	42.2362	13,515,532		
June 2003	42.2372	13,515,826		
September 2003	42.2379	13,516,061		
December 2003	42.2385	13,516,249		
March 2004	42.2389	13,516,399		
June 2004	42.2393	13,516,519		
September 2004	42.2396	13,516,614		
December 2004	42.2399	13,516,689		
March 2005	42.2401	13,516,749		
June 2005	42.2402	13,516,796		
September 2005	42.2403	13,516,833		
December 2005	42.2404	13,516,862		
March 2006	42.2405	13,516,885		
June 2006	42.2405	13,516,903		
September 2006	42.2406	13,516,929		
December 2006	42.2406	13,516,937		
Subsequent to 2006	42.2407	13,516,964		

ACCIDENT YEARS 1986 & 1987

	IBNR			
	Expected		Actual	
Quarter Ending	Emerged Count	Emerged Amount	Emerged Count	Emerged Amount
September 1989	3.1423	$ 1,005,528	4.0000	$ 1,624,197
December 1989	6.0711	1,942,741	8.0000	3,580,534
March 1990	8.8009	2,816,281	9.0000	4,163,362
June 1990	11.3452	3,630,474	10.0000	4,495,560
September 1990	13.7167	4,389,353		
December 1990	15.9271	5,096,674		
March 1991	17.9873	5,755,940		
June 1991	19.9075	6,370,417		
September 1991	21.6973	6,943,148		
December 1991	23.3655	7,476,968		
March 1992	24.9203	7,974,521		
June 1992	26.3695	8,438,271		
September 1992	27.7203	8,870,515		
December 1992	28.9793	9,273,392		
March 1993	30.1527	9,648,899		
June 1993	31.2464	9,998,895		
September 1993	32.2659	10,325,112		
December 1993	33.2161	10,629,166		
March 1994	34.1017	10,912,563		
June 1994	34.9271	11,176,707		
September 1994	35.6965	11,422,905		
December 1994	36.4136	11,652,377		
March 1995	37.0820	11,866,259		
June 1995	37.7049	12,065,610		
September 1995	38.2855	12,251,418		
December 1995	38.8267	12,424,602		
March 1996	39.3312	12,586,021		
June 1996	39.8013	12,736,473		
September 1996	40.2395	12,876,704		
December 1996	40.6480	13,007,407		
March 1997	41.0287	13,129,231		
June 1997	41.3835	13,242,778		
September 1997	41.7142	13,348,611		
December 1997	42.0225	13,447,254		
March 1998	42.3098	13,539,195		
June 1998	42.5776	13,624,890		
September 1998	42.8272	13,704,763		
December 1998	43.0599	13,779,210		
March 1999	43.2768	13,848,598		
June 1999	43.4789	13,913,273		
September 1999	43.6673	13,973,554		
December 1999	43.8429	14,029,739		
March 2000	44.0066	14,082,107		
June 2000	44.1591	14,130,917		
September 2000	44.3012	14,176,411		
December 2000	44.4337	14,218,814		

ACCIDENT YEARS 1986 & 1987

	IBNR			
	Expected		Actual	
Quarter Ending	Emerged Count	Emerged Amount	Emerged Count	Emerged Amount
March 2001	44.5572	$14,258,337		
June 2001	44.6723	14,295,174		
September 2001	44.7795	14,329,509		
December 2001	44.8795	14,361,511		
March 2002	44.9727	14,391,339		
June 2002	45.0596	14,419,141		
September 2002	45.1405	14,445,054		
December 2002	45.2160	14,469,206		
March 2003	45.2864	14,491,717		
June 2003	45.3520	14,512,699		
September 2003	45.4131	14,532,255		
December 2003	45.4701	14,550,483		
March 2004	45.5232	14,567,472		
June 2004	45.5727	14,583,307		
September 2004	45.6188	14,598,066		
December 2004	45.6618	14,611,823		
March 2005	45.7018	14,624,645		
June 2005	45.7392	14,636,596		
September 2005	45.7740	14,647,735		
December 2005	45.8065	14,658,117		
March 2006	45.8367	14,667,794		
June 2006	45.8649	14,676,813		
September 2006	45.8912	14,685.220		
December 2006	45.9157	14,693,055		
Subsequent to 2006	46.2516	14,800,552		

C L R S E X A M P L E

Actual Parameters Used in the Simulation

Frequency

Accident Periods	Distributions	Mean Average Lag
1984 & 1985	Weibull B = 49.8479 S = 1.5	45.00
1986 & 1987	Exponential theta = 0.0222 shift = 0	45.00

All accident years were generated from the same expected frequency of fifty claims per year. The distribution used to generate the claim count by year was a negative binomial have standard deviation of five claims.

Severity

Accident Periods	Distributions	Average Claim Size
1984 & 1985	Pareto B = 13547.75 q = 1.13153718	$ 325,322
1986 & 1987	Pareto B = 13547.75 q = 1.13153718	$ 325,322

CLRS Example

Year	Exposure	Claim Count @ 6/30/89	Incurred Losses(000's) 6 mos	12 mos	18 mos	24 mos	30 mos	36 mos	42 mos	48 mos	54 mos	60 mos	@ 6/30/89
1984	25,000,000	43	0	0	943	2,683	6,114	7,023	8,664	10,514	12,167	13,502	14,685
1985	25,000,000	33	0	750	2,665	4,179	4,461	5,805	7,511	9,266	11,720		11,720
1986	25,000,000	24	4	892	1,505	3,575	4,469	4,892	6,016				6,016
1987	25,000,000	22	750	1,786	3,443	4,955	6,309						6,309

Age-to-Age Factors

Year	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	60-66
1984	***	***	2.845	2.279	1.149	1.234	1.214	1.157	1.110	1.088
1985	***	3.553	1.568	1.067	1.301	1.294	1.234	1.265		
1986	223.000	1.687	2.375	1.250	1.095	1.230				
1987	2.381	1.928	1.439	1.273						

Age-to-Age Factors

	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	60-66
Unweighted										
All Year Ave	112.691	2.389	2.057	1.467	1.182	1.252	1.224	1.211	1.110	1.088
3 Year Ave	112.691	2.389	1.794	1.197	1.182	1.252	1.224	1.211		
Middle Ave	***	2.620	1.972	1.262	1.149	1.234				
Weighted										
All Year Ave	4.546	2.496	1.799	1.387	1.178	1.252	1.223	1.208	1.110	1.088
3 Year Ave	3.552	2.221	1.669	1.199	1.178	1.252	1.223	1.208		
Middle Ave	***	2.540	1.859	1.264						

Age-to-Age Factors

		6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	60-66	66-ult
FITTED --	First 2 yrs	6.123	2.678	1.823	1.512	1.356	1.262	1.200	1.156	1.122	1.097	1.410
	Last 2 yrs	3.822	1.891	1.409	1.252	1.175	1.129	1.100	1.079	1.063	1.052	1.326
ACTUAL --	First 2 yrs	5.541	2.495	1.725	1.450	1.311	1.229	1.174	1.135	1.106	1.084	1.367
	Last 2 yrs	3.831	1.896	1.414	1.256	1.178	1.133	1.102	1.081	1.066	1.054	1.359

CLRS EXAMPLE SIMULATED VALUES WEIBULL — 45 MONTH LAG

MONTH	% REPORTED	% UNREPORTED	ATU	ATA
6	0.00821	0.99179	121.85357	5.54108
12	0.04547	0.95453	21.99094	2.49520
18	0.11346	0.88654	8.81329	1.72547
24	0.19578	0.80422	5.10775	1.44967
30	0.28382	0.71618	3.52339	1.31155
36	0.37224	0.62776	2.68644	1.22892
42	0.45745	0.54255	2.18602	1.17407
48	0.53708	0.46292	1.86191	1.13518
54	0.60969	0.39031	1.64019	1.10636
60	0.67454	0.32546	1.48250	1.08435
66	0.73143	0.26857	1.36718	1.06718
72	0.78057	0.21943	1.28111	1.05359
78	0.82240	0.17760	1.21595	1.04274
84	0.85756	0.14244	1.16610	1.03403
90	0.88674	0.11326	1.12773	1.02701
96	0.91069	0.08931	1.09806	1.02136
102	0.93015	0.06985	1.07510	1.01682
108	0.94579	0.05421	1.05731	1.01317
114	0.95825	0.04175	1.04357	1.01026
120	0.96808	0.03192	1.03297	1.00794
126	0.97577	0.02423	1.02483	1.00611
132	0.98174	0.01826	1.01860	1.00468
138	0.98633	0.01367	1.01386	1.00355
144	0.98983	0.01017	1.01027	1.00268
150	0.99249	0.00751	1.00757	1.00201
156	0.99449	0.00551	1.00554	1.00150
162	0.99598	0.00402	1.00404	1.00111
168	0.99708	0.00292	1.00292	1.00082
174	0.99790	0.00210	1.00211	1.00060
180	0.99849	0.00151	1.00151	1.00043
186	0.99893	0.00107	1.00107	1.00031
192	0.99924	0.00076	1.00076	1.00022
198	0.99947	0.00053	1.00054	1.00016
204	0.99963	0.00037	1.00037	1.00011
210	0.99974	0.00026	1.00026	1.00008
216	0.99982	0.00018	1.00018	1.00006
222	0.99988	0.00012	1.00012	1.00004
228	0.99991	0.00009	1.00009	1.00003
234	0.99994	0.00006	1.00006	1.00002
240	0.99996	0.00004	1.00004	1.00001
246	0.99997	0.00003	1.00003	1.00001
252	0.99998	0.00002	1.00002	1.00001
258	0.99999	0.00001	1.00001	1.00000
264	0.99999	0.00001	1.00001	1.00000
270	0.99999	0.00001	1.00001	1.00001

September 18,1989

CLRS EXAMPLE SIMULATED VALUES EXPONENTIAL — 45 MONTH LAG

MONTH	% REPORTED	% UNREPORTED	ATU	ATA
6	0.03191	0.96809	31.33855	3.83112
12	0.12225	0.87775	8.18000	1.89626
18	0.23182	0.76818	4.31377	1.41365
24	0.32771	0.67229	3.05152	1.25608
30	0.41163	0.58837	2.42939	1.17843
36	0.48507	0.51493	2.06155	1.13251
42	0.54935	0.45065	1.82034	1.10240
48	0.60560	0.39440	1.65125	1.08129
54	0.65483	0.34517	1.52711	1.06580
60	0.69792	0.30208	1.43283	1.05403
66	0.73563	0.26437	1.35939	1.04486
72	0.76863	0.23137	1.30102	1.03758
78	0.79751	0.20249	1.25390	1.03169
84	0.82279	0.17721	1.21538	1.02689
90	0.84491	0.15509	1.18356	1.02291
96	0.86427	0.13573	1.15705	1.01960
102	0.88121	0.11879	1.13480	1.01683
108	0.89604	0.10396	1.11602	1.01448
114	0.90901	0.09099	1.10009	1.01249
120	0.92037	0.07963	1.08652	1.01080
126	0.93031	0.06969	1.07491	1.00935
132	0.93901	0.06099	1.06495	1.00811
138	0.94662	0.05338	1.05639	1.00704
144	0.95329	0.04671	1.04900	1.00612
150	0.95912	0.04088	1.04262	1.00532
156	0.96422	0.03578	1.03711	1.00463
162	0.96869	0.03131	1.03233	1.00404
168	0.97260	0.02740	1.02818	1.00352
174	0.97602	0.02398	1.02457	1.00307
180	0.97901	0.02099	1.02144	1.00268
186	0.98163	0.01837	1.01871	1.00234
192	0.98392	0.01608	1.01634	1.00204
198	0.98593	0.01407	1.01427	1.00178
204	0.98769	0.01231	1.01247	1.00156
210	0.98922	0.01078	1.01089	1.00136
216	0.99057	0.00943	1.00952	1.00119
222	0.99175	0.00825	1.00832	1.00104
228	0.99278	0.00722	1.00728	1.00091
234	0.99368	0.00632	1.00636	1.00079
240	0.99447	0.00553	1.00556	1.00069
246	0.99516	0.00484	1.00487	1.00061
252	0.99576	0.00424	1.00426	1.00053
258	0.99629	0.00371	1.00372	1.00046
264	0.99675	0.00325	1.00326	1.00041
270	0.99716	0.00284	1.00285	1.00285

September 18,1989

CLRS Example - IBNR Calculation Based on Lag Distributions

Accident Periods	Year	Months of Dev. @6/30/89	Earned Premium (EP)	Market Index (MI)	Actual Tail Probability (TP)	w	w/(1-w)	Known Count	IBNR Count	Severity	IBNR Based on Act'l Distr.	IBNR Based on Actual Distribution Count	IBNR Based on Actual Distribution Amount
	1984	66	25,000,000	1.000	26.828%							15.20	4,862,912
1						0.3291	0.4906	76	37.29	320,000	11,932,515		
	1985	54	25,000,000	1.000	39.002%							22.09	7,069,603
	1986	42	25,000,000	1.000	45.065%							21.57	6,902,920
2						0.5195	1.0812	46	49.74	320,000	15,915,393		
	1987	30	25,000,000	1.000	58.837%							28.16	9,012,473
							TOTAL	122	87.02	320,000	27,847,909		

CLRS EXAMPLE
Claims to be Reported

DATE OF LOSS	REPORT DATE	INCURRED LOSS
August 1984	July 1989	$750,000
March 1985	July 1989	57,671
November 1986	July 1989	138,061
June 1987	July 1989	337,194
June 1987	July 1989	398,942
May 1984	August 1989	60,880
June 1987	August 1989	750,000
May 1984	September 1989	231,176
November 1984	September 1989	631,850
November 1985	October 1989	65,513
January 1987	October 1989	295,390
April 1985	November 1989	181,746
May 1985	November 1989	571,202
January 1986	November 1989	750,000
July 1986	November 1989	160,947
October 1984	December 1989	750,000
January 1985	December 1989	750,000
April 1986	December 1989	750,000
July 1985	February 1990	404,859
May 1985	March 1990	57,162
April 1986	March 1990	582,828
May 1985	April 1990	63,815
December 1985	May 1990	140,729
December 1985	May 1990	564,960
February 1987	June 1990	332,198
June 1987	July 1990	93,305
August 1984	September 1990	750,000
September 1985	September 1990	77,121
March 1986	October 1990	750,000
April 1987	November 1990	645,249
May 1987	December 1990	17,753
August 1987	December 1990	750,000
November 1987	December 1990	6,970
January 1985	January 1991	154,387
October 1985	January 1991	40,951
August 1986	January 1991	750,000
November 1986	January 1991	464,053
June 1987	January 1991	750,000
September 1987	January 1991	256,612
April 1984	February 1991	23,500
June 1985	March 1991	750,000
May 1984	July 1991	750,000
August 1984	July 1991	8,274
June 1985	July 1991	16,931
December 1984	September 1991	34,149
September 1986	September 1991	637,881
March 1987	September 1991	750,000
January 1987	December 1991	750,000
May 1984	January 1992	246,252
February 1986	February 1992	66,747

CLRS EXAMPLE
Claims to be Reported

DATE OF LOSS	REPORT DATE	INCURRED LOSS
September 1987	February 1992	$442,411
August 1984	March 1992	12,015
April 1986	March 1992	27,402
June 1987	March 1992	599,368
October 1984	April 1992	397,813
December 1985	July 1992	123,196
October 1985	August 1992	301,522
May 1985	November 1992	27,500
June 1987	November 1992	238,327
December 1984	December 1992	97,505
September 1984	February 1993	10,052
November 1985	February 1993	33,687
October 1986	February 1993	567,952
July 1985	April 1993	70,124
January 1986	May 1993	177,616
March 1987	June 1993	617,821
October 1986	August 1993	750,000
January 1984	October 1993	71,295
August 1987	March 1994	113,303
February 1987	April 1994	66,244
September 1987	May 1994	40,874
June 1986	June 1994	463,879
November 1986	August 1994	750,000
December 1986	August 1994	440,840
June 1985	November 1994	181,120
July 1985	November 1994	21,641
November 1986	December 1994	468,376
December 1986	December 1994	35,446
October 1987	March 1995	207,703
July 1987	April 1995	422,532
February 1986	May 1995	269,752
August 1987	September 1995	54,599
November 1987	February 1996	451,740
March 1985	August 1996	2,079
November 1986	December 1996	173,995
May 1985	January 1997	750,000
May 1986	July 1997	184,456
December 1987	January 1998	264,695
April 1987	January 2000	261,465
June 1987	June 2000	750,000
May 1987	July 2002	175,547
September 1986	October 2006	396,049
December 1987	September 2010	507,592
October 1987	November 2011	221,427

CLRS Example -- IBNR Calculation

Accident Periods	Year	Months of Dev. @6/30/89	Earned Premium (EP)	Market Index (MI)	"True" IBNR Count	"True" IBNR
1	1984	66	25,000,000	1.000	16	4,824,761
	1985	54	25,000,000	1.000	24	5,407,916
2	1986	42	25,000,000	1.000	23	9,756,280
	1987	30	25,000,000	1.000	31	11,569,261
				TOTAL	94	31,558,218

MR. ACCOMANDO: Thanks, Ernie. Next we have Bob Bear. Bob is an assistant vice-president and manager of the Technical Department at North Star Reinsurance Corporation, the treaty broker/subsidiary of Gen Re. Bob has a MS degree in theoretical Mathematics from NYU and MS degrees in Industrial and Applied Math and in Economic Systems from the Polytechnic Institute of New York. He is a Fellow of the CAS. Before working at North Star, Bob worked at ISO in commercial lines pricing and econometric research, and also did a stint at Pru Re. Bob?

MR. BEAR: I believe that one of the reasons that this approach to loss reserving has not been used in the past as much as it might have been is that most people who have applied it have fit individual claim data. For many people, the report lags are not easily available, maybe impossible to get, and for others the effort to compile the data and go through the analysis that we've been discussing today may be too great for the task at hand. And it may be thought that the advantages don't just justify the large amount of effort to apply this approach.

So, I'm going to discuss how report lag models or claim settlement lag models can be estimated based on summary data, fitting loss triangles. We all feel comfortable working with that kind of readily available data. I hope to show you that the approach is practical and can be applied efficiently so that the benefits derived justify the effort expended.

I use the summary claim count triangle that was generated based on Ernie Wilson's simulated data. And if you turn to exhibit 3, page 2 of his presentation you'll see the claim count triangle that was generated based on his assumed underlying loss distributions. I took the data and viewed each accident year as a truncated reporting pattern. You only see the claims up to a certain point in time. Beyond that you haven't observed the data. You tell the computer, yes, I'm looking at each accident year as a truncated distribution and you basically input the rows of the triangle as incremental claims reported at each stage of development.

So, for example, in Exhibit A, page 1, the first few numbers under Emp.# are the incremental claims reported for accident year '84. Seven claims were reported for accident year 1984 between zero and 18 months, 13 claims were reported between 18 and 30 months, 11 claims were reported between 30 and 42 months, and 12 claims were reported for '84 between 42 and 60 months. (You'll notice a slight discrepancy with the data in Ernie's triangle. I think you'll see 8 and 12 claims, respectively, reported in the first two 1984 development periods. I used the preliminary summary that Ernie provided. Perhaps it was in error and he corrected it later on, but that wouldn't make any appreciable difference to the work that I've done.)

For 1985, you had 12 claims reported between zero and 18 months, 6 claims reported between 18 and 30 months, and 15 claims reported between 30 and 48 months. The negative numbers under Emp# simply tell the software package that you're at the end of the data for a particular accident year and now you're going to go on to another distribution. Each accident year is a truncated distribution of claims reported in various report lag periods.

At the top of Exhibit A, Page 1, you see the summary output of the Weibull distribution that I fit to the 198485 data. I first tried fitting all of the years combined and obtained unreasonable fits, (e.g., mean lags which just didn't make sense).

Consequently, I analyzed '84-85 separately from '86-87 and I obtained very reasonable report lag patterns for '84-85, but unreasonable patterns for '86-87. It turns out that the maximum likelihood procedure does not always provide reliable estimates when you've only seen a small portion of the report lag distribution. For 1984-85, you've seen enough of the reporting pattern that the maximum likelihood estimate is able to infer what the ultimate reporting pattern is.

So, I estimated reporting patterns for '84-85 based on two alternative models and this is my summary computer output for the Weibull and for the Gamma model. I'm going to use these models to predict the IBNR for '84-85 and since I don't know any better, I'll also attempt to use these models to estimate the IBNR for '86 and '87 as well.

The numbers that are displayed under Mod# are the fitted estimates from the model. Based on the claims that have been reported to date, and the underlying model that has been estimated the software estimates how many claims one would expect to have been reported at the earlier stages.

Knowing the claims reported today and given this estimated distribution, the program calculates how many claims one would have expected to have been reported at the earlier stages. Chi Square contributions, denoted ChSq, are calculated by taking the square of the difference between the actual and fitted values and dividing by the fitted value, Mod#. The Chi Square contributions are added to obtain the Chi Square statistic.

We have four observations for '84 and three for '85. So, that's seven observations. You subtract one degree of freedom and two for the two parameters that you've estimated, yielding four degrees of freedom. A highly significant P value was obtained, which is the significance level at which you would just reject the model. So, the model is clearly fitting well.

You can look, also, at the empirical cumulative probability distribution function (CDF) for accident year '84, denoted EmpFreq, and compare it with the theoretical CDF truncated at 60 months, denoted ModFreq. Similarly you can look at the empirical CDF and theoretical truncated CDF for '85. The empirical and model limited expected values, EmpLEV and ModLEV, respectively, are only of real interest at the latest evaluation. At 60 months for 1984, the time it has taken your average claim to be reported is 32.16 months.

Based on the model, you would expect that the average time to report the 1984 claims would have been 31.73 months. For 1985, the average time to report the claims that you observed to date is 25.36 months. The model will tell you 26.76. The ultimate mean report lag estimated by the fitted Weibull model is 45.5 months. The underlying Weibull that was used to generate this data had a mean report lag of 45 months.

So, given summary data and feeding it into my software program, I was able to estimate the underlying report lag distribution for accident years 1984-85 reasonably accurately. The shape parameter that I got was around 1.65 and the shape parameter underlying the data was 1.5. So, there's a little more variability in the underlying distribution that was used to generate the data, so I'll probably be a little light in my IBNR.

The Gamma model that I'm showing here also produces a very good fit. In fact, the P values of the two models are really not significantly different. Based on the fit, you would have little reason to prefer the Weibull model to the Gamma model if you didn't know what the underlying process was. This is a quite significant judgment that one has to make because the mean report lag for the Weibull distribution is 58 months as

contrasted with the 45.5 months for the Weibull. This is going to account for a very large difference in the IBNR that's going to be estimated by these alternative models.

On Exhibit A, Page 2, we see a graphical comparison of the 1984 histogram and truncated probability density function, denoted PDF. The fit appears to be fairly decent. The Gamma fit was similar.

On page , I also show a comparison of the empirical and model cumulative probability distribution functions and again the fit is rather good. On pages 4-5 you'll see fits for accident year '85 as well. You can see that the fit is fairly decent for this Weibull model. Most importantly, we've estimated the mean report lag fairly accurately.

At the bottom of Exhibit A, page 6, you see a computation of the average amount of time it will take for the IBNR claims to be reported. That's of significant interest certainly to management, as it may have a bearing on how it wants to staff its claims department. This statistic might also influence your judgment as to whether the Weibull or the Gamma was more appropriate for this particular class of business when in real life you wouldn't really know what the underlying process was.

I calculate the average remaining lag by taking the excess pure premium, which should be thought of as the total remaining lags for the claims which are yet to be reported divided by all claims. As you know that the cumulative probability represents the percentage of claims reported at a given stage, one minus the cumulative probability equaled the percentage of claims incurred but not reported at that stage of development.

So, if one divides the excess pure premium by one minus the cumulative probability, one obtains the total remaining lags on the claims yet to be reported divided by the number of claims which are yet to be reported. Hence, this ratio is the average time it will take for the IBNR claims to be reported.

The average age of claims occurring in 1984 and evaluate 6/30/89 is 60 months. So, I calculated the percent reported by averaging the cumulative probability at 60, 54 and 66 months in an effort tc recognize that for '84 some claims are 54 months old and some are 66 months old. I found that this type of an approximation procedure yields an average percent reported close to what would have been obtained from a more accurate procedure which reflects the underlying exposures within an accident year.

I took the excess pure premium at 60 months, 6.15, and divided by one minus .729 to obtain 22.69 as the average time (in months) for IBNR claims to be reported. I probably should have used a similar averaging process on the excess pure premiums, but I was just trying to get an approximate answer as a reasonability test.

The underlying Weibull has an average remaining lag of 25.69 months and the simulated claims that actually came in had an average remaining lag, of coincidentally, 22.69 months.

The fitted Gamma had an average remaining lag of 39.43 months. This is quite different and it has a very large impact on the IBNR. The similar comparison for '85 shows that the fitted Weibull is reasonably close to the underlying Weibull used to generate the data but quite far from the Gamma.

At the bottom of page 6, I show a comparison of the mean lag for all claims based on the alternative models. That is the average time it takes to report all claims and, as I said before, the fitted Weibull is very close to the underlying Weibull used to generate the

data. The lognormal is unreasonably large. The P values of the fitted Weibull and Gamma are about equally good.

It should be noted that if you never knew of Weibulls and Gammas, and you used the fit totally to judge your model and didn't look at these other statistics, and you only knew how to fit lognormals and Transformed Gammas, then the P value of the log normal is much more significant than for the Transformed Gamma. So, you would have preferred that model even though it's giving you a ridiculous average lag and would have generated a ridiculous IBNR. So, clearly there is more to this process than just looking at the fit.

On Exhibit A, page 7, I calculated the IBNR using the Bornheutter-Ferguson type approach that was discussed earlier by Todd and Ernie. Since the method was so well explained, you may look at it at your leisure.

In Exhibit B, I go into some triangulation approaches. These are the kinds of approaches that you would have used if you didn't know of report lag distributions. Since the latest valuation on the triangle of counts is at 66 months, I simply averaged consecutive prior valuations at 12 months, 24 months, etc. in order to get valuations at annual increments consistent with the latest valuation at 66 months.

On Exhibit B, page 1, I went ahead and computed age to age factors, and even filled in a few factors in that portion of the triangle where you don't have many factors. I filled in a few factors for credibility purposes by using a Modified Bondy approach developed at ISO, which is a decay ratio approach. That's illustrated at the bottom of Exhibit B, page 1.

I also told the program that at the eighth valuation, I expect all claims to be reported. So, three more years for 1984 and it's all over. I used the decay ratio approach to calculate tail factors from the fifth to sixth, sixth to seventh, and seventh to eighth periods and multiplied these factors to generate a tail factor for 1984. I used these factors in my loss development approach and in my Bornhuettere-Ferguson calculation displayed on Exhibit B, pages 3 and 4. Note that the ultimate loss ratio used in the Bornhuetter-Ferguson approach is computed by dividing the known loss ratio by an exposure weighted average percent reported.

On Exhibit B, pages 2 and 4, I also used a loss ratio increment analysis, which is really an additive model. It is essentially a Bornhuetter-Ferguson approach with multiplication replaced by addition in the IBNR formula. It is applied to triangles of trended loss ratios, which are projected to ultimate and multipled by on-level premium to estimate ultimate trended losses. IBNR is computed by detrending ultimate losses and subtracting reported losses.

Note that this trend adjustment is also generally performed in the loss development and Bornhuetter-Ferguson approaches. It was not applied in this application because it was assumed that claim frequencies were unaffected by external trends.

The ultimate loss ratio is a known loss ratio plus the expected points of loss ratio to emerge beyond a particular stage of development. We estimate the expected emergence by calculating points of loss ratio (frequently in this example) which have emerged between two stages of development. So, you look at the emergence between the first and second stage, the second and third, et cetera, and you compute average points of loss ratio emergence between these different stages. These are added cumulatively to obtain the expected emergence beyond each stage of development the loss ratio increments displayed at the bottom of page 2. The ultimate loss ratio is the known loss ratio plus

the expected loss ratio to emerge beyond that point using these increments which you have estimated, as displayed at the bottom of page 4. Note that a tail loss ratio increment was computed using an analogus decay ratio approach, as illustrated at the bottom of page 2. Ultimate losses and IBNR are computed in the obvious way, and we don't need to detrend because it was unnecessary to trend our original frequencies.

Alternative indications for the three triangulaton methods are developed two ways. First, assume ultimate is at the eighth valuation. Second, assume ultimate is at the tenth valuation. This is a key assumption of the decay ratio method of calculating your tail factor. You can see on pages 5 and 6 estimates of what the tail factor contributed to the IBNR based on these alternative assumptions and methods. It turns out that the tail factor accounted for about 65 percent of the difference between the IBNR projected by the loss ratio increment method and the IBNR projected by the loss development factor method. The Bornhuetter-Ferguson method yields indications in this case which are between these two methods.

I now want to focus on comparing the projections of the report lag models with those of these triangulation approaches. On Exhibit C, Page 1, you see a comparison of the IBNR predicted by the fitted Weibull and the fitted Gamma with the IBNR expected based on the underlying distributions and the IBNR to emerge from this one simulation. The Underlying Distributions yield expected IBNR.

This is what you would be trying to estimate in pricing and in most reserving cases because you know you can't predict random variation. It is the IBNR you would have expected based on the underlying distributions used to generate the data.

The Actual simulated represents the claims that emerged in this one experiment. In a subsequent exhibit, I compare the model projections to the expected IBNR based on the underlying distributions. The difference between the Actual Simulated IBNR and the Underlying Distributions IBNR projection is attributed to process variation.

On the Exhibit C, Page 2, you see a projection of the dollars based on these methods. Here I'm using the average reported claim to estimate the IBNR for the fitted model and I'm using the underlying average severity to generate my expected IBNR. The actual simulated is the actual data that came in.

On pages 3 and 4, I show a comparison between these projections. You see that the fitted Weibull did a rather good job of predicting the IBNR. The errors in the fitted Weibull are of the same order of magnitude as the errors of the actual simulated data from the expected. This means that if you waited for all of the data to come in and used this to try to tell you more about the underlying process, you wouldn't really learn much more than this fitted Weibull would have told you. Clearly, the fitted Gamma is off by quite a large amount.

On Exhibit C, Pages 5-8, I show projections based on the alternative triangulation techniques. On Page 9, I show the errors in projections of IBNR claim counts based on loss development, Bornhuetter-Ferguson method and the loss ratio increment approach and compare those errors to the errors in the actual simulated IBNR in this one experiment from the underlying expected. The loss ratio increment method does quite well. It tells you as much about the underlying process as you would have learned by waiting for all of the claims to come in. The Bornheutter-Ferguson and loss development methods are progressively further away from the expected IBNR. The numbers that are not in parentheses assume the ultimate is at the eighth valuation. The numbers that are within parentheses assume that ultimate is at the tenth valuation.

The low ratio increment method underpredicted for '84-85 and overpredicted for 1984-87 assuming that all claims are reported at the eighth valuation. This method consistently overpredicts both groups of years if it is assumed that ultimate is at the tenth valuation. But nevertheless, the loss ratio increment method does at least as good a job as the fitted Weibull and, in fact, does a little better in the all year projection. On Page 10, similar error measures are obtained from comparing dollars instead of counts.

This analysis suggests that you might do as well with triangulation approaches as with a report lag approach. However, when you use a report lag approach you generally tend to test more thoroughly your model and you might make more informed judgments about the underlying process based on prior experience. Thus, you may do a better job because you went through that analytical process.

Most people that are using triangulation approaches would have used a traditional Bornheutter-Ferguson and/or loss development approach, and wouldn't have tested the loss ratio increment approach. Prediction errors would have been greater using the more traditional approaches. So, the key is to really try to understand the process and test your models. An advantage of the report lag approach is the understanding that you gain about the underlying process. This may help you to make better judgments, leading to more accurate interpolations and extrapolations.

I now wish to discuss an analysis of ISO claim settlement data. ISO is trying to fit ISO Products, CGL Increased Limits Table 2 claim settlement data in an effort to come up with a more accurate increase limits procedure, which would basically fit paid loss distributions by settlement period. It needs the underlying claim settlement lag distribution in order to average the distributions at various settlement lags to estimate a final size of loss distribution to use in its increased limits calculation.

On Exhibit D, Page 1, I show by accident year the number of claims settled at various lags. Within accident year '73, 3,017 claims were settled in 1973, 1,706 claims were settled in 1974, et cetera. The total of that row is the total claims paid to date. Hence, the data represents claims settled within various settlement lags. The last column is the case outstanding.

Exhibit D, Page 2, shows a comparison of three models that were fitted to this data, again using my statistical package. I inputted the data by accident year as various truncated distributions into my package and fit Lognormal, Transformed Gamma, and a Gamma settlement lag distributions. The numbers at the bottom of Page 2 are the expected percentage claims settled within each lag period. If I calculate cumulative sums, I obtain the cumulative percentage claims settled by accident year displayed at the top of Page 2. That's used to calculate the expected claims outstanding which are used to evaluate the appropriateness of the alternative models.

On Page 3, I show a graph of a histogram and probability density function (PDA) for the Transformed Gamma distribution fit to 1973 data. It appears to provide a pretty reasonable fit even though the Chi-square test statistic was not significant. We're fitting a very large amount of data and ISO has since concluded that two of the years, '79 and '80, should be thrown out due to the disruptivee effects of CSP.

On Page 4, I show the histogram and PDF for 1977, and again the fit is reasonable. The fits for the Lognormal were similar.

On Exhibit D, Page 5, I calculate the expected claims to be settled based on the alternative models. One would expect the model predictions to exceed the current case outstanding because they include IBNR. For the mature years, the Transformed Gamma model predicts total outstanding claims moderately in excess of the case outstanding claims. The Lognormal predictions appear to be too high, while the Gamma model seriously underpredicts the case outstanding claims. It should be noted that the Transformed Gamma distribution is a generalization of the traditional Gamma and Weibull distributions.

On Page 6, the fitted triangle based on the Transformed Gamma is displayed. Given the claims settled to date, expected claims settled at earlier stages are estimated based on this model. Page 7 displays a comparison with the original triangle on Page 1. Percentage errors between the actual data and model predictions are computed. You notice that within the various settlement lags, the fact that the plus and minus signs are not random, is a source of concern. This is an issue that should be addressed in developing a more refined model.

For all accident years with data for a particular settlement lag, I calculated a weighted average error, an unweighted average error and an average absolute error. The errors by settlement lag are larger than one would hope for in a final model, but it does show that the project itself is promising and should be pursued. ISO has spent a lot of effort and they're now developing a more refined model. I'm simply presenting this for illustrative purposes.

On Exhibit D, Page 8, I calculate the mean remaining settlement lag using the same concepts I talked about earlier. For the censored Transformed Gamma model, I take the excess pure premium and divide by one minus the cumulative probability to calculate the mean time it will take to settle those claims which are still outstanding. In the last two columns I calculate the average known lag based on the data and this distribution. For 1973, the claims that have been settled to date have taken an average of 23.2 months. Based on the model one would have expected the claims that have been settled to date to have taken an average of 21.3 months to settle. The comparison on the last two columns of Page 8 show that the model is doing a pretty decent job of estimating the average settlement lag of the claims that have been settled to date.

Note that I said we're using a censored model in these calculations. I've censored the Transformed Gamma at 30 years, assuming any claims that haven't been settled by then will be settled in that last year. I did that because the model predicts claims being settled for a great many years and one would have obtained unreasonable estimates of mean remaining settlement lags if one relied on the uncensored distributions fitted to the claim.

At the bottom of the Page 8, I show the average time to settlement of all claims, as well as the average remaining lags after five years and after fourteen years for these three models. This information might suggest that the model should have been censored at 25 or 20 years. I'll leave that issue to ISO in its development of a more refined model.

I have attempted to demonstrate that this is a feasible approach which can be valuable for ISO in its estimation of increased limit factors, as well as in work that you might be doing using paid reserving methods or in estimating payout patterns.

I conclude that fitting lag distributions to summary data is practical and frequently worth the effort you expend on it. Thank you.

MR. ACCOMANDO: Thanks, Bob. I know people are anxious to get to lunch. Unfortunately, we don't have time for questions. But if you do have burning questions, the panel will stay up here for a few minutes after the session.

Thank you.

Panelist: Robert Bear
Simulation Example: Fitting Summarized Data

Fits of Alternative Models to 1984-85 Data

Fits on 1986-87 and 1984-87 data produced unreasonable results. A lognormal fit to 1984-85 data produced unreasonable results, while a transformed gamma yielded a poorer fit than Weibull and Gamma distributions.

Parameters for Weibull model
Theta[1] =1.65584E+000
Theta[2] =5.08655E+001

Loglikelihood = 9.48059E+001

Var[1] = 8.06124E-002
Var[2] = 2.99122E+002

Correlation matrix of estimators
1.00000 -0.87402
-0.87402 1.00000

Class	EmpFreq	ModFreq	EmpLEV	ModLEV	Actual Emp#	Mod#	ChSq
0	0.0000	0.0000	0.000E+000	0.000E+000	7.00	9.64	-0.72
18	0.1628	0.2241	1.653E+001	1.643E+001	13.00	10.42	0.64
30	0.4651	0.4664	2.477E+001	2.431E+001	11.00	10.36	0.04
42	0.7209	0.7072	2.965E+001	2.924E+001	12.00	12.59	-0.03
60	1.0000	1.0000	3.216E+001	3.173E+001	-1.00	-1.00	-1.00
0	0.0000	0.0000	0.000E+000	0.000E+000	12.00	9.06	0.95
18	0.3636	0.2747	1.473E+001	1.607E+001	6.00	9.80	-1.47
30	0.5455	0.5715	2.127E+001	2.303E+001	15.00	14.14	0.05
48	1.0000	1.0000	2.536E+001	2.676E+001	-10.00	-1.00	-1.00

Chi-square test statistic = 3.90
Degrees of Freedom = 4
Significance level (p-value) = 0.4190

To satisfy assumptions of Chi-Square test, it is suggested that one have at least 5 intervals with at least 5 claims expected in each. The intervals were selected so as to satisfy this criteria.

Parameters for Gamma model
Theta[1] =1.90027E+000
Theta[2] =3.05310E+001

Loglikelihood = 9.48426E+001

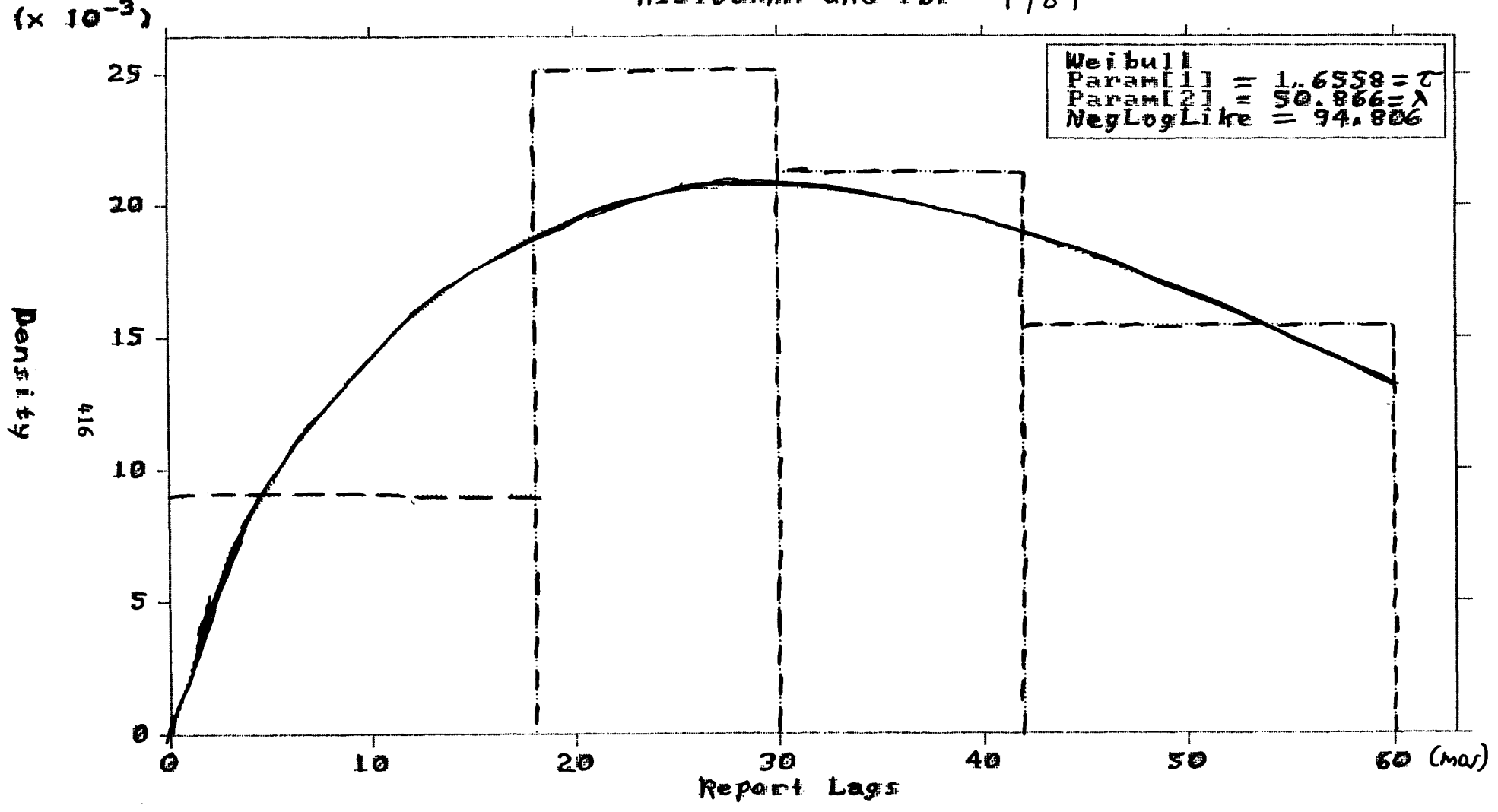
Var[1] = 3.18278E-003
Var[2] = 5.33373E+000

Correlation matrix of estimators
1.00000 -0.96885
-0.96885 1.00000

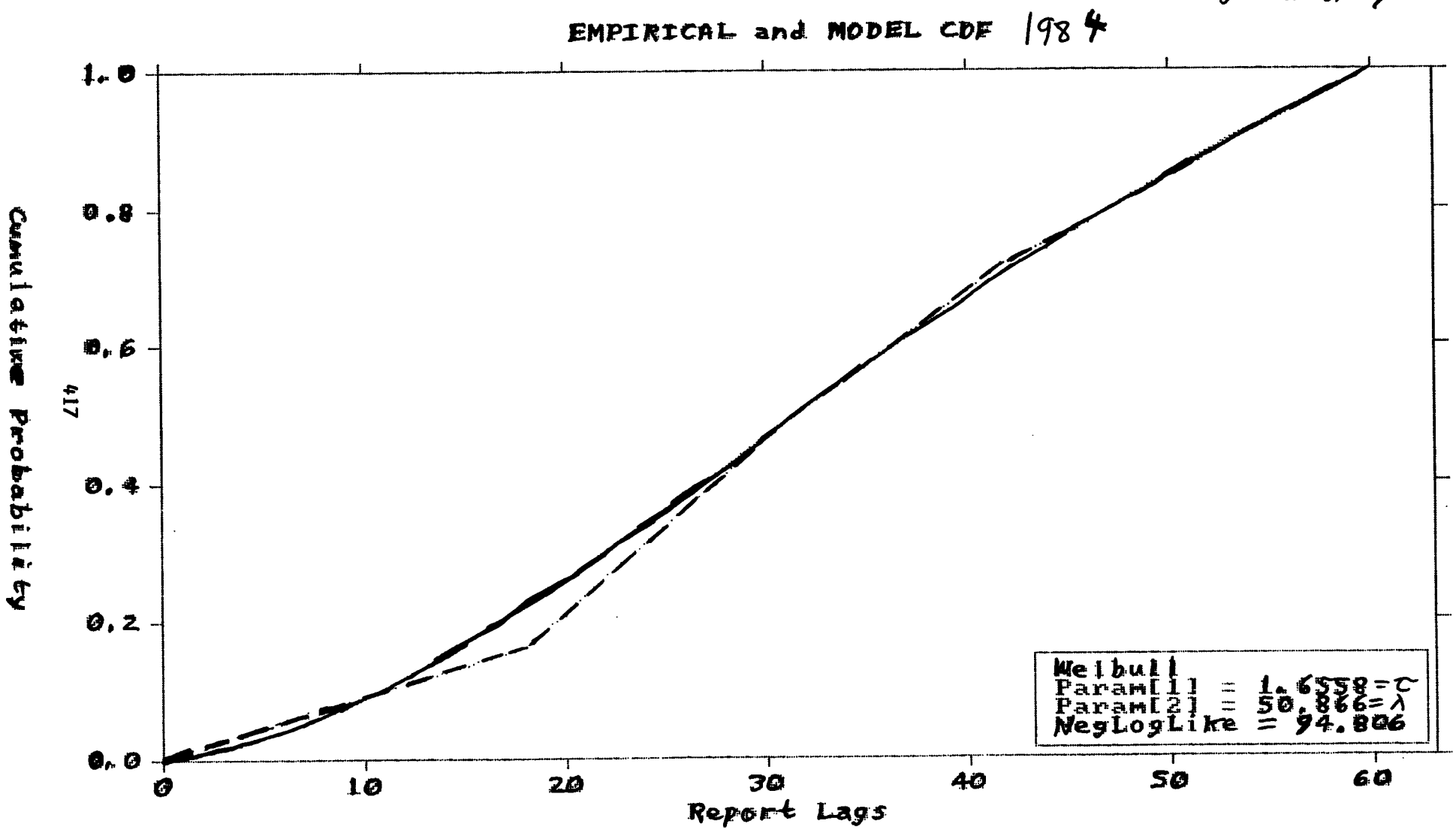
Class	EmpFreq	ModFreq	EmpLEV	ModLEV	Emp#	Mod#	ChSq
0	0.0000	0.0000	0.000E+000	0.000E+000	7.00	9.64	-0.72
18	0.1628	0.2241	1.653E+001	1.647E+001	13.00	10.40	0.65
30	0.4651	0.4660	2.477E+001	2.434E+001	11.00	10.17	0.07
42	0.7209	0.7024	2.965E+001	2.931E+001	12.00	12.80	-0.05
60	1.0000	1.0000	3.216E+001	3.187E+001	-1.00	-1.00	-1.00
0	0.0000	0.0000	0.000E+000	0.000E+000	12.00	9.13	0.90
18	0.3636	0.2766	1.473E+001	1.611E+001	6.00	9.85	-1.50
30	0.5455	0.5750	2.127E+001	2.302E+001	15.00	14.03	0.07
48	1.0000	1.0000	2.536E+001	2.674E+001	-10.00	-1.00	-1.00

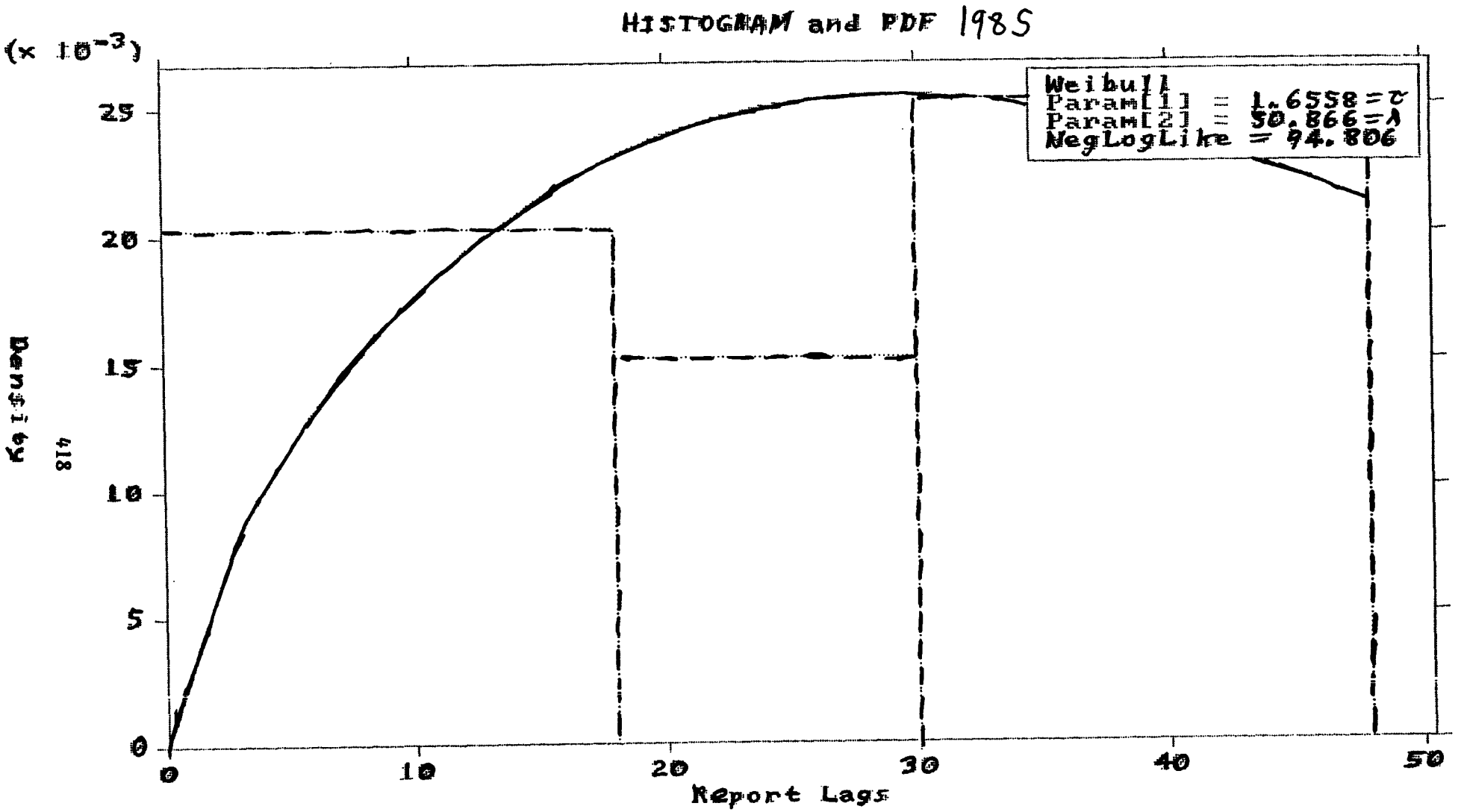
Chi-square test statistic = 3.97
Degrees of Freedom = 4
Significance level (p-value) = 0.4107

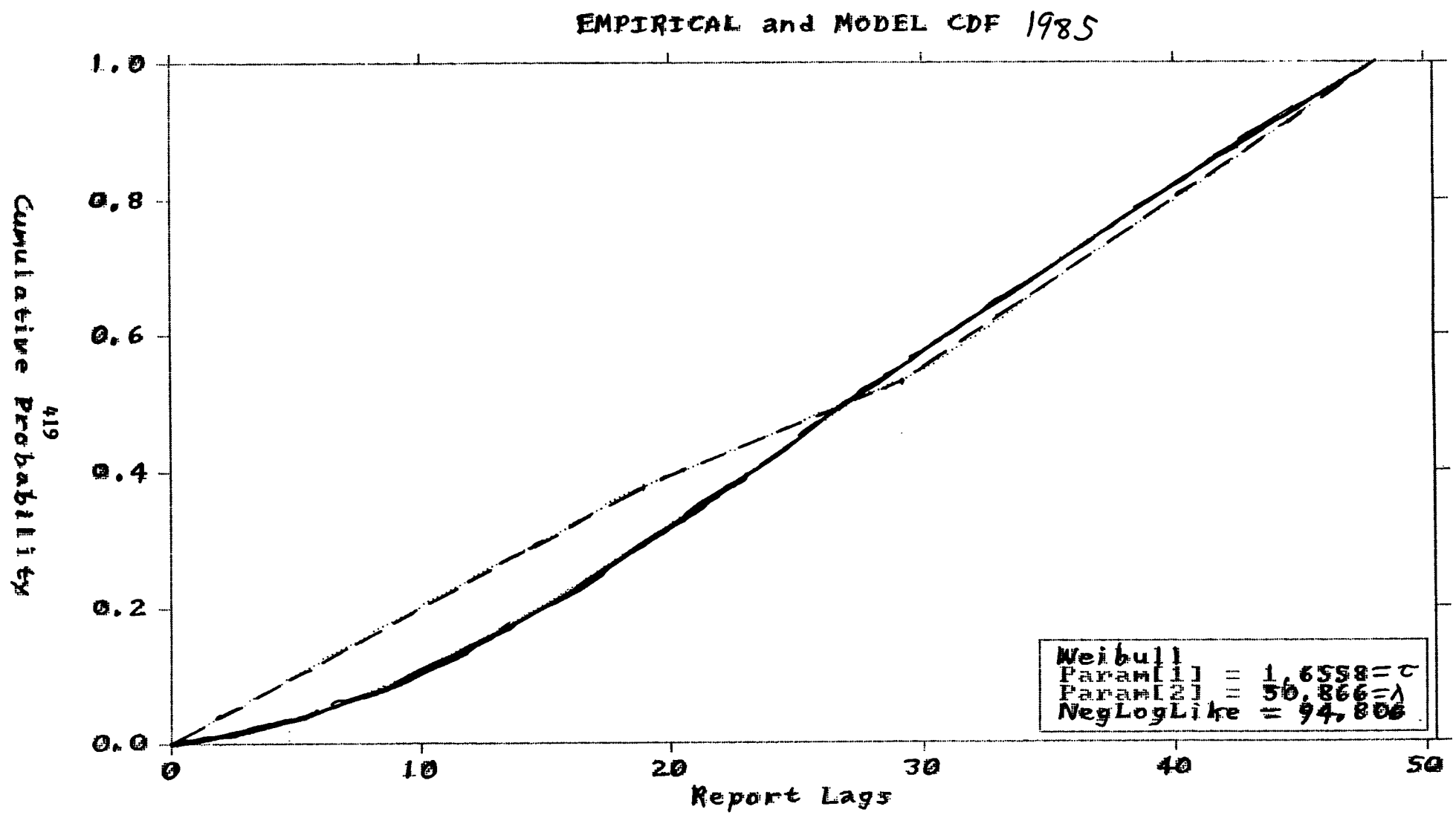
Weibull Fits (Gamma Fits are similar)



Weibull Fits (Gamma fits are similar)




HISTOGRAM and PDF 1985
(x 10^-3)
Density
418
Weibull
Param[1] = 1.6558 = α
Param[2] = 50.866 = λ
NegLogLike = 94.806
25
20
15
10
5
0
0
10
20
30
40
50
Report Lags


EMPIRICAL and MODEL CDF 1985
1.0
0.8
0.6
0.4
0.2
0.0
Cumulative Probability
0
10
20
30
40
50
Report Lags
Weibull
Param[1] = 1.6558 = c
Param[2] = 56.866 = λ
NegLogLike = 94.808

Report Lag Distribution

Weibull

Fitted Weibull
1984-85: $\tau = 1.65584$
$\lambda = 50.8655$

mean report lag 45
std dev 28

Report Lag	Cumulative Probability		Excess Pure Premium
0.00	0.0001		45.47
6.00	0.0282		39.54
12.00	0.0865	.093 @12 mos.	33.87
18.00	0.1630		28.62
24.00	0.2502	.251 @24 mos.	23.86
30.00	0.3411		19.63
36.00	0.4315	.430 @36 mos.	15.95
42.00	0.5178		12.80
48.00	0.5975	.595 @48 mos.	10.15
54.00	0.6692		7.95
60.00	0.7321	.729 @60 mos.	6.15
66.00	0.7861		4.71
72.00	0.8317		3.56
78.00	0.8690		2.66
84.00	0.9006		1.97

Average Remaining Lag (mos)

Year	Age (mos)	Fitted Weibull	Underlying Weibull	Simulated Data	Fitted Gamma
1984	60	22.69	25.69	22.69	39.43
1985	48	25.06	27.67	28.42	40.69

Weibull(τ, λ): $F(x) = 1 - e^{-t}$, $t = \left(\frac{x}{\lambda}\right)^{\tau}$

Gamma(α, λ): $F(x) = \Gamma(\alpha; t)$, $t = \frac{x}{\lambda}$
$\Gamma(\alpha; t)$ is Incomplete Gamma function.

Average Report Lags Based on Fits to 1984-85 Data

Distribution	Mean Lag (mos)	Chi-Square Test Significance Level (p-value)
Fitted Weibull	45.5	.4190
Fitted Gamma	58.0	.4107
Lognormal	217.7	.3964
Transformed Gamma	31.7	.2833
Underlying Weibull	45.0	

Calculation of IBNR Claims Using Alternative Report Lag Distributions

SUMMARY SECTION

COMPANY: Premises/Operations
LINE: Fitted Weibull
EVAL. YR. 1989
AGE (MOS) 12.00

(1) ACCIDENT YEAR	(2) PROVISIONAL PREMIUM	(3) EXPECTED LOSS RATIO	(4) EXPECTED ULT LOSSES	(5) PERCENT UNREPORTED	(6) IBNR PROJECTION		(7) ACTUAL REPORTED	(8) EXPECTED REPORTED	(9) ULTIMATE INCURRED	(10) ULTIMATE LOSS RATIO	(11) Actual IBNR	
1987	10	543.6%	54	74.9%	41		19	14	60	597.2%	31	
1986	10	543.6%	54	57.0%	31		21	23	52	519.9%	23	
1985	10	543.6%	54	40.5%	22	37	26	32	48	480.2%	24	40
1984	10	543.6%	54	27.1%	15		43	40	58	577.3%	16	
	40	543.6%	217	49.9%	(108)		109	109	217	543.6%	(94)	

SUMMARY SECTION

COMPANY: Premises/Operations
LINE: Fitted Gamma
EVAL. YR. 1989
AGE (MOS) 12.00

(1) ACCIDENT YEAR	(2) PROVISIONAL PREMIUM	(3) EXPECTED LOSS RATIO	(4) EXPECTED ULT LOSSES	(5) PERCENT UNREPORTED	(6) IBNR PROJECTION		(7) ACTUAL REPORTED	(8) EXPECTED REPORTED	(9) ULTIMATE INCURRED	(10) ULTIMATE LOSS RATIO	(11) Actual IBNR	
1987	10	648.8%	65	78.9%	51		19	14	70	701.9%	31	
1986	10	648.8%	65	64.0%	42		21	23	63	625.2%	23	
1985	10	648.8%	65	50.4%	33	58	26	32	59	587.0%	24	40
1984	10	648.8%	65	38.7%	25		43	40	68	681.1%	16	
	40	648.8%	260	58.0%	(151)		109	109	260	648.8%	(94)	

421

SUMMARY SECTION

COMPANY: Premises/Operations
LINE: Underlying Weibull
EVAL. YR. 1989
AGE (MOS) 12.00

(1) ACCIDENT YEAR	(2) PROVISIONAL PREMIUM	(3) EXPECTED LOSS RATIO	(4) EXPECTED ULT LOSSES	(5) PERCENT UNREPORTED	(6) IBNR PROJECTION		(7) ACTUAL REPORTED	(8) EXPECTED REPORTED	(9) ULTIMATE INCURRED	(10) ULTIMATE LOSS RATIO	(11) Actual IBNR	
1987	10	473.9%	(50) 47	58.9%	(29.5) 28	49	19	19	47	469.1%	31	54
1986	10	473.9%	(50) 47	45.1%	(22.6) 21		21	26	42	423.7%	23	
1985	10	473.9%	(50) 47	39.1%	(19.6) 19	32	26	29	45	445.3%	24	40
1984	10	473.9%	(50) 47	26.9%	(13.5) 13		43	35	56	557.5%	16	
	40	(500%) 473.9%	(200) 190	42.5%	(85)	(81)	109	109	190	473.9%	(94)	

Numbers in parentheses are based on loss distributions used to generate the simulation.

Panelist: Robert Bear
Simulation Example: Triangulation Techniques

Exhibit B
Page 1 of 6

LOSS DEVELOPMENT ANALYSIS

CEDING COMPANY	Simulation Example	CLASS OF BUSINESS	Premises/Operations
TYPE OF ANALYSIS	RESERVING	RESERVING DATE	06/30/89
NATURE OF LOSS DATA APPEARING ON TRIANGLES	EXCESS	ANALYST'S NAME AND DATE	Bob Bear · 8/11/89

TRENDED LOSS RATIO TRIANGLE

Figures from simulated triangle were interpolated to create triangle below.

Trended accident or policy year loss ratios for each valuation for which data is available.

ACCIDENT YEAR	ON-LEVEL PREMIUM	VALUATION 1 (18 mos)	2 (30 mos)	3 (42 mos)	4 (54 mos)	5 (66 mos)
1984	1.00	3.500	13.500	25.500	36.000	43.000
1985	1.00	6.500	15.000	22.000	33.000	
1986	1.00	9.500	18.000	24.000		
1987	1.00	12.500	22.000			

METHOD USED TO CALCULATE THE ENTRIES ON THIS TRIANGLE
[ENTER 1 FOR THE STANDARD LOSS DEVELOPMENT FACTOR METHOD; ENTER 2 FOR THE TRENDED LOSS RATIO INCREMENT METHOD]: 1

VALUATION AFTER WHICH NO MORE LOSS DEVELOPMENT IS ASSUMED [USED TO COMPUTE THE TAIL FACTOR] DO NOT ENTER A VALUATION NUMBER LESS THAN 5.: 8

ACCIDENT YEAR	ON-LEVEL PREMIUM	1 - 2	2 - 3	3 - 4	4 - 5
1984	1.00	3.857	1.889	1.412	1.191
1985	1.00	2.308	1.467	1.500	1.301 *
1986	1.00	1.895	1.333	1.321 *	1.301 *
1987	1.00	1.760			

* Modified Bondy Factor

NUMBER OF YEARS IN AVERAGE (MINIMUM = 1; MAXIMUM = 4)	3	3	3	3	
WEIGHTED AVERAGE	1.987 *	1.563 *	1.411	1.265	1.391
SELECTED AGE-TO-AGE FACTOR	1.987	1.563	1.411	1.265	1.391

TAIL FACTOR: Modified Bondy (Decay Ratio)

	1-ULTIMATE	2-ULTIMATE	3-ULTIMATE	4-ULTIMATE	TAIL FACTOR
AGE-TO-ULTIMATE FACTOR	7.711	3.880	2.482	1.759	1.391
PERCENT OF LOSSES REPORTED	13.0%	25.8%	40.3%	56.8%	71.9%

* Valuation 3-4 Modified Bondy Factor

$$= \left(\frac{.563}{.987}\right)(.563) + 1^{.422} = 1.321$$

LOSS RATIO INCREMENT ANALYSIS

CEDING COMPANY	Simulation Example	CLASS OF BUSINESS	Premises/Operations
TYPE OF ANALYSIS	RESERVING	RESERVING DATE	06/30/89
NATURE OF LOSS DATA APPEARING ON TRIANGLES	EXCESS	ANALYST'S NAME AND DATE	Bob Bear - 8/11/89

TRENDED LOSS RATIO TRIANGLE — Figures from simulated triangle were interpolated to create triangle below.

Trended accident or policy year loss ratios for each valuation for which data is available.

ACCIDENT YEAR	ON-LEVEL PREMIUM	VALUATION 1(12mos)	2(30mos)	3(42mos)	4(54mos)	5(66mos)
1984	1.00	3.500	13.500	25.500	36.000	43.000
1985	1.00	6.500	15.000	22.000	33.000	
1986	1.00	9.500	18.000	24.000		
1987	1.00	12.500	22.000			

METHOD USED TO CALCULATE THE ENTRIES ON THIS TRIANGLE [ENTER 1 FOR THE STANDARD LOSS DEVELOPMENT FACTOR METHOD; ENTER 2 FOR THE TRENDED LOSS RATIO INCREMENT METHOD]: 2

VALUATION AFTER WHICH NO MORE LOSS DEVELOPMENT IS ASSUMED [USED TO COMPUTE THE TAIL FACTOR] DO NOT ENTER A VALUATION NUMBER LESS THAN 5.: 8

ACCIDENT YEAR	ON-LEVEL PREMIUM	1 - 2	2 - 3	3 - 4	4 - 5
1984	1.00	10.000	12.000	10.500	7.000
1985	1.00	8.500	7.000	11.000	
1986	1.00	8.500	6.000	7.862 *	
1987	1.00	9.500			

* Modified Bondy Increment

					TAIL Increment : Modified Bondy (Decay Ratio)
NUMBER OF YEARS IN AVERAGE (MINIMUM = 1; MAXIMUM = 4)	3	3	3	3	
WEIGHTED AVERAGE	8.833 *	8.333 *	9.787	7.000	11.148
SELECTED AGE-TO-AGE INCREMENT	8.833	8.333	9.787	7.000	11.148

	1-ULTIMATE	2-ULTIMATE	3-ULTIMATE	4-ULTIMATE	TAIL FACTOR
AGE-TO-ULTIMATE INCREMENT	45.102	36.269	27.936	18.148	11.148

* Valuation 3-4 Modified Bondy Increment

$$= \left(\frac{8.333}{8.833}\right)(8.333) = 7.862$$

Exhibit B
Page 3 of 6

PROJECTIONS OF ULTIMATE LOSSES AND LOSS RATIOS

EDING COMPANY	Simulation Example	CLASS OF BUSINESS	Premises/Operations
PE OF ANALYSIS	RESERVING	RESERVING DATE	06/30/89
TURE OF LOSS DATA PPEARING ON TRIANGLES	EXCESS	ANALYST'S NAME AND DATE	Bob Bear - 8/11/89

UMBER OF ACCIDENT YEAR VALUATIONS APPEARING ON LOSS TRIANGLES: 5

REND LINE SELECTIONS: LOSSES MISCELLANEOUS 1 | PREMIUMS MISCELLANEOUS 1

Ultimate = 8 Valuation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
ACCIDENT YEAR	COLLECTED PREMIUM	PREMIUM TREND FACTOR	ON-LEVEL PREMIUM [(1)*(2)]	LATEST VALUATION UNTRENDED LOSSES	LOSS TREND FACTOR	LATEST VALUATION TRENDED LOSSES [(4)*(5)]	LATEST VALUATION UNTRENDED LOSS RATIO [(4)/(1)]	LATEST VALUATION TRENDED LOSS RATIO [(6)/(3)]	ULTIMATE LOSS DEVELOPMENT FACTOR	PERCENT OF LOSSES REPORTED [1.0/(9)]	ULTIMATE TRENDED LOSS RATIO INCREMENT
1984	1.00	1.000	1.00	43	1.000	43	43.000	43.000	1.391	71.9%	11.148
1985	1.00	1.000	1.00	33	1.000	33	33.000	33.000	1.760	56.8%	18.148
1986	1.00	1.000	1.00	24	1.000	24	24.000	24.000	2.483	40.3%	27.936
1987	1.00	1.000	1.00	22	1.000	22	22.000	22.000	3.880	25.8%	36.269
TOTAL	4.00		4.00	122		122	30.500	30.500		48.7%	

LOSS DEVELOPMENT FACTOR METHOD

	(12)	(13)	(14)	(15)	(16)	(17)
	TRENDED DATA			TRENDED DATA		
ACCIDENT YEAR	ULTIMATE LOSSES [(6)*(9)]	PROJECTED IBNR [(12)-(6)]	ULTIMATE LOSS RATIO [(12)/(3)]	ULTIMATE LOSSES [(12)/(5)]	PROJECTED IBNR [(15)-(4)]	ULTIMATE LOSS RATIO [(15)/(1)]
1984	60 = 43(1.391)	17	59.825	64	21	64.395
1985	58	25	58.068	63	30	62.503
1986	60	36	59.584	64	40	64.135
1987	85	63	85.367	92	70	91.888
TOTAL	263	141	65.711	283	161	70.730

Ultimate = 8 valuations

Ultimate = 10 valuations

Exhibit B
Page 4 of 6

BORNHEUTTER-FERGUSON METHOD

ACCIDENT YEAR	(18) ULTIMATE LOSSES [(6)+(19)]	(19) PROJECTED IBNR [(3)*(25) *(1-(10))]	(20) ULTIMATE LOSS RATIO [(18)/(3)]	(21) TRENDED DATA ULTIMATE LOSSES [(18)/(5)]	(22) TRENDED DATA PROJECTED IBNR [(21)-(4)]	(23) TRENDED DATA ULTIMATE LOSS RATIO [(21)/(1)]
1984	61	18*	60.618¥	65	22	65.402
1985	60	27	60.043	65	32	64.827
1986	61	37	61.411	66	42	66.195
1987	68	46	68.499	73	51	73.283
TOTAL	251	129	62.643	270	148	67.427

Ultimate = 8 valuations

(24) BORNHEUTTER-FERGUSON AVERAGE TRENDED ULTIMATE LOSS RATIO = (LATEST EVALUATION TRENDED LOSS RATIO FOR ALL YEARS COMBINED)/ (AVERAGE PERCENT OF LOSSES REPORTED) = 62.643 (8 valuations) 67.427 (10 valuations)

Ultimate = 10 valuations

(25) SELECTED TRENDED EXPECTED LOSS RATIO (Enter as a decimal.) 62.643 (8 valuations) 67.427 (10 valuations)

* (62.643)(1.0)(1-.719) = 17.6 = IBNR
Ultimate Losses = 43+17.6 = 60.6

LOSS RATIO INCREMENT METHOD

ACCIDENT YEAR	(26) ULTIMATE LOSSES [(3)*(28)]	(27) PROJECTED IBNR [(26)-(6)]	(28) ULTIMATE LOSS RATIO [(8)+(11)]	(29) TRENDED DATA ULTIMATE LOSSES [(26)/(5)]	(30) TRENDED DATA PROJECTED IBNR [(29)-(4)]	(31) TRENDED DATA ULTIMATE LOSS RATIO [(29)/(1)]
1984	54	11	54.148Ø	57	14	57.290
1985	51	18	51.148	54	21	54.290
1986	52	28	51.936	55	31	55.077
1987	58	36	58.269	61	39	61.411
TOTAL	216	94	53.875	228	106	57.017

Ultimate = 8 valuations Ultimate = 10 valuations

Ø Ultimate Loss Ratio = 43+11.148 = 54.148
Ultimate Losses = (1)(54.148) = 54.148
IBNR = 54.148 − 43 = 11.148

ADDITIONAL DOLLARS OF TRENDED PROJECTED IBNR DUE TO TAIL FACTOR AND TAIL INCREMENT

Ultimate = 8 valuations

TAIL FACTOR — Loss Development Technique

ACCIDENT YEAR	(1) ON-LEVEL PREMIUM	(2) LATEST VALUATION TRENDED LOSSES	(3) ULT. LOSS DEV. FACTOR WITH TAIL	(4) ULT. LOSS DEV. FACTOR WITHOUT TAIL [(3)/1.391]	(5) ULTIMATE LOSSES WITH TAIL [(2)*(3)]	(6) ULTIMATE LOSSES WITHOUT TAIL [(2)*(4)]	(7) ADDITIONAL IBNR DUE TO TAIL FACTOR [(5)-(6)]	(8) RATIO OF ADDITIONAL IBNR TO PREMIUM [(7)/(1)]
1984	1	43	1.391	1.000	60	43	17	16.825
1985	1	33	1.760	1.265	58	42	16	16.331
1986	1	24	2.483	1.784	60	43	17	16.757
1987	1	22	3.880	2.789	85	61	24	24.009
TOTAL	4	122			263	189	74	18.481

Tail factor is increasing IBNR by an average of 18.5 claims per year.

TAIL INCREMENT — Loss Ratio Increment Technique

ACCIDENT YEAR	(1) ON-LEVEL PREMIUM	(2) LATEST VALUATION TRENDED LOSSES	(3) ULT LOSS RATIO INCREMENT WITH TAIL	(4) ULT LOSS RATIO INCREMENT WITHOUT TAIL [(3)-11.148]	(5) ULTIMATE LOSSES WITH TAIL [(2)+(1)*(3)]	(6) ULTIMATE LOSSES WITHOUT TAIL [(2)+(1)*(4)]	(7) ADDITIONAL IBNR DUE TO TAIL FACTOR [(5)-(6)]	(8) RATIO OF ADDITIONAL IBNR TO PREMIUM * [(7)/(1)]
1984	1	43	11.148	0.000	54	43	11	11.148
1985	1	33	18.148	7.000	51	40	11	11.148
1986	1	24	27.936	16.787	52	41	11	11.148
1987	1	22	36.269	25.121	58	47	11	11.148
TOTAL	4	122			216	171	45	11.148

Tail increment is increasing IBNR by an average of 11.1 claims per year.

* By definition, the tail increment must equal the ratio of the additional trended IBNR generated by its inclusion to the respective on-level premium. This statement holds for all accident or policy years.

ADDITIONAL DOLLARS OF TRENDED PROJECTED IBNR DUE TO TAIL FACTOR AND TAIL INCREMENT

Ultimate = 10 valuations

TAIL FACTOR — Loss Development Technique

ACCIDENT YEAR	(1) ON-LEVEL PREMIUM	(2) LATEST VALUATION TRENDED LOSSES	(3) ULT. LOSS DEV. FACTOR WITH TAIL	(4) ULT. LOSS DEV. FACTOR WITHOUT TAIL [(3)/1.498]	(5) ULTIMATE LOSSES WITH TAIL [(2)*(3)]	(6) ULTIMATE LOSSES WITHOUT TAIL [(2)*(4)]	(7) ADDITIONAL IBNR DUE TO TAIL FACTOR [(5)-(6)]	(8) RATIO OF ADDITIONAL IBNR TO PREMIUM [(7)/(1)]
1984	1	43	1.498	1.000	64	43	21	21.395
1985	1	33	1.894	1.265	63	42	21	20.766
1986	1	24	2.672	1.784	64	43	21	21.309
1987	1	22	4.177	2.789	92	61	31	30.529
TOTAL	4	122			283	189	94	23.500

Tail factor is increasing IBNR by an average of 23.5 claims per year.

TAIL INCREMENT — Loss Ratio Increment Technique

ACCIDENT YEAR	(1) ON-LEVEL PREMIUM	(2) LATEST VALUATION TRENDED LOSSES	(3) ULT LOSS RATIO INCREMENT WITH TAIL	(4) ULT LOSS RATIO INCREMENT WITHOUT TAIL [(3)-14.290]	(5) ULTIMATE LOSSES WITH TAIL [(2)+(1)*(3)]	(6) ULTIMATE LOSSES WITHOUT TAIL [(2)+(1)*(4)]	(7) ADDITIONAL IBNR DUE TO TAIL FACTOR [(5)-(6)]	(8) RATIO OF ADDITIONAL IBNR TO PREMIUM * [(7)/(1)]
1984	1	43	14.290	0.000	57	43	14	14.290
1985	1	33	21.290	7.000	54	40	14	14.290
1986	1	24	31.077	16.787	55	41	14	14.290
1987	1	22	39.411	25.121	61	47	14	14.290
TOTAL	4	122			228	171	57	14.290

Tail increment is increasing IBNR by an average of 14.3 claims per year.

* By definition, the tail increment must equal the ratio of the additional trended IBNR generated by its inclusion to the respective on-level premium. This statement holds for all accident or policy years.

Panelist: Robert Bear

Projection of IBNR Claim Counts
Based on Fitted Report Lag Distributions

Accident Year	Fitted Weibull	Fitted Gamma	Underlying * Distributions	Actual Simulated
1987	40.7	51.2	29.5	31
1986	31.0	41.5	22.6	23
1985	22.0	32.7	19.6	24
1984	14.7	25.1	13.5	16
1984-85	36.7	57.8	33.0	40
1984-87	108.4	150.5	85.0	94

* The following distributions were selected to simulate the data. The report lag distribution for 1984-85 is Weibull with mean of 45 months and shape of 1.5. The report lag distribution for 1986-87 is Weibull with mean of 45 months and shape of 1 (exponential with mean of 45 months). Fifty claims expected each year are generated by Negative Binomial distribution with standard deviation of 5 claims. (Variance to mean ratio is .5).

Projection of IBNR Losses (Millions)

Accident Year	Fitted** Weibull	Fitted** Gamma	Underlying*** Distributions	Actual Simulated
1987	12.92	16.25	9.70	11.57
1986	9.84	13.17	7.43	9.76
1985	6.98	10.38	6.44	5.41
1984	4.67	7.97	4.44	4.82
1984-85	11.65	18.35	10.85	10.23
1984-87	34.41	47.78	27.94	31.56

** Assume average IBNR claim equals average reported claim of $317,458.

*** Assume average IBNR claim equals average underlying Pareto claim in layer of $328,708. (The parameters of the Pareto severity distribution used to simulate claim values are B = $13,547.75, Q = 1.13, P = .893, and T = $21,934. These are ISO Premises/Operations Table 2 parameters.)

Percentage Errors in Projections of Expected IBNR Claims Counts
(Expected IBNR claim counts are based on underlying distributions.)

Accident Year	Fitted Weibull	Fitted Gamma	Actual Simulated
1987	+38%	+74%	+5%
1986	+37%	+84%	+2%
1985	+12%	+67%	+22%
1984	+9%	+86%	+19%
1984-85	+11%	+75%	+21%
1984-87	+28%	+77%	+11%

Percentage Errors in Projection of Expected IBNR Losses (Millions)
(Expected IBNR losses are based on underlying distributions.)

Accident Year	Fitted Weibull	Fitted Gamma	Actual Simulated
1987	+33%	+68%	+19%
1986	+32%	+77%	+31%
1985	+8%	+61%	-16%
1984	+5%	+80%	+9%
1984-85	+7%	+69%	-6%
1984-87	+23%	+71%	+13%

Note: As expected IBNR counts and losses are based on underlying loss distributions, the variation in the actual simulated IBNR of this one experiment from the expected IBNR can be thought of as process variation.

Projection of IBNR Claim Counts
Based on Triangulation Techniques
Assume All Claims Reported at Eighth Valuation (102 months)

Accident Year	Loss Development	Bornhuetter-Ferguson	Loss Ratio Increment	Underlying * Distributions	Actual Simulated
1987	63.4	46.5	36.3	29.5	31
1986	35.6	37.4	27.9	22.6	23
1985	25.1	27.0	18.1	19.6	24
1984	16.8	17.6	11.1	13.5	16
1984-85	41.9	44.6	29.2	33.0	40
1984-87	140.9	128.5	93.5	85.0	94

* The following distributions were selected to simulate the data. The report lag distribution for 1984-85 is Weibull with mean of 45 months and shape of 1.5. The report lag distribution for 1986-87 is Weibull with mean of 45 months and shape of 1 (exponential with mean of 45 months). Fifty claims expected each year are generated by Negative Binomial distribution with standard deviation of 5 claims. (Variance to mean ratio is .5).

Projection of IBNR Losses (Millions)
Assume All Claims Reported at Eighth Valuation (102 months)

Accident Year	Loss ** Development	Bornhuetter- ** Ferguson	Loss Ratio** Increment	Underlying*** Distributions	Actual Simulated
1987	20.13	14.76	11.52	9.70	11.57
1986	11.30	11.87	8.86	7.43	9.76
1985	7.97	8.57	5.75	6.44	5.41
1984	5.33	5.59	3.52	4.44	4.82
1984-85	13.30	14.16	9.27	10.85	10.23
1984-87	44.73	40.79	29.68	27.94	31.56

** Assume average IBNR claim equals average reported claim of $317,458.

*** Assume average IBNR claim equals average underlying Pareto claim in layer of $328,708. (The parameters of the Pareto severity distribution used to simulate claim values are B = $13,547.75, Q = 1.13, P = .893, and T = $21,934. These are ISO Premises/Operations Table 2 parameters.)

Projection of IBNR Claim Counts
Based on Triangulation Techniques
Assume All Claims Reported at Tenth Evaluation (126 months)

Accident Year	Loss Development	Bornhuetter-Ferguson	Loss Ratio Increment	Underlying * Distributions	Actual Simulated
1987	69.9	51.3	39.4	29.5	31
1986	40.1	42.2	31.1	22.6	23
1985	29.5	31.8	21.3	19.6	24
1984	21.4	22.4	14.3	13.5	16
1984-85	50.9	54.2	35.6	33.0	40
1984-87	160.9	147.7	106.1	85.0	94

* The following distributions were selected to simulate the data. The report lag distribution for 1984-85 is Weibull with mean of 45 months and shape of 1.5. The report lag distribution for 1986-87 is Weibull with mean of 45 months and shape of 1 (exponential with mean of 45 months). Fifty claims expected each year are generated by Negative Binomial distribution with standard deviation of 5 claims. (Variance to mean ratio is .5).

Projection of IBNR Losses (Millions)
Assume All Claims Reported at Tenth Evaluation (126 months)

Accident Year	Loss ** Development	Bornhuetter- ** Ferguson	Loss Ratio** Increment	Underlying*** Distributions	Actual Simulated
1987	22.19	16.29	12.51	9.70	11.57
1986	12.73	13.40	9.87	7.43	9.76
1985	9.37	10.10	6.76	6.44	5.41
1984	6.79	7.11	4.54	4.44	4.82
1984-85	16.16	17.21	11.30	10.85	10.23
1984-87	51.08	46.89	33.68	27.94	31.56

** Assume average IBNR claim equals average reported claim of $317,458.

*** Assume average IBNR claim equals average underlying Pareto claim in layer of $328,708. (The parameters of the Pareto severity distribution used to simulate claims values are B = $13,547.75, Q = 1.13, P = .893, and T = $21,934. These are ISO Premises/Operations Table 2 parameters.)

Percentage Errors in Projections of Expected IBNR Claim Counts
Based on Triangulation Techniques
Assume All Claims Reported at Eighth Valuation (102 months)
(Numbers in parentheses are based on assumption that all claims are reported at tenth valuation; i.e., 126 months)

Accident Year	Loss Development	Bornhuetter-Ferguson	Loss Ratio Increment	Actual Simulated
1987	+115%(+137%)	+58%(+74%)	+23%(+34%)	+5%
1986	+58%(+77%)	+65%(+87%)	+23%(+38%)	+2%
1985	+28%(+51%)	+38%(+62%)	- 8%(+9%)	+22%
1984	+24%(+59%)	+30%(+66%)	-18%(+6%)	+19%
1984-85	+27%(+54%)	+35%(+64%)	-12%(+8%)	+21%
1984-87	+66%(+89%)	+51%(+74%)	+10%(+25%)	+11%

Percentage Errors in Projections of Expected Losses (Millions)
Based on Triangulation Techniques
Assume All Claims Reported at Eighth Valuation (102 months)
(Numbers in Parentheses are based on assumption that all claims are reported at tenth valuation; i.e., 126 months)

Accident Year	Loss Development	Bornhuetter-Ferguson	Loss Ratio Increment	Actual Simulated
1987	+108%(+129%)	+52%(+68%)	+19%(+29%)	+19%
1986	+52%(+71%)	+60%(+80%)	+19%(+33%)	+31%
1985	+24%(+45%)	+33%(+57%)	-11%(+5%)	-16%
1984	+20%(+53%)	+26%(+60%)	-21%(+2%)	+9%
1984-85	+23%(+49%)	+31%(+59%)	-15%(+4%)	-6%
1984-87	+60%(+83%)	+46%(+68%)	+6%(+21%)	+13%

Note: As expected IBNR counts and losses are based on underlying loss distributions, the variation in the actual simulated IBNR of this one experiment from the expected IBNR can be thought of as process variation.

Panelist: Robert Bear

Exhibit D
Page 1 of 8

Analysis of Fit of Transformed Gamma Distribution
ISO Products CGL Table 2 Data
Actual Values

Numbers of Claims Settled at Various Lags

Accident Year	1	2	3	4	5	6	7	8
1973	3,017	1,706	431	257	221	128	121	58
1974	2,991	2,119	473	303	259	189	138	113
1975	4,463	2,551	506	416	264	250	146	115
1976	4,302	2,619	627	411	403	292	203	157
1977	4,521	3,062	777	488	420	355	245	200
1978	5,151	2,933	761	524	490	489	433	239
1979	5,838	5,462	1,450	1,285	841	747	508	723
1980	8,966	6,459	1,719	1,419	1,097	658	601	
1981	9,876	6,642	1,753	1,339	941	748		
1982	10,135	6,247	1,710	1,292	1,179			
1983	10,924	7,639	1,961	1,469				
1984	9,442	6,284	2,389					
1985	8,949	6,364						
1986	6,656							
Yr 73-85	88,575	60,087	14,557	9,203	6,115	3,856	2,395	1,605

Accident Year	9	10	11	12	13	14	Total Paid	Case Outstanding
1973	36	108	135	145	88	41	6,492	188
1974	91	89	89	47	47		6,948	344
1975	101	230	105	164			9,311	1,652
1976	150	109	130				9,403	522
1977	129	147					10,344	434
1978	246						11,266	786
1979							16,854	1,789
1980							20,919	1,858
1981							21,299	1,721
1982							20,563	2,312
1983							21,993	3,496
1984							18,115	4,323
1985							15,313	4,448
1986							6,656	5,853
Yr 73-85	753	683	459	356	135	41	188,820	23,873

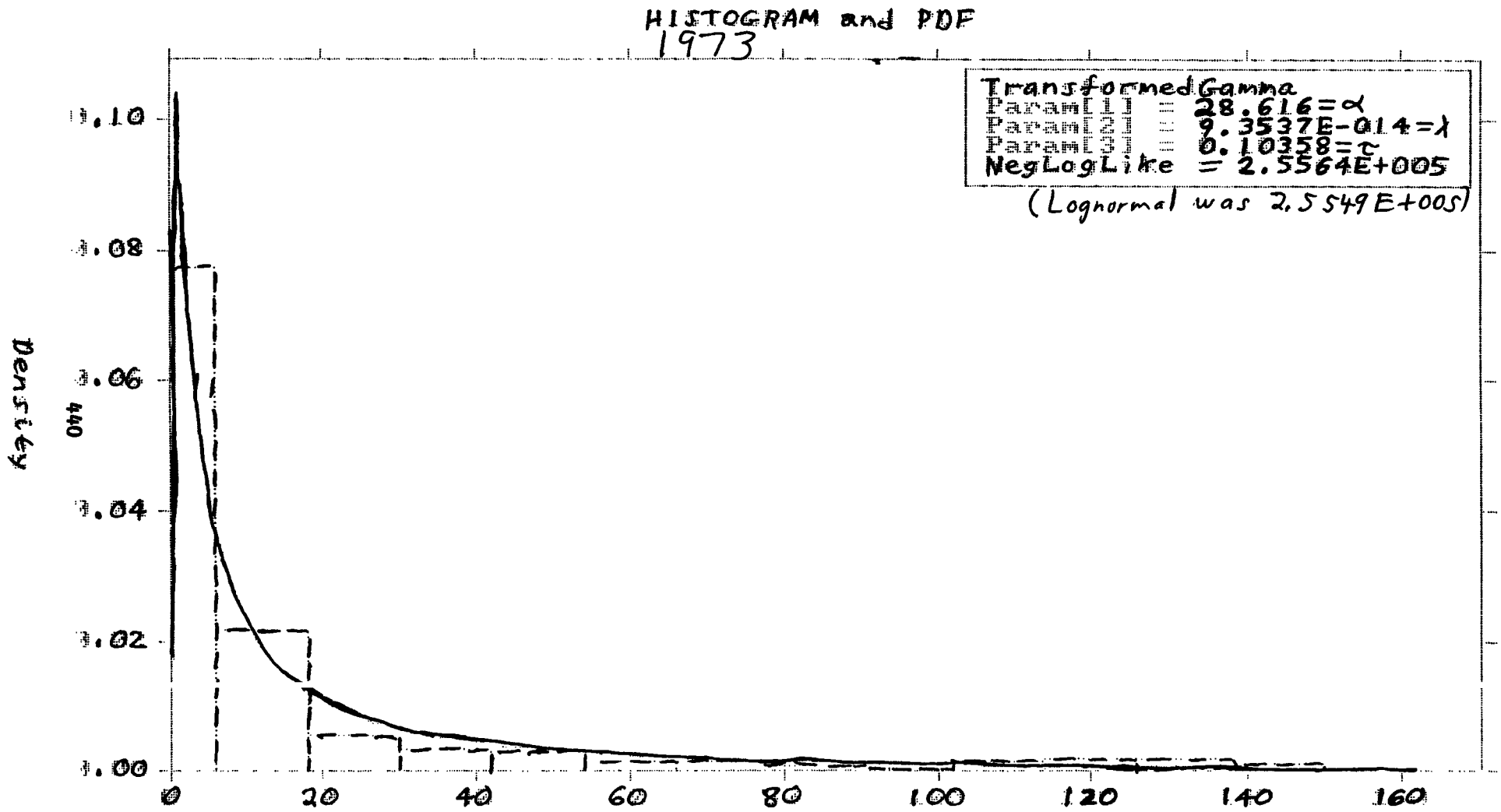
Exhibit D
Page 2 of 8

Analysis of Claim Settlement Patterns

ISO Products CGL Table 2 Data

Accident Year	Cumulative Percentage Claims Settled		
	Lognormal	Trans. Gamma	Gamma
1977	0.9118	0.9224	0.9762
1978	0.9016	0.9122	0.9678
1979	0.8890	0.8997	0.9562
1980	0.8734	0.8840	0.9401
1981	0.8533	0.8635	0.9174
1982	0.8255	0.8352	0.8839
1983	0.7871	0.7959	0.8359
1984	0.7281	0.7354	0.7630
1985	0.6228	0.6280	0.6431
1986	0.3821	0.3888	0.4249

Lag (years)	Expected Percentage Claims Settled		
	Lognormal	Trans. Gamma	Gamma
Ten & Over	9.84%	8.78%	3.22%
9	1.26%	1.25%	1.16%
8	1.56%	1.57%	1.61%
7	2.01%	2.05%	2.27%
6	2.78%	2.83%	3.35%
5	3.84%	3.93%	4.80%
4	5.90%	6.05%	7.29%
3	10.53%	10.74%	11.99%
2	24.07%	23.92%	21.82%
1	38.21%	38.88%	42.49%
	100.00%	100.00%	100.00%


HISTOGRAM and PDF
1973
Transformed Gamma
Param[1] = 28.616 = α
Param[2] = 9.3537E-014 = λ
Param[3] = 0.10358 = τ
NegLogLike = 2.5564E+005
(Lognormal was 2.5549E+005)
Density
.10
.08
.06
.04
.02
.00
0
20
40
60
80
100
120
140
160

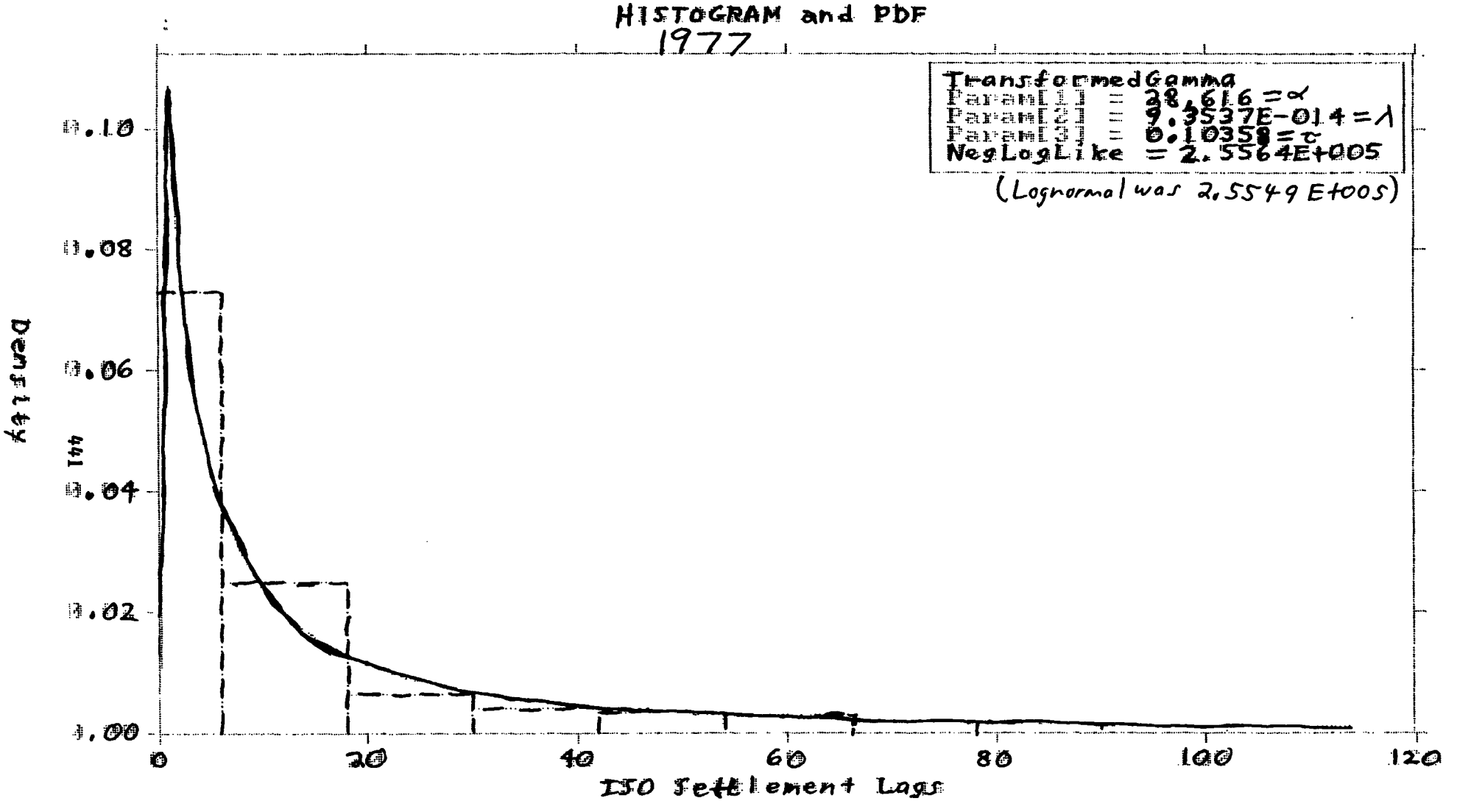

HISTOGRAM and PDF
1977
TransformedGamma
Param[1] = 28.616 = α
Param[2] = 9.3537E-014 = λ
Param[3] = 0.10359 = c
NegLogLike = 2.5564E+005
(Lognormal was 2.5549 E+005)
Density
0.10
0.08
0.06
0.04
0.02
0.00
0
20
40
60
80
100
120
ISO Settlement Lags

Exhibit D
Page 5 of 8

Analysis of Claim Settlement Patterns

ISO Products CGL Table 2 Data

Accident Year	Total Claims at 12/31/86 Paid	Case Outstanding
1973	6,492	188
1974	6,948	344
1975	9,311	1,652
1976	9,403	522
1977	10,344	434
1978	11,266	786
1979	16,854	1,789
1980	20,919	1,858
1981	21,299	1,721
1982	20,563	2,312
1983	21,993	3,496
1984	18,115	4,323
1985	15,313	4,448
1986	6,656	5,853
All Years	195,476	29,726
Years 1976-85	166,069	21,689
Years 1976-82	110,648	9,422
Years 1973-78	53,764	3,926
Years 1973-81	112,836	9,294

Accident Year	Expected Claims Outstanding (includes IBNR) Lognormal	Trans. Gamma	Gamma
1973	422	350	48
1974	494	414	69
1975	728	618	124
1976	814	699	169
1977	1,001	870	252
1978	1,230	1,084	375
1979	2,104	1,879	772
1980	3,032	2,745	1,333
1981	3,662	3,367	1,918
1982	4,347	4,057	2,701
1983	5,949	5,640	4,318
1984	6,765	6,518	5,627
1985	9,274	9,071	8,498
1986	10,764	10,463	9,009
All Years	50,586	47,775	35,212
Years 1976-85	38,178	35,930	25,963
Years 1976-82	16,190	14,702	7,520
Years 1973-78	4,689	4,035	1,037
Years 1973-81	13,487	12,026	5,059

Exhibit D
Page 6 of 8

Analysis of Fit of Transformed Gamma Distribution
ISO Products CGL Table 2 Data
Fitted Values from Transformed Gamma

Accident Year	1	2	3	4	5	6	7	8
1973	2,717	1,631	700	404	266	188	140	108
1974	2,924	1,755	754	435	286	202	151	116
1975	3,943	2,367	1,016	587	385	273	202	157
1976	4,013	2,408	1,034	597	392	278	207	160
1977	4,454	2,674	1,148	663	435	308	230	177
1978	4,905	2,944	1,264	730	479	340	253	195
1979	7,441	4,466	1,918	1,107	727	515	383	296
1980	9,400	5,643	2,423	1,399	919	651	484	
1981	9,798	5,881	2,525	1,458	958	678		
1982	9,771	5,865	2,518	1,454	955			
1983	10,959	6,578	2,825	1,631				
1984	9,750	5,852	2,513					
1985	9,569	5,744						
1986	6,656							
Yr 73-85	89,644	53,808	20,638	10,465	5,802	3,433	2,050	1,209

Transformed Gamma

Chi-square test statistic = 5936 (Lognormal Chi-Square is 5644 with
Degrees of Freedom = 101 102 d.f., where
Significance level (p-value) is less than 0.0003 $\mu = 2.28746, \sigma = 1.81162$)
Parameters
Alpha = 28.6158
Lambda = 9.35372E-14
Tau = .103576

Accident Year	9	10	11	12	13	14	Total Paid	Predicted Outstanding
1973	86	70	57	48	41	35	6,492	350
1974	92	75	62	52	44		6,948	414
1975	125	101	83	70			9,311	618
1976	127	103	85				9,403	699
1977	141	114					10,344	870
1978	155						11,266	1,084
1979							16,854	1,879
1980							20,919	2,745
1981							21,299	3,367
1982							20,563	4,057
1983							21,993	5,640
1984							18,115	6,518
1985							15,313	9,071
1986							6,656	10,463
Yr 73-85	726	463	287	170	85	35	188,820	37,312

Exhibit D
Page 7 of 8

Analysis of Fit of Transformed Gamma Distribution
ISO Products CGL Table 2 Data
Percentage Errors of Actuals from Transformed Gamma Fitted Values

$$\% \text{ error} = \left(\frac{\text{actual} - \text{fitted}}{\text{fitted}}\right) 100$$

Accident Year	1	2	3	4	5	6	7	8
1973	11%	5%	-38%	-36%	-17%	-32%	-14%	-46%
1974	2%	21%	-37%	-30%	-9%	-6%	-9%	-3%
1975	13%	8%	-50%	-29%	-31%	-8%	-28%	-27%
1976	7%	9%	-39%	-31%	3%	5%	-2%	-2%
1977	2%	15%	-32%	-26%	-3%	15%	7%	13%
1978	5%	37%	-40%	-28%	2%	44%	71%	23%
1979	-22%	22%	-24%	16%	16%	45%	33%	144%
1980	-5%	14%	-29%	1%	19%	1%	24%	
1981	1%	13%	-31%	-8%	-2%	10%		
1982	4%	7%	-32%	-11%	23%			
1983	32%	16%	-31%	-10%				
1984	-3%	7%	-5%					
1985	-6%	11%						
Weighted Yr 73-85	-1%	12%	-29%	-12%	5%	12%	17%	33%
Unweight Average	1%	11%	-32%	-18%	0%	8%	10%	15%
Average Absolute	6%	11%	32%	21%	13%	19%	23%	37%

Accident Year	9	10	11	12	13	14	Total Paid	Predicted Outstanding
1973	-58%	54%	137%	202%	115%	17%	0%	-46%
1974	-1%	19%	44%	-10%	7%		0%	-17%
1975	-19%	128%	27%	134%			0%	168%
1976	18%	6%	53%				0%	-25%
1977	-9%	29%					0%	-50%
1978	59%						0%	-28%
1979							0%	-5%
1980							0%	-32%
1981							0%	-49%
1982							0%	-43%
1983							0%	-38%
1984							0%	-34%
1985							0%	-51%
Yr 73-85	4%	48%	60%	109%	59%	17%	0%	-36%
Unweight Average	-2%	47%	65%	109%	61%	17%	0%	-19%
Average Absolute	27%	47%	65%	115%	61%	17%	0%	45%

Exhibit D
Page 8 of 8

ISO Products CGL Table 2 Data
Settlement Lag Distribution: Censored Transformed Gamma
All Claims Assumed Settled Within Thirty Years

Accident Year	Lag	Cumulative Probability	Excess Pure Premium (mos)	Mean Remaining Settlement Lag	Average Known Lag	
					Data	Model
1986	6	0.3888	29.74	48.66	3.0	2.3
1985	18	0.6282	24.19	65.06	6.7	5.6
1984	30	0.7354	20.50	77.48	8.9	8.0
1983	42	0.7959	17.73	86.87	10.2	10.1
1982	54	0.8352	15.55	94.36	12.1	11.8
1981	66	0.8635	13.75	100.73	13.6	13.3
1980	78	0.8840	12.24	105.52	15.9	14.7
1979	90	0.8997	10.95	109.17	20.6	15.9
1978	102	0.9122	9.82	111.85	19.1	17.0
1977	114	0.9224	8.83	113.79	18.4	18.0
1976	126	0.9308	7.95	114.88	19.2	18.9
1975	138	0.9378	7.16	115.11	20.2	19.8
1974	150	0.9438	6.45	114.77	20.4	20.6
1973	162	0.9489	5.81	113.70	23.2	21.3

Note 1: Mean Remaining Settlement Lag = (Excess Pure Premium)/(1-Cum. Probability)

Settlement Lag Distribution	Censored	Average Lag (mos)	Average Remaining Lag	
			After 5 Years	After 14 Years
Trans. Gamma	Yes - 30 years	34.3	94.4	113.7
Lognormal	Yes - 30 years	37.4	105.5	121.9
Gamma	No	21.5	37.6	36.0

Note 2 : For uncensored distributions, mean of Transformed Gamma is 40.7 months, while mean of Lognormal is 50.8 months.

1989 CASUALTY LOSS RESERVE SEMINAR

3C: CURRENT ISSUES AFFECTING ALAE

Moderator

Stuart N. Lerwick
Fireman's Fund Insurance Company

Panel

John J. Kollar
Insurance Services Office, Inc.

Lisa J. Kramer
Tillinghast/Towers Perrin

MR. LERWICK: The luncheon ran on a little bit late, but I think the topic was worth it. The topic here, this is Session 3C for those checking your program. And the topic as displayed up here is "Current Issues Affecting Allocated Loss Adjustment Expense."

Before getting into the agenda of what we're going to cover today, I guess I want to start off by commenting simply on the name. I think what will emerge from our discussion later on in reviewing the reserves for this item is this is sort of what I would call a Rodney Dangerfield reserve. It gets no respect. And part of the reason, I think, is just simply the name. Somehow we've come up with this, I think it's ten syllables, a bunch of words pieced together, no one of which can really stand on its own.

I mean, if you take any one of them, they are the kind of word that you've got to have something else along with it, you know. People generally know what an expense is, but if it's like my vacation expense or automotive expenses, or medical expense, or legal expense, which of course is what we're going to be talking about here. But we don't have any of those. What we have is adjustment expense.
Well, what the hell is an adjustment? I mean, that's another of those words you need something else to go with it. For those in this room, maybe a gap adjustment or something like that.

Loss is a pretty good word because we know it means claim, which is a good solid word. But in the context of all these other words, it would appear it's sort of an accounting jargon and you might think this is profit or loss.

To top it off, we've got good old allocated. And that's pretty much a nothing word all by itself too.

But I think part of the reason why a person in the general public might react that this is not an important issue, or it's hard to believe that anybody could care about such thing is simply this name. And I think we probably would do well if we, actuaries, would come up with something better, but we'll have to make do with what we have.

Of course, what we're really talking about is legal expenses, the cost of defending claims that are disputed or litigated or have the potential to go to litigation. And I think if we put it in those terms the general public could understand and realize that we have some real issues in the country and could probably understand that the insurance industry would be faced with problems arising from our tort system, arising from litigation.

What we're going to cover today, this is a quick overview, we're going to have three presentation segments. The first of which is to give you an overview of trends in the environment generally. The level of litigation in the country and how that is affecting the insurance mechanism. Where is it coming from geographically, what lines of business, what is changing of late.

We're going to take a look at how these trends are affecting insurance operations in a day-to-day sense and a people sense. And that, of course, primarily is seen in claims departments of insurance carriers.

How are claims departments dealing with this emerging problem, the rising level of litigation? What strategies and tactics are they employing? How do you cope with what is happening? The value to us and many of us in this room have responsibilities for setting loss reserves and reserves for this category is that it's very helpful to understand the dynamics of the process, what is really going on day-to-day if we're going to figure

out what it is we have to quantify and measure and track over time if we're going to then extrapolate into the future to develop a reasonable and accurate reserve.

We're going to look at how well we're doing in the industry. We're actually going to look, I guess, at page 76 of that report that Jack Burn talked about. And the message here is, maybe because this is a Rodney Dangerfield type of reserve, I really don't think we're doing a good job at all. Particularly with regard to these reserves.

We're going to try to leave a little time at the end for questions and answers. That's not to foreclose any questions.
I assume the panelists will be amenable to questions, points of fact, clarification as we proceed. But if you have wider ranging questions, what do you really think about the impact of the Cumas (phonetic) decisions and what does all that mean long term, we could spend probably an hour and a half on any one of those alone. So, we're going to allow all of about ten minutes at the end for that.
Who are we? Your MC here, I'm Stu Lerwick, actuary at Fireman's Fund Insurance Company. One of my prime responsibilities is setting reserves, developing recommendations for funding actions to make sure we maintain a sound and disciplined balance sheet to use Jack's term.

We have John Kollar, Vice-President and actuary at Insurance Services Office. John's area is responsible, among other things, for developing actuarial analyses and studies to support informed debate, I guess, of public policy issues. He's also responsible for looking at industry financial performance, particularly as it may relate to rate making. It cuts across all lines of business. So, for example, investment income and reserves fall in that category.

So, John is here to present some new information on the first item that I mentioned on the agenda, an update of some of the trends and developments in the environment and in the industry. And he will also comment on that page 76.

And on the panel, also, we have Lisa Kramer, who is a litigation and claims management consultant with Tillinghast in their Philadelphia office. Lisa brings a very valuable real world perspective to what is going on here and, I think, can help fill us in on what is really happening. Today she is consulting with Tillinghast. She's a consultant and provides clients with advice on how to deal with the problem of litigation in their claims departments.

Before that, she was a vice-president with a major property casualty insurer, and developed the litigation management strategies and programs that are in place there, and administered those.

Before that, she was a practicing attorney on the defense side, defense counsel, and on the plaintiff's side. So, she's sort of done it all. And I think has a unique vantage point to really fill us in on what is happening from the vantage point of all the players in the game.

So, with that, I'd like to turn the podium over to John Kollar, who will start us off on the first segment.

MR. KOLLAR: Thank you, Stu. Good afternoon. As Stu said, we're trying to talk about allocated loss adjustment expense here. That's the main theme of the presentation this afternoon. When we think of allocated loss expense, we have to remember this is something that I like to characterize as defense cost. I'll use the terms interchangeably. And defense cost is something that is provided on every single policy. Every liability policy provides for defense.

(Slide)

The first slide basically points out the kind of standard wording from a GL policy which says we have a duty to defend. Now, everyone knows we have a duty to indemnify. But the duty to defend actually transcends that duty to indemnify. It is more important. It's something that the courts view almost universally as a more important duty.

If we look at defense costs, we can view that as something separate from losses. It's beyond the duty to indemnify. It's in addition to it. Further there's no particular dollar limit mentioned. It's a time limit. It actually applies until you have expended the policy limits by the payment of judgments and settlements. Until that takes place, defense costs are unlimited, and that's something you always have to keep in mind.

(Slide)

Now, if we take a look at a definition, generally the definition of allocated is that it's anything that can be traced to a particular claim. Well, the ISO stat plan has something a little bit more specific and I just put it up here so we can talk about some of the components. We're talking about attorneys fees, and that can include discovery and other court expenses, like expert witnesses. And then we also have other loss adjustment expense, those that we cannot trace down to a particular claim and we'll just call those unallocated.

Now, just a bit of information. The last specific point on the slide, adjustors fees, varies by statistical agent. It's not that important here. We're really talking about the general subject of allocated and unallocated.

(Slide)

I think it was mentioned at lunch time that, maybe defense costs are not a material problem. It's immaterial to the extent of about $12 billion. And it also represents about eight percent of earned premium. These are estimates that we put together from Schedule P.

Of course, we don't have reserves for allocated expenses separated on Schedule P. What is extremely important to remember is through this point in time it's very difficult to get all the data that you want to analyze to find out if the reserves are appropriate. Whatever the issue you're trying to resolve, there is really a lack of good data to this point.

With the 1989 statement it's going to get better. It won't be perfectly solved, but it will be better. So, you'll notice as I go through the presentation, the sources will vary. That's the best we could do as far as coming up with data. That's part of the problem, getting the appropriate data to do the job right. Consequently, it was very necessary and important to make estimates.

(Slide)

Looking at it another way, allocated as a percentage of incurred losses, was 13 percent -- Pretty significant. Now, I'd just like to point out one thing else that's very important. There are reserves included in here with the incurred. Both numerator and denominator. We're talking about how good are the reserves for allocated, how good are the reserves for losses. Keep that in mind for the second part of my presentation. These numbers are just as good as the reserves that underlie them.

(Slide)

Okay. Allocated loss adjustment expense. Let's look at some by line information. Worker's compensation. We're talking about 6.8 percent, the ratio of allocated to incurred losses. Now, we have to keep in mind that worker's compensation indemni is mainly statutory benefits. A lot of things are determined by table and you can look them up. There doesn't seem like there's a big need for attorneys. But still, 6.8 percent of incurred losses.

Now, we'll take a look at auto liability, 7.6 percent. Not too bad yet. But keep in mind again what we're talking about. PIP is in here, personal injury protection, medical payments. There's some first party coverage in here and that has to be kept in mind.

(Slide)

Looking at multi-peril. A lot of property in there and yet we're still running 12.8 percent. Take a look at GL. Well, now, we're starting to make real progress here. We're up to 34 percent. So, roughly put, for every $4 of losses and allocated loss adjustment expense, we're talking about one dollar of the four being for allocated loss adjustment expense for GL. And we'll add in medical malpractice at 35.8 percent, finishing first, but still not way ahead of GL. So, that gives you an idea of the situation by line.

(Slide)

Now, if we take a look at the last ISO study on defense costs, going back to 1986, we looked at several things. Was this a problem that existed in one particular area or that maybe extended to certain classifications or policy limits or what have you. Well, when we did that study a few years ago we we saw that we couldn't attribute it to a particular area. It was not just a problem in particular states, that was not the case.

We looked at classification and, well, maybe it's limited to a few classes. There were some classes that were worse than others. But when we tried to predict what would happen in these classes in subsequent years, we found that some classes had good years and some classes had bad. So, there was nothing conclusive there either.

And size of loss -- I'd say size of risk is a much better way to describe this. When we looked at size of risk, we found out that there was no pattern there. No matter how big the risk was or the limits they purchased, the ratio of allocated to losses still stayed roughly the same. We couldn't identify a segment that had a greater proportion of allocated loss adjustment expense.

And for policy limits, the same thing. We looked at that as well. And again, no pattern. It wasn't just centralized in accounts that had very high policy limits -- say over a million dollars.

So, this was the study done in 1986. Now, Stu said we were updating some things today, and that's true. Currently, we're producing a new study on defense costs and it's going to be broader than the last one. The prior one was restricted to GL. Now, we're going to look at all of the lines, all of the Schedule P lines at least -- and we'll provide a report on that by the end of the year.

We have done some analysis on geographic data and just for the heck of it we said, well, let's put together some slides on that. (We had some nifty slides, so we thought we could make use of them.)

(Slide)

So we looked at geographic variations and we tried different models on different sublines of GL. Using one particular model on owners, landlords and tenants data we saw that there were some states that had worse experience than the average. Okay. (Slide) So, then we took another shot at it and we found a few states that had better experience. Okay.

(Slide)

We went so far as to look at products, which is not the best thing to look at (basically you're talking countrywide coverage here), but, you know, we figured let's take a shot at it anyway, and see if we can find any pattern. These states came out worse. (Slide) And those came out better.

(Slide)

So, we said, well, let's try another model. And we looked at this model for again, owners, landlords and tenants. This model showed different states. You know, again, we cut it a little bit differently. We wanted to see if we had a really meaningful pattern. And as it turns out when you take a look at it... I'm just going to flip through the rest of these. (Slide) These are the better states. (Slide) This is products (Slide) worse and better.

It turns out that you really cannot find to this point a conclusive pattern that really shows that you can trace it down to a particular area or areas and say, yeah, those states are better or worse. Okay. Most of them cluster around the average.

(Slide)

Now, we wanted to also take a look at what has been happening over time. We see that losses incurred are growing. Okay. No surprise to anybody.

(Slide)

The source of this data is A.M. Best. Let's take a look now at loss adjustment expense. Now, I have to point out this is total loss adjustment expense, not allocated loss adjustment expense. If you take a look at it though, you'll see that loss adjustment expense from 1984 onwards is starting to grow faster than the losses.

The growth rates are pretty consistent from '76 to '84. But it takes off in '84. Here we are looking at all lines and seeing that the loss adjustment expense, which includes unallocated, is actually growing faster than the losses now, and has been for a few years.

(Slide)

So, let's take a look now at some of the lines of business. Let's take a look at the Schedule P lines and ultimate losses. I have to point out to you that ultimate losses are something that we estimated. We actually developed the losses on Schedule P to what we figured were their ultimate
values. And you can see the losses are, again, similar to the all lines data, going up pretty quickly, pretty consistently.

Just for your information, we did use a paid development approach. If we did it on incurred basis, we'd get very similar results. And there are other methods that we are considering looking at. But just looking at that you can see losses growing.

Take a look at ultimate allocated loss adjustment expense. We've approximated this and we've compared the loss adjustment expense, the allocated loss adjustment expense as a ratio to losses. Now, it looks pretty flat and in reality it is. I kind of see it going downwards a little bit during the first years, but maybe no fault laws have an impact or whatever. And then it seems to be going up a little bit. Again, that's the ratio of allocated to losses.

Try another line. Multi-peril. Losses growing. Okay. Maybe towards the end there, you know, they dipped a little bit. Perhaps the fact that there were a couple of light catastrophe years had something to do with that. So, not as many property losses.

By the way, the reason we have 1977 here instead of '76 is that we just could not obtain the '76 in the time frames of this presentation.

So, we took a shot at allocated compared to the losses. And lo and behold, look what is happening. The allocated is growing faster.

So, we tried another line. Worker's compensation. Losses growing.

And now we take a look at allocated compared to the losses and look what is happening at the end of that line, starting to grow pretty quickly.

And let's take a look at med-mal. That's a little more erratic, but still generally heading upwards. Maybe there is an impact of tort reform measures or something towards the end of the line. I don't know. And here is a ratio of the allocated to the incurred losses. Well, as you can see from that one over the whole course of the line or virtually the whole course of the line, it is growing rapidly. It looks like just a GL problem. Right? Okay.

General liability, there are the losses and the ratio of allocated to losses. And that is growing over the course of the line. So, it seems like it may be more than just a GL problem. Okay. And since we originally targeted for a GL study, we have done some extra work on general liability and the next few slides will address that particular area.

(Slide)

The source of this information is ISO expense data, it's calendar year data for GL. We have a special call on our expense analysis where we ask companies to split out the allocated from the unallocated. So, this slide shows just the allocated. As a ratio to incurred losses for general liability, you can see that it has grown a little bit from the 40's. At one point it was not a major component. And all of a sudden it's gone from 10 to 33 percent today.

(Slide)

Now, to be fair you have to look at the unallocated, because maybe something else is happening there. In fact, it is. As you can see, the unallocated has dropped. Okay. But let's see what it looks like together. Put the two together (simply add them up) and you see you have a definite upward pattern. You're starting to approach 10 cents for every dollar going towards expense costs. So, there is something here to be concerned about. GL is probably the worst.

(Slide)

Okay. The problem is continuing. It has been around, but it's deteriorating, it's getting worse. And there are several things that may continue to make it worse. You have bad faith situations. Early on at the beginning, I mentioned the contract language. There is teeth in that language and insurers have to make sure that they meet the duties of the contract, the duty to defend. If they don't, they could be held to bad faith.

An article recently talked about reinsurers being concerned with how well primary insurers are doing as far as handling losses and loss adjustment expenses. That came out in the last week. A little bit different aspect of the same type of problem.

Good news-bad news, also known as winning the battle and losing the war. Some situations, companies go out there and they win the suit. No losses zero losses in a situation. Maybe they lose the war because defense costs are enormous. We took a look at a sample of some GL data and found out there were about nine claims with zero dollars in losses, but over a million dollars in defense cost. That's just a horror story, but, you know, they are there. So you can win and lose at the same time.

Litigation between insurers. Well, probably every week in the Nationa Underwriter you can find an article involving litigation between companies. What's the coverage, who is on the coverage, how long, et cetera.

Growth of litigation in new areas. There's quite a bit of that. Let's take a look at a couple of examples. Personal auto liability, pretty standard stable line. Not much happens there, it stays pretty much the same, other than some problems in a few states.

(Slide)

Percentage of claimants with attorneys, that might have an impac on things. The source of this is the AIRAC closed claim study which was released this year. For all liability coverage going back to 1977, ten years earlierthan the last study, we saw that 31 percent of the claimants had attorney's. And I have to point out that those are not just bodily injury claims, they are medical payments, personal injury protection, UM, UIM, everything except property damage liability. The number of claimants with attorneys has increased from 31 to 44 percent.

Now, let's take a look at one particular coverage, personal injury protection. The first party coverage, a piece of cake. You know, you just make the claim, you get paid, and that's about it. In some states it's unlimited, you know, they pay for everything, witch doctors, everything, whatever you need, whatever it is.

And you take a look at PIP, in 1977, 17 percent of the people consulted attorneys. It's up

to 31 percent on a first party coverage. That's an item of concern. Just one example.

(Slide)

Pollution liability. That's a favorite subject now. And that is a real problem. All you have to do is read the press, there's plenty of articles, superfunds, whatever, lots and lots of dollars going down the tubes just to determine who is going to pay. It says nothing about how much is going to be paid, the $200 billion. Just lots of legal costs. A lot of them may not be defense costs, but nevertheless it's an indication of the problem, the litigiousness of our society. And we'll take a look at one other indication.

Number of lawyers. Well, they make their contribution, but, you know, they have a job to do and they are just a sign of our society. Society wants this. Society feels that people have to be recompensed. And that contributes to the problem. So, there's been a big increase in the number of lawyers. Just remember that one for a while and we'll come back to it a little bit later on.

I guess, to sum it up, I'd say that defense costs are more than an immaterial problem. You can see it's a real problem and it's growing, and it's something that we have to deal with. It's here and we just have to make sure we treat it correctly.

With that, I'd like to turn it over to Lisa.

(Applause)

MS. KRAMER: Let's see if we can get the first slide on the screen.

(Slide 1)

Okay. I want to take care of a couple of housekeeping items before I go into my presentation for you. First of all, you won't have in the handouts hard copies of all the slides I'm going to use and if you would like a hard copy of a slide and it isn't there, if you will either give me your card after this session or call me in Philadelphia at Tillinghast, I'd be happy to send you a copy.

Second, I want to say that although I might have liked to have been a plaintiff's lawyer, I've never represented a plaintiff and I'm back there on your side of the table. I was a defense lawyer and then went to CIGNA and ran their staff counsel program, and was responsible for the policies and procedures that CIGNA used to manage and control outside litigation.

With that in mind, I'd like to go on to talk to you about how in the claims industry some property-casualty companies have come to cope with the problem of ever increasing allocated loss adjustment expense, legal fees.

Is this in focus? No. Rich, can we get -- is that better? Okay.

The problem in the United States is that we call our lawyers to sue before we call our opponents to talk. And as a result you're going to see more and more litigation, more and more legal costs, and more and more lawyers.

(Slide 2)

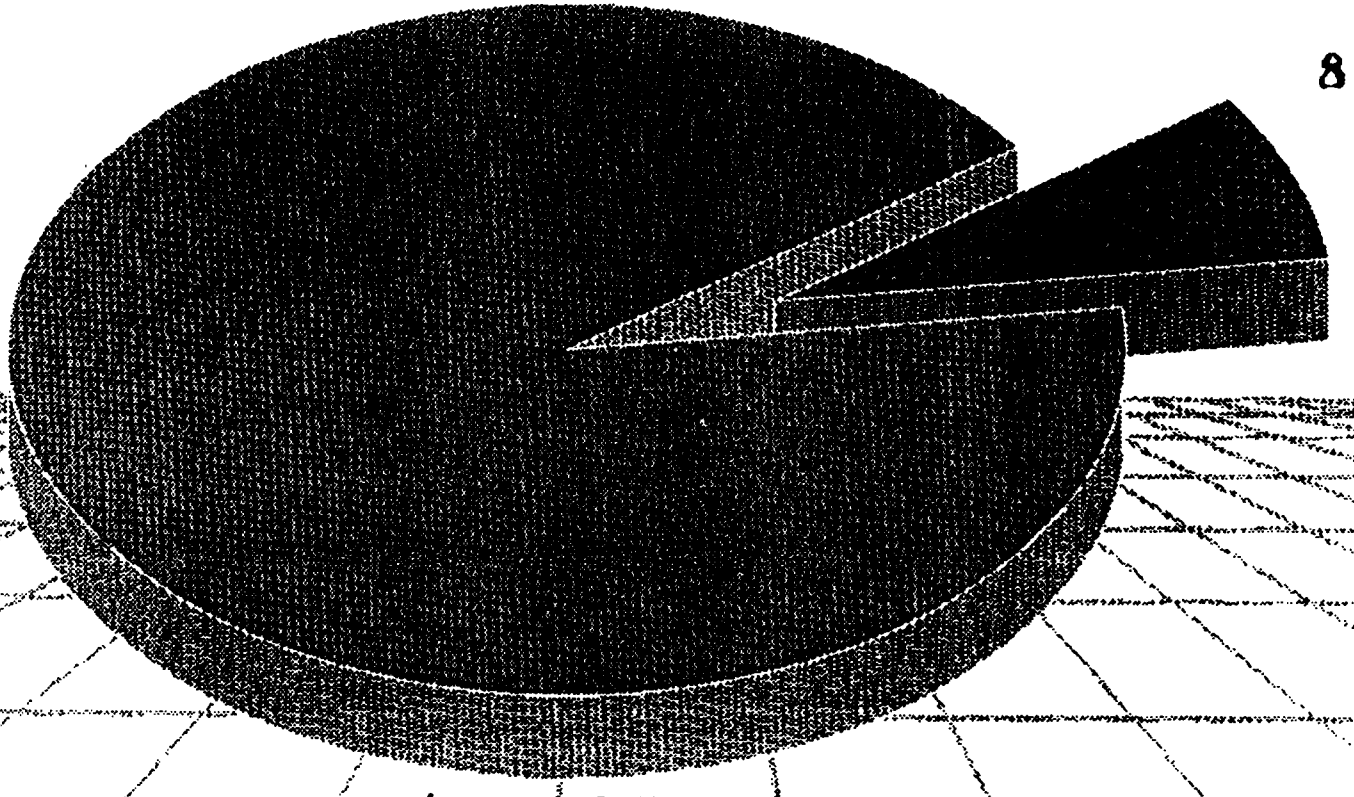
Tillinghast has studied the growth in ALAE in several product lines. In the medical

CURRENT ISSUES AFFECTING ALAE 3C

JOHN J. KOLLAR
VICE PRESIDENT & ACTUARY
INSURANCE SERVICES OFFICE, INC.

Allocated Loss Adjustment Expenses

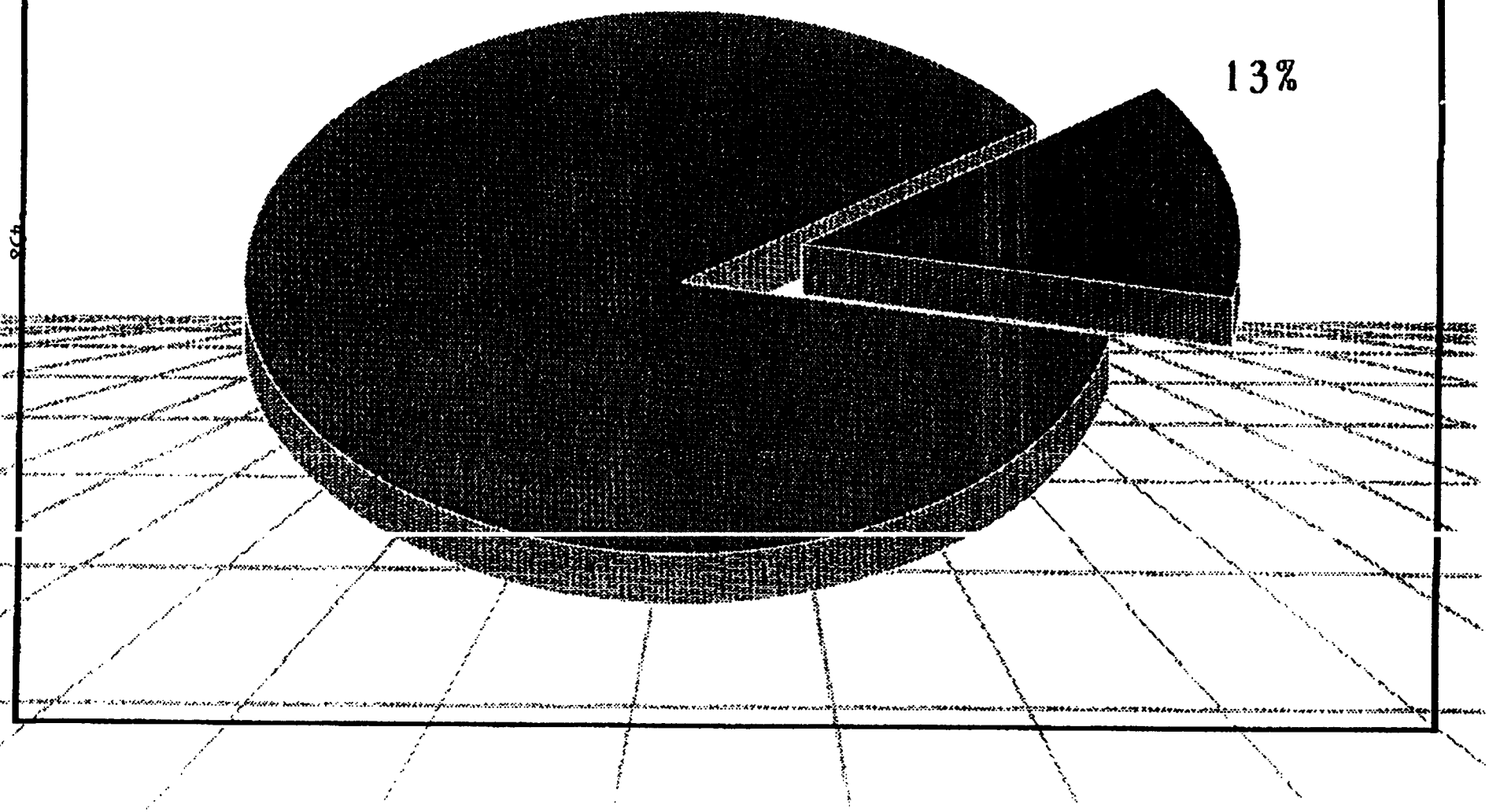
Percent of Earned Premiums



$12 Billion

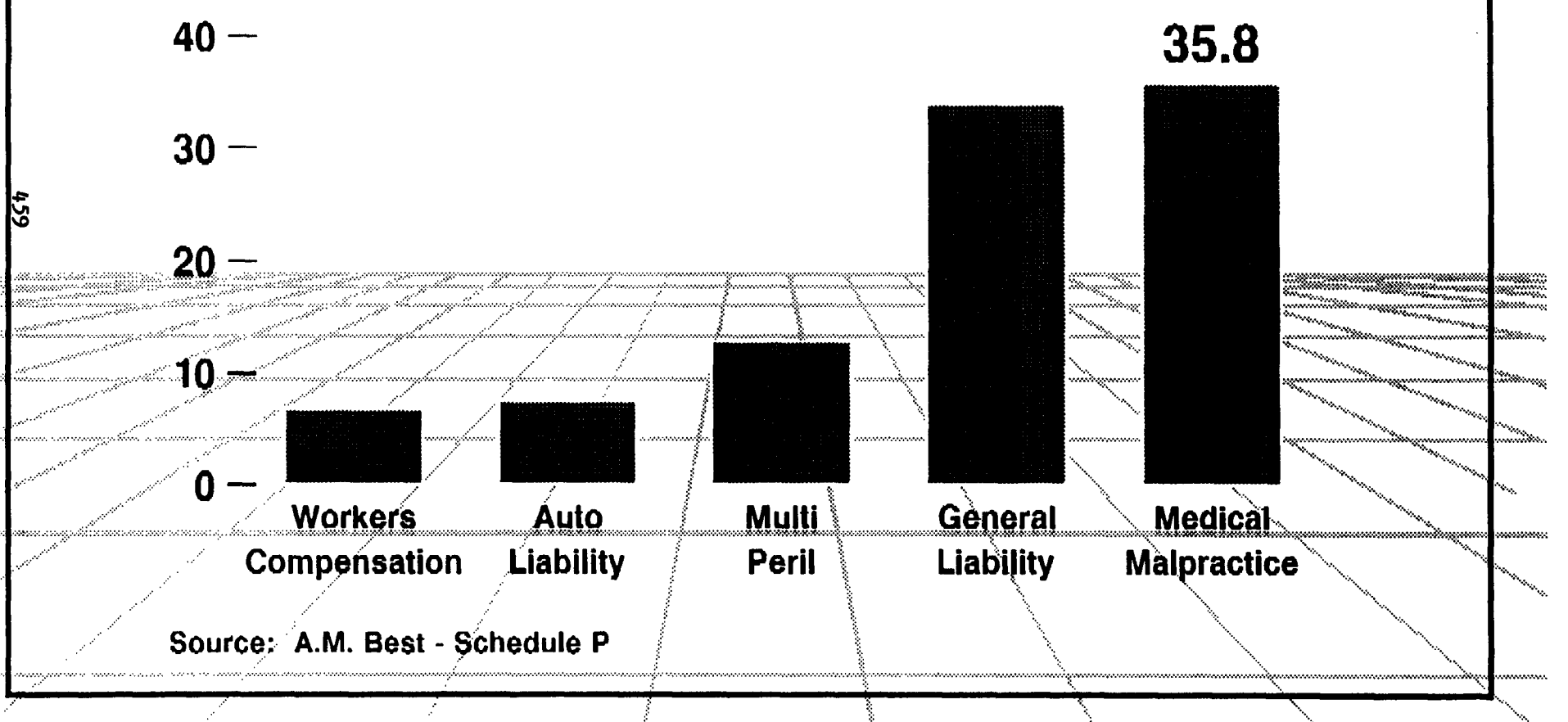
Allocated Loss Adjustment Expenses

Percent of Incurred Losses



Allocated Loss Adjustment Expenses

Calendar Year 1988
% of Incurred Losses



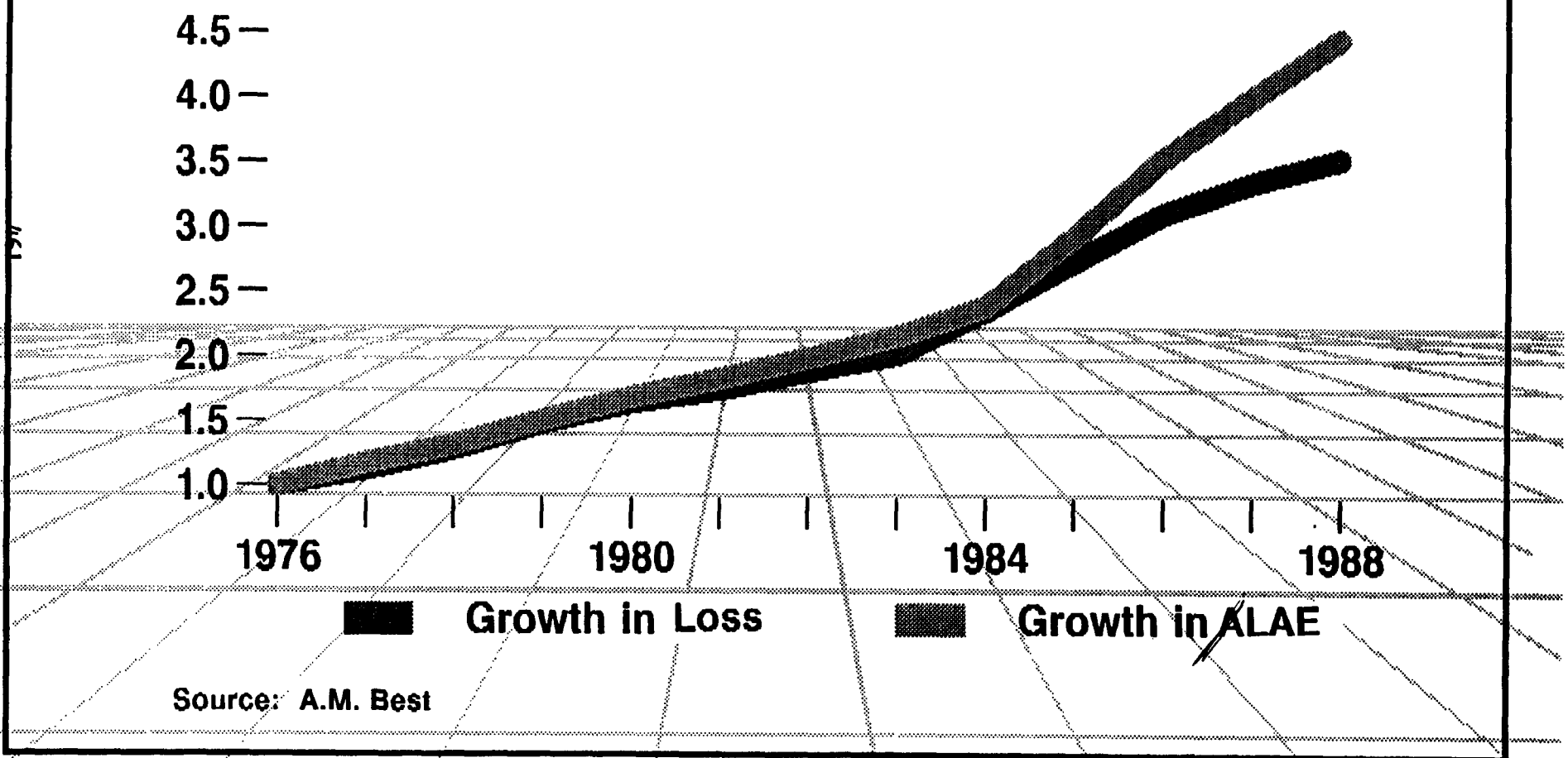
Source: A.M. Best - Schedule P

Variability of Defense Costs

- Geographic
- Classification
- Size of ~~loss~~ risk
- ~~Policy limits~~

Growth in Losses and LAE

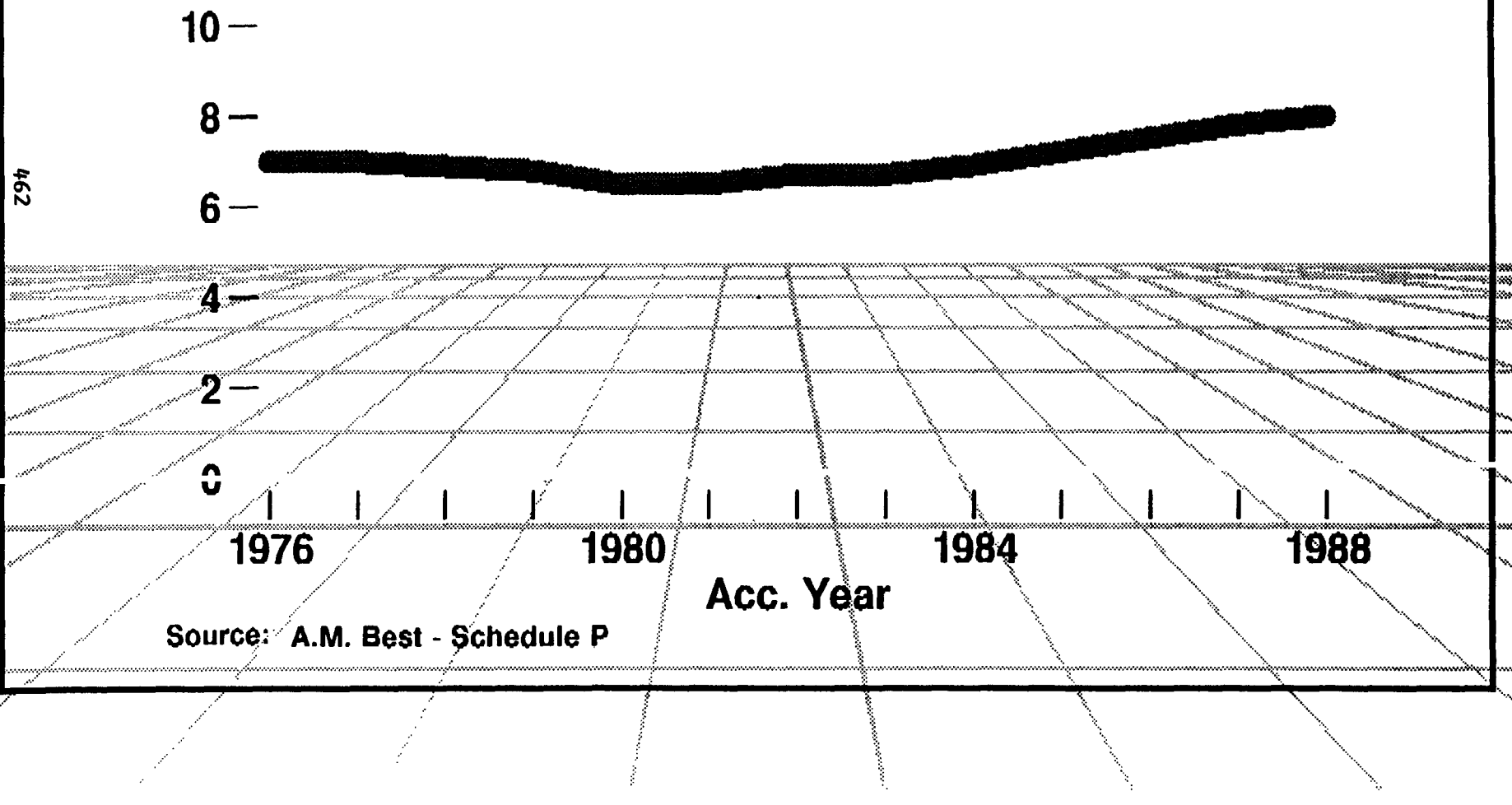
(1976 = 1.0)



Source: A.M. Best

Ultimate Allocated Loss Adjustment Expenses

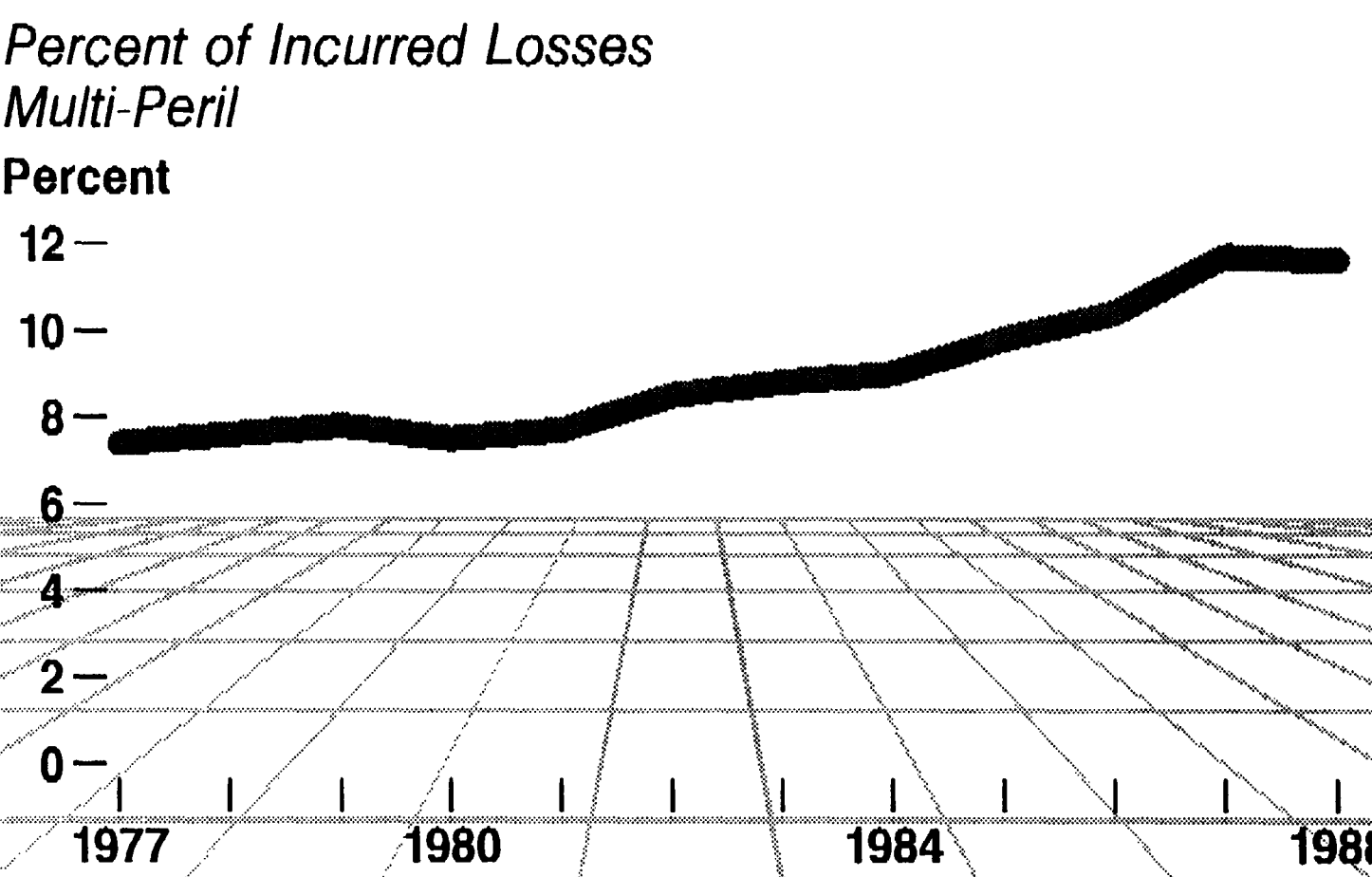
Percent of Incurred Losses
Auto Liability



Source: A.M. Best - Schedule P

Ultimate Allocated Loss Adjustment Expenses

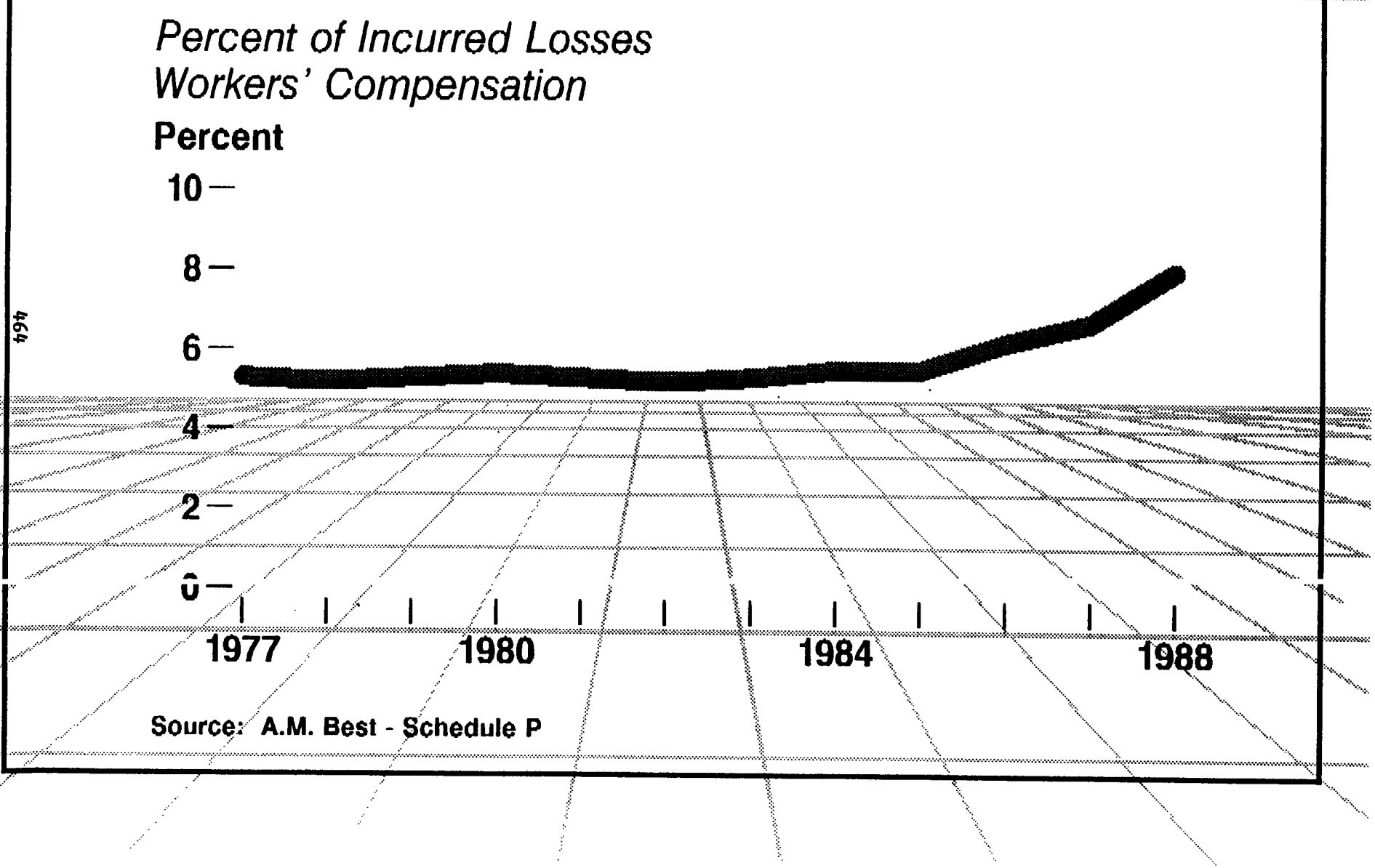
Percent of Incurred Losses
Multi-Peril



Source: A.M. Best - Schedule P

Ultimate Allocated Loss Adjustment Expenses

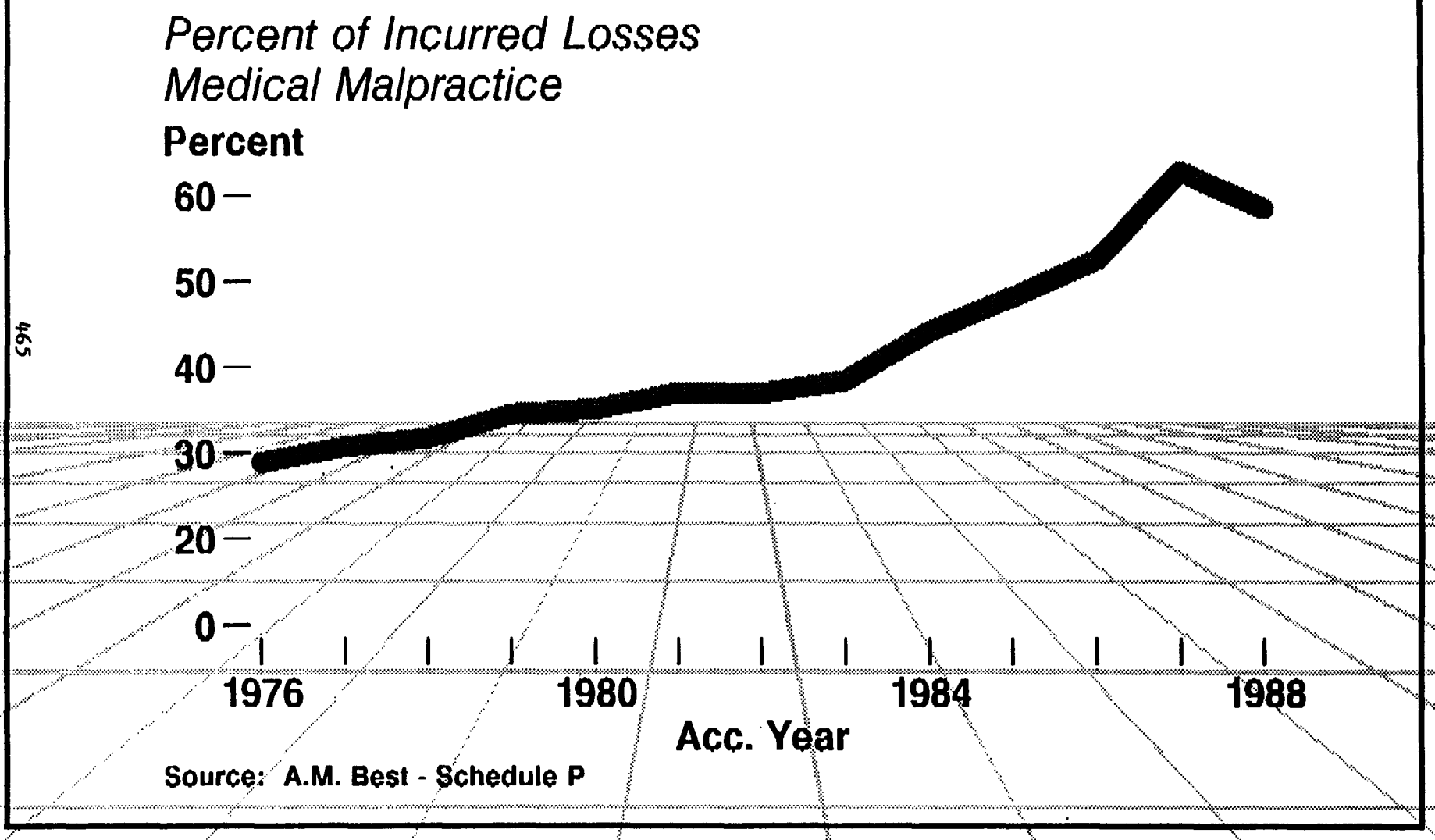
Percent of Incurred Losses
Workers' Compensation



Source: A.M. Best - Schedule P

Ultimate Allocated Loss Adjustment Expenses

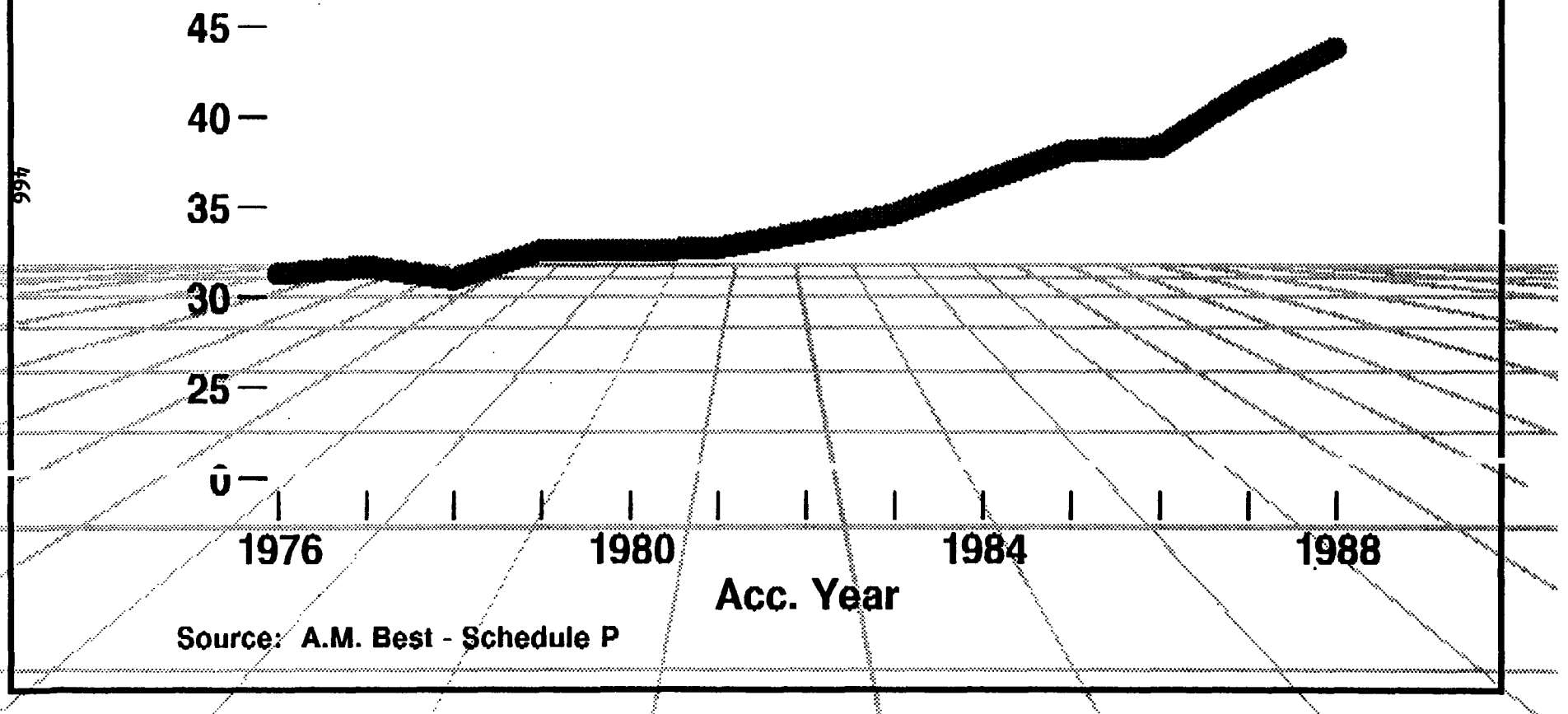
Percent of Incurred Losses
Medical Malpractice



Source: A.M. Best - Schedule P

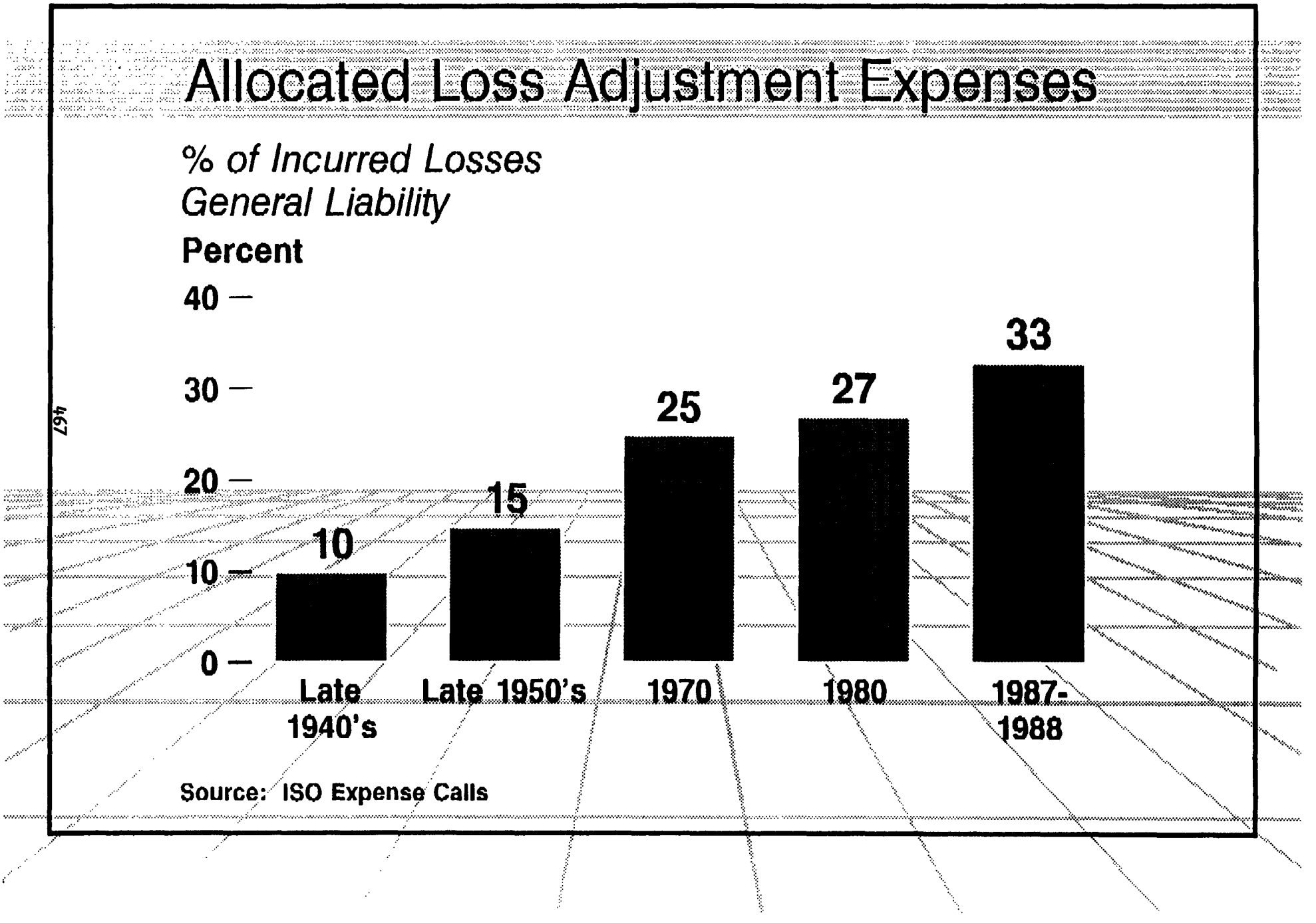
Ultimate Allocated Loss Adjustment Expenses

Percent of Incurred Losses
General Liability



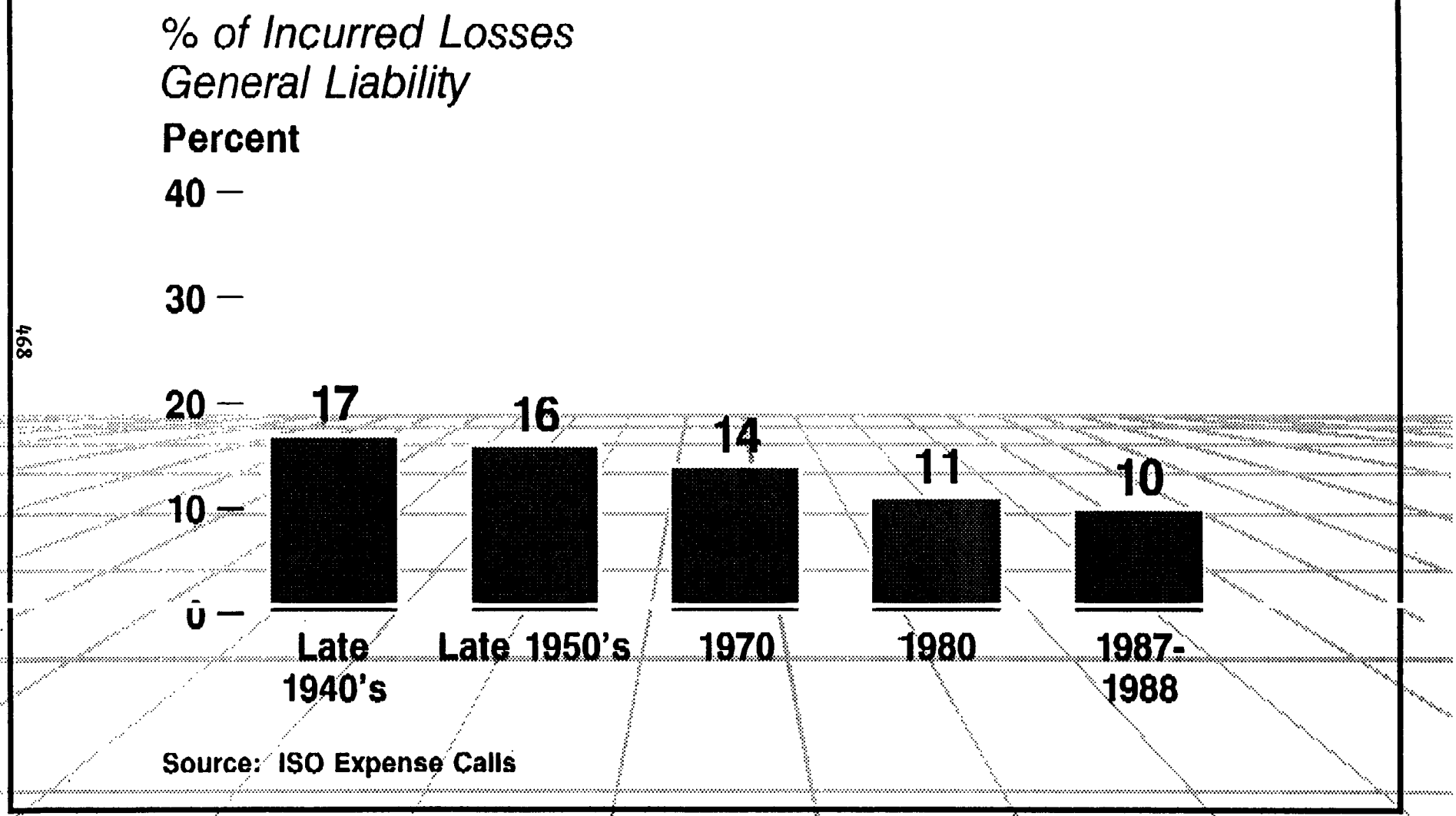
Source: A.M. Best - Schedule P

Allocated Loss Adjustment Expenses



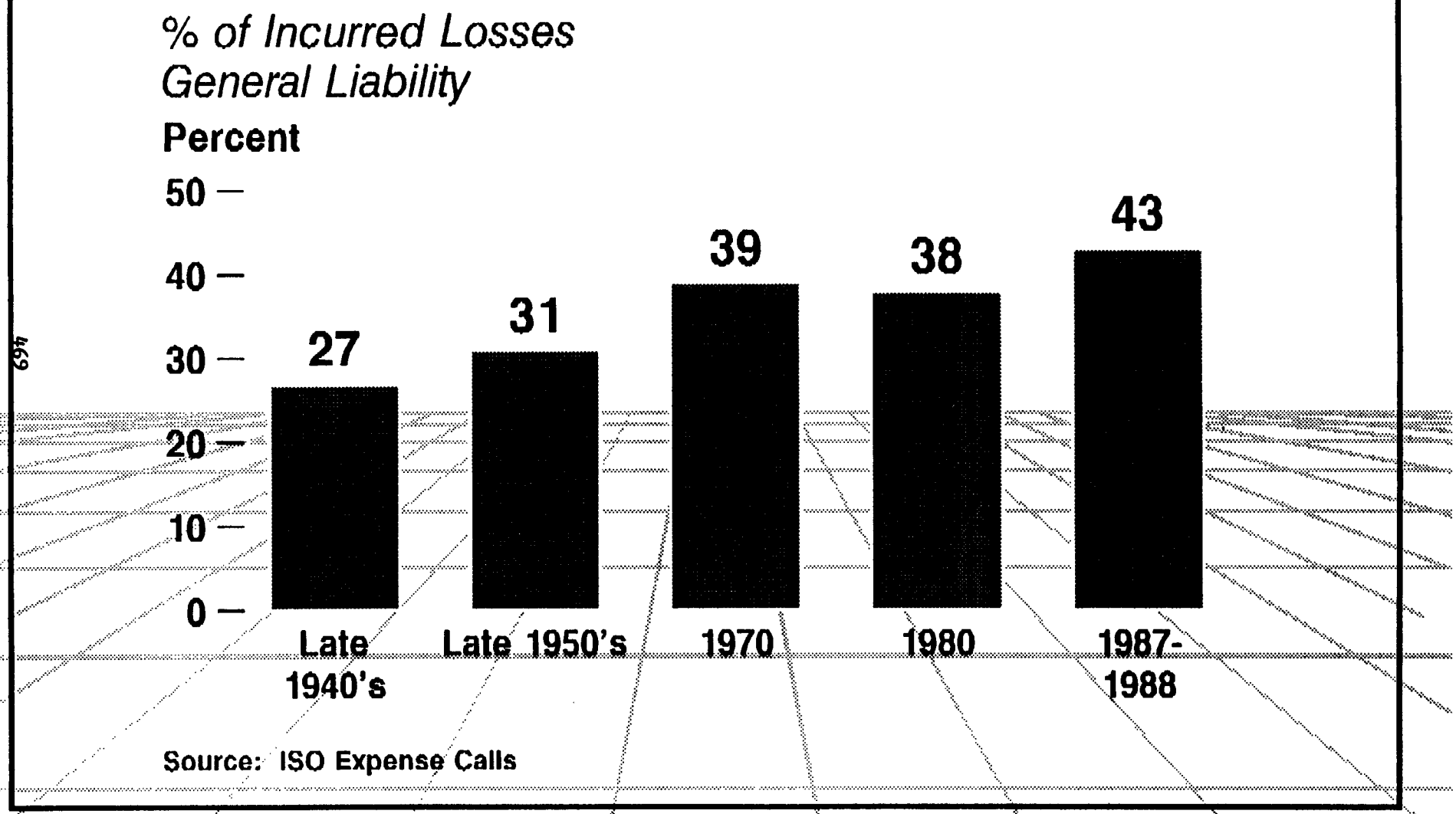
Unallocated Loss Adjustment Expenses

% of Incurred Losses
General Liability



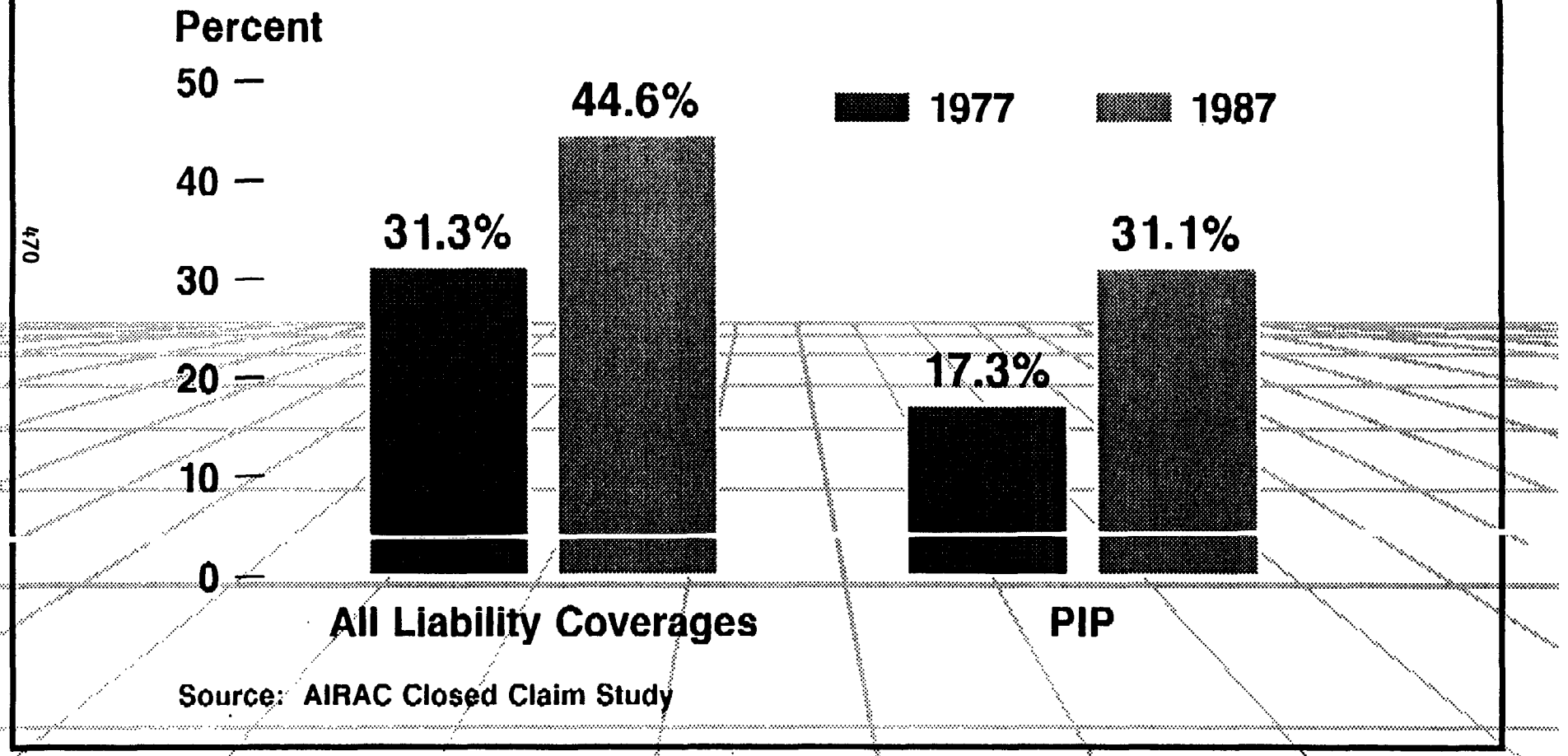
Source: ISO Expense Calls

Total Loss Adjustment Expenses



Personal Auto Liability

% of Claimants With Attorneys



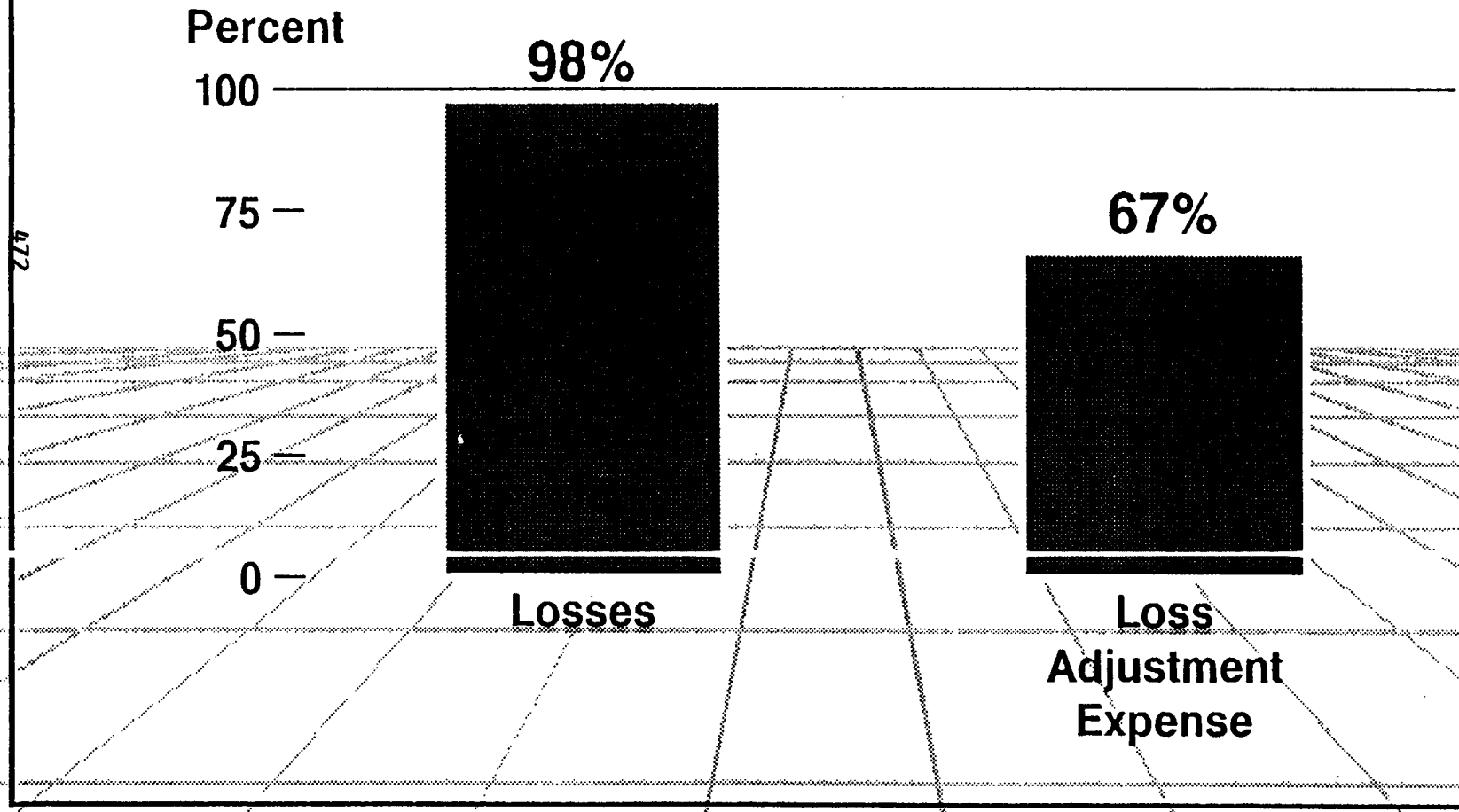
Source: AIRAC Closed Claim Study

Continuing and Growing Problems

- Bad faith
- Good news/Bad news
- Litigation between insurers
- Growth of litigation in new areas
- Pollution liability

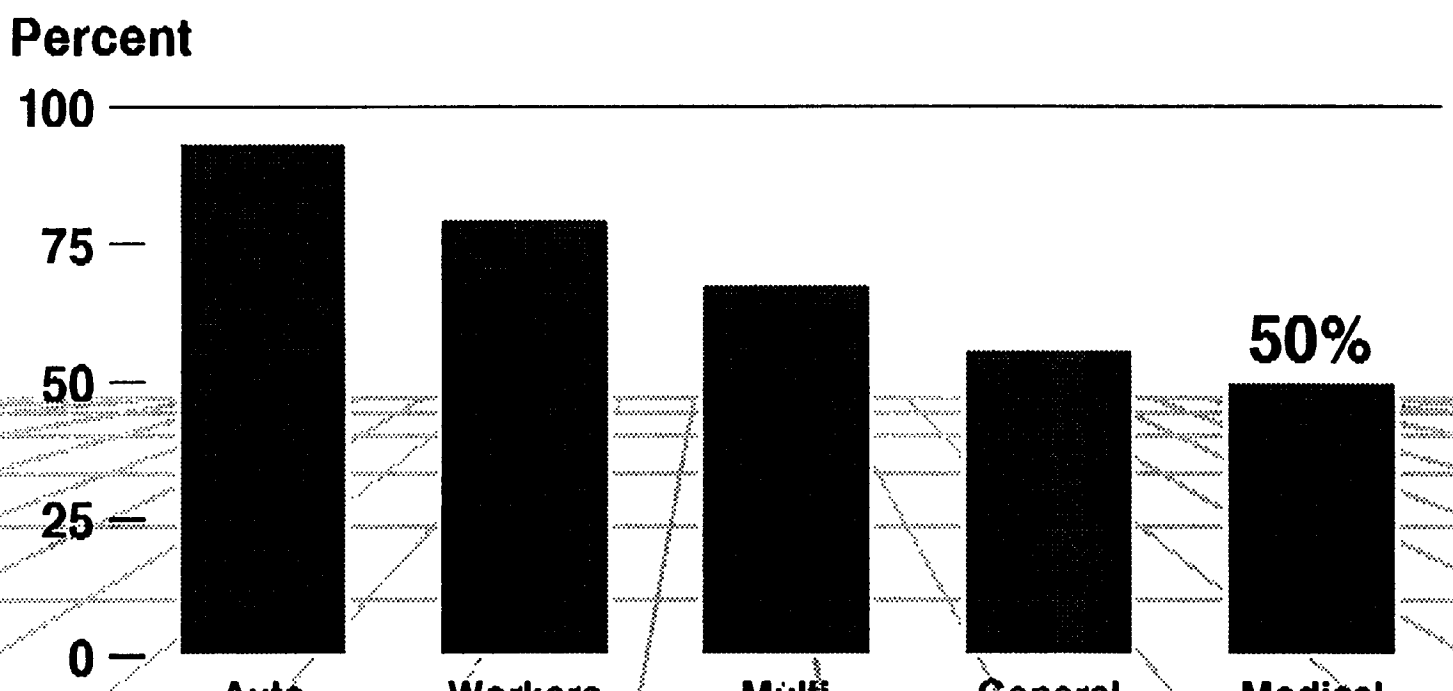
Industry LAE Reserve Adequacy

Schedule P Lines
Carried Reserve as % of Needed



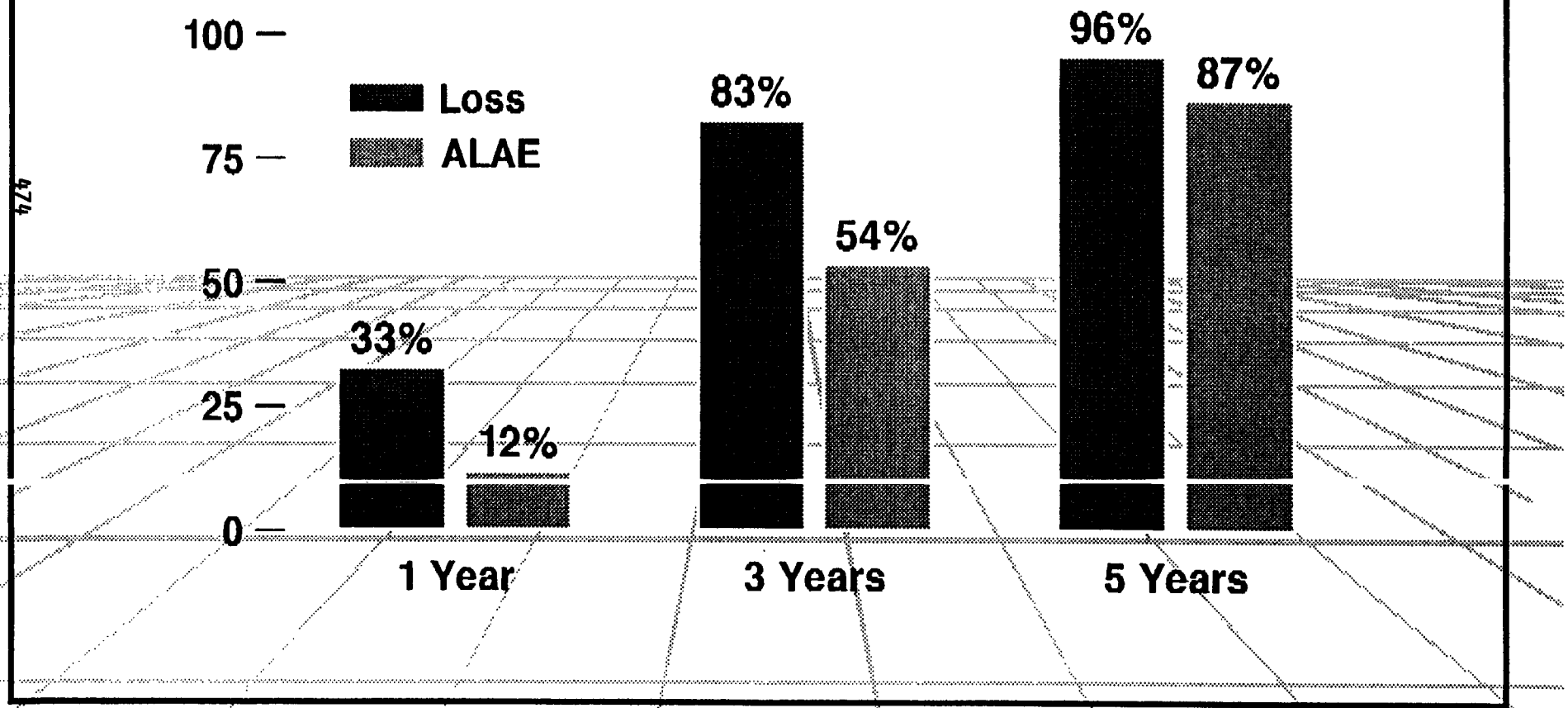
Industry LAE Reserve Adequacy

Schedule P Lines
Carried Reserve as % of Needed



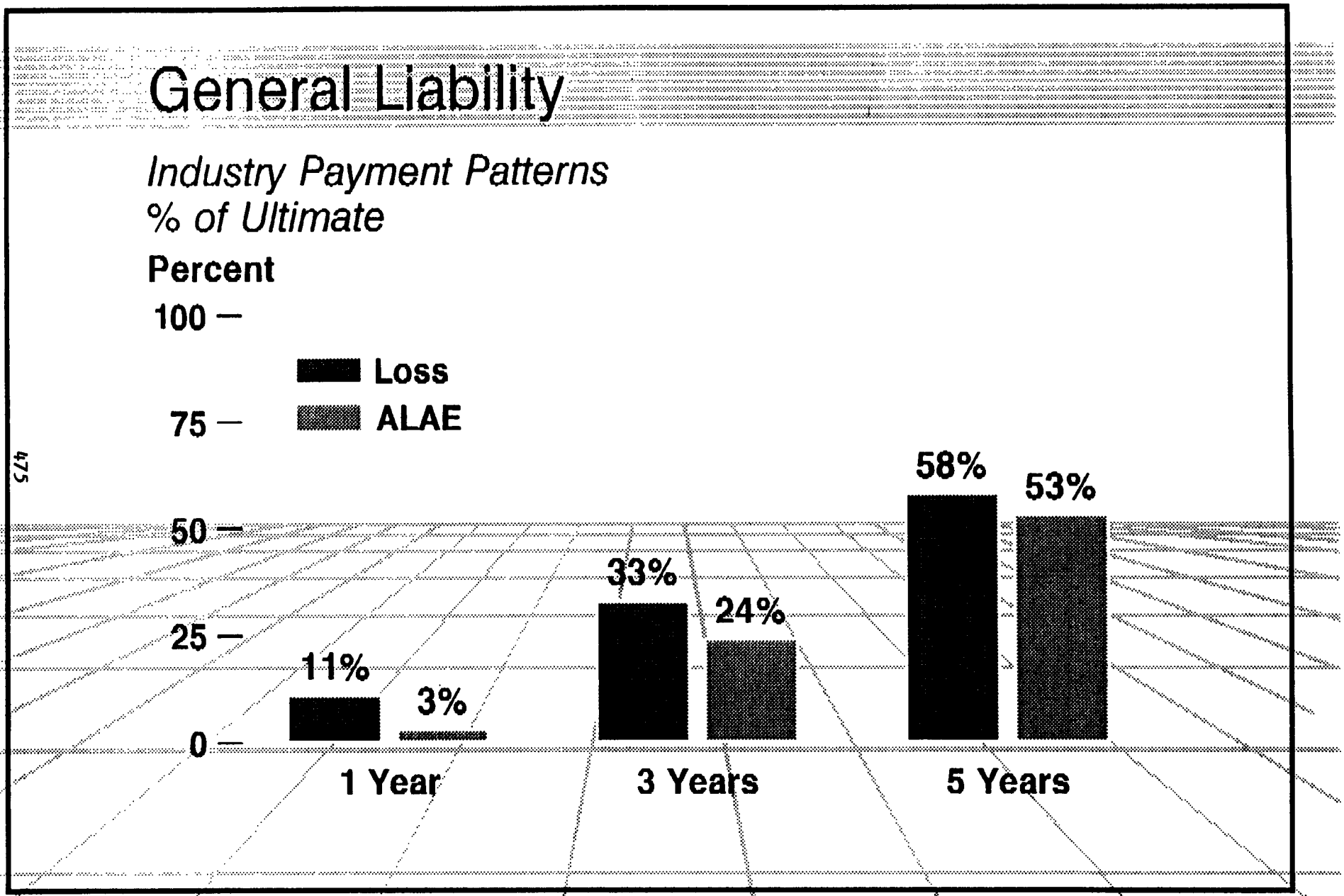
Auto Liability

Industry Payment Patterns
% of Ultimate



General Liability

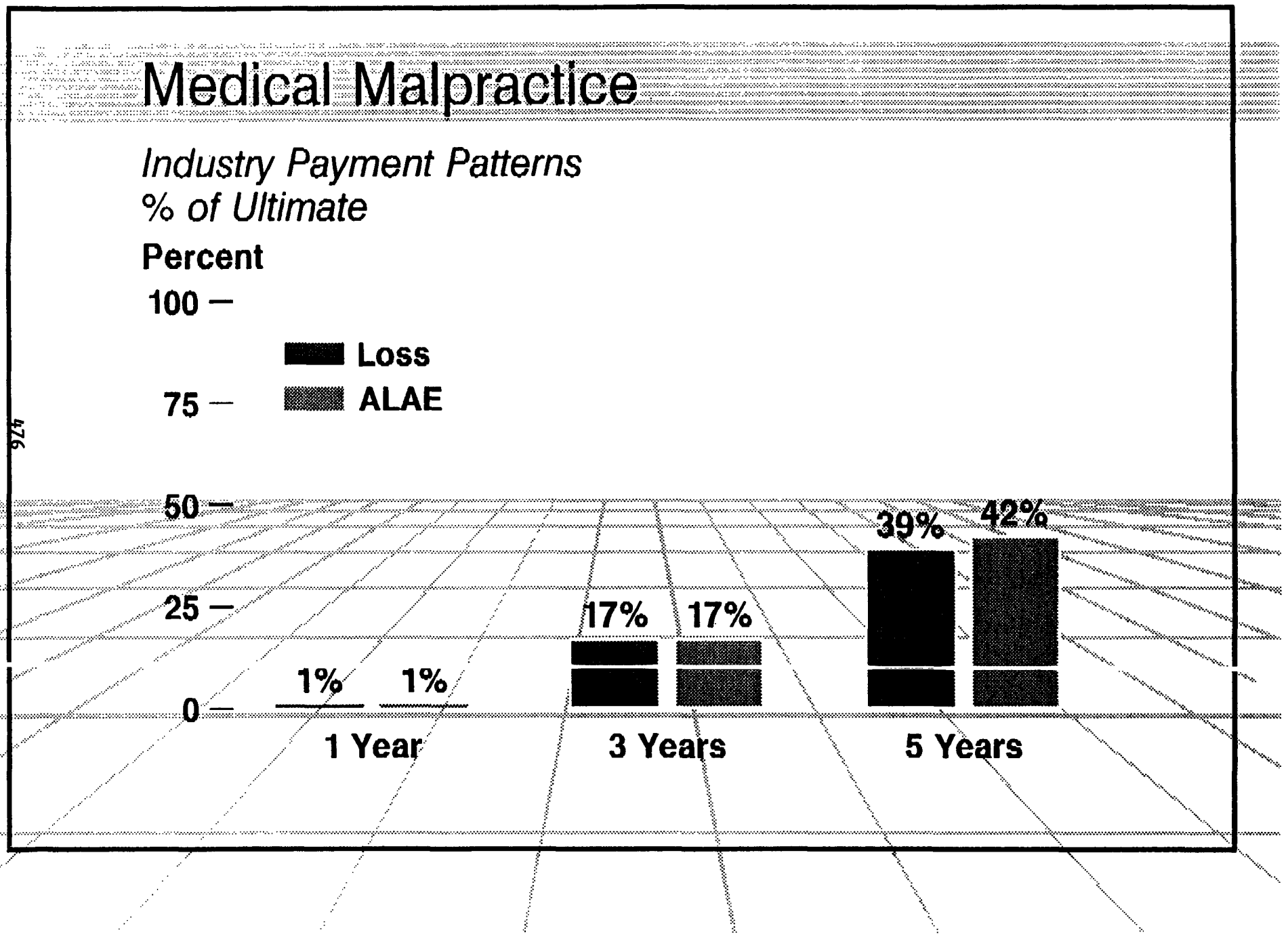
Industry Payment Patterns
% of Ultimate



475

Medical Malpractice

Industry Payment Patterns
% of Ultimate



ALAE Reserving

Why Not Do it Right?

- Reserves ⟷ Prices
- Public credibility
- Reinsurance availability
- Changing world

malpractice area we took data from AM Best for 38 med-mal companies, specialized companies, and found, somewhat surprisingly, that the growth rate in expenses was more than double the growth rate in losses.

(Slide 3)

Now, if that trend were to continue, some time in the next decade, we might have a rather bleak forecast and outlook where for every dollar that the med-mal companies were spending for losses, they'd be spending an equal dollar in expenses.

(Slides 4, 5)

We've also, not in the detail that John Kollar has looked at it, but looked at some data from, again, AM Best, in the GL and medmal lines. It doesn't seem quite as dramatic, but I think the point is clear that in both of those lines the loss expense is increasing at a higher rate than the losses. And here it is again broken out. This is by accident year data evaluated for 36 months.

(Slide 6)

Now, what can we do to control some of this rise in legal expense? And that's where we come to the goal of litigation management. The major goal of a litigation management program should be to reduce litigation costs, but without sacrificing case results. And I can't emphasize that strongly enough.

The question that your company in the claim department needs to keep at the front of your mind is for every additional dollar that you're going to pay in defending a case will you save at least an additional dollar in indemnity costs. What you've got is a balancing act. You want to avoid programs that might save you expense and control your ALAE and in the mean time result in an increase in indemnity or loss payment. So, it's again a balance that you've got to continue to strike.

(Slide 7)

Some of the issues that we look at in consulting with our clients on how to control loss adjustment expense are these. First, if the company has a volume of litigation or a litigation inventory that is appropriate, we might recommend the development or expansion of an in-house litigation program, a staff counsel program or house counsel.

We would do a litigation inventory analysis, look at the volume, see whether it is geographically concentrated in one or more locations, and then see whether there are certain routine issues that cut across all of the cases. If we find that kind of pattern emerging, then typically you have a litigation inventory that is appropriate or suitable for a staff counsel operation.

Second, we then look at how the company and the claim department are managing outside counsel and, therefore, outside legal activity. And so, we go into some programs and strategies regarding the selection, retention and control of defense counsel, outside counsel. When I get to this section I'm going to tell you that there's really one major rule and that is: choose a lawyer, not a law firm.

Third, we look at alternative dispute resolution. Although the jury is still out on whether ADR works, many carriers are successfully implementing ADR programs where they are transferring litigated cases or even claims that have not yet become law suits into some

alternative dispute resolution program other than the traditional court system.

(Slide 8)

We also consider the development of litigation budgets, and carried to its logical extreme, the issue of case reserving for allocated or expense reserving on an individual case basis.

Finally, we talk to our clients and learn more about their current litigation management information systems to determine what they need to do to track the data as the cases develop so that they have the information to forecast ALAE for the future.
(Slide 9)

Here are some of the criteria that I suggest you can use in selecting outside counsel. First as I said, choose a lawyer, not a law firm. You can go by the previous experience of someone in your company, in your claim department, or in another company. Pick up the phone and call a colleague or a counterpart elsewhere, because they may be able to recommend a lawyer in the area where you have a litigated case.

Second, you need to match the lawyer's skills with the issues in the case. You don't want to go and find the best lawyer in professional liability to try some simple automobile cases. You need to match expertise with the issues and the complexity of your cases.

Track record, wins and losses. Now, there are some ways to check on a lawyer's track record. Lexis and WestLaw, two computerized data banks for legal opinions, for example, will, if you plug in the name of an attorney, tell you whether he's had cases that have gone up on appeal. You can't just find a win or loss at trial; it has to be a case that has been appealed. There are other ways to check on track record. By talking to those in the community where the lawyer practices, you'll get some idea as to whether he or she has been successful.

Location of the firm -- this is very important in controlling costs. You want to find a lawyer who is familiar with the jurisdiction in which the case is being tried and not necessarily bring someone else in from far away who might have a powerful reputation as an attorney, but not in that local jurisdiction.

And second, you want to find a lawyer whose office is relatively close either to the court house or to where the legal activity will take place (e.g. where the depositions are going to be taken). You want to avoid the travel expense that the lawyer will bill you in representing you if his office is far from where the action is.

(Slide 10)

Availability. It sounds a little silly, but you've gone to the trouble of selecting a lawyer. Now, the lawyer has assembled a team and you discover that the lawyer won't be available to actually try your case if it should go to trial. I think it's important to get an understanding with the attorney you select right up front that you want him or her to be available to try the case and available to help you out with any matters that come up during the course of the litigation, or multiple cases if you're sending that attorney a sizeable volume of litigation.

Fees. It's important to compare the fees of several other attorneys in the same community and in the same area of specialization, so that you have some choices.

And then the last two criteria, I think are pretty much the same. Responsiveness to client and chemistry. To me they are probably the most important. You need to select someone with whom you'll have a good rapport, with whom you can work effectively and efficiently, and someone who you think will work on your matters in a dedicated way personally, as well as professionally, and will be responsive to you, to your telephone calls, et cetera.

Probably the best way to apply this list of criteria is to interview several lawyers and visit them at their offices. Inspect the library, see what the research facilities are like, see whether they have computerized research, and then try to match the resources as well as the lawyer's skills to the individual case.

(Slide 11)

These are some of the resources that we use in identifying outside counsel. Again, previous experience of someone in your company. Referrals from other lawyers. You can call a lawyer whom you've used on a case in the past or continue to use on your litigation inventory, and ask for a referral to a new firm. Lawyers want to keep you as a satisfied client and they will be happy to give you a good referral in a specific instance.

Referrals from your colleagues is a good way to get to new lawyers. Call your counterpart in another company who has had experience with that particular product line.

And then last, legal directories. I've listed Martindale- Hubbell, because it's one of the most complete. It's a compendium of all you ever wanted to know, and more, about your lawyer -- where he or she went to law school, who else is in the firm, the areas in which they practice, and information about the firm.

The ABA now includes a rating system for lawyers, which you can take or leave. By that I mean that you need to impose some of your own judgment. In addition to Martindale-Hubbell. there's the American Law Firm Association Directory and Best's Directory of Insurance Lawyers, just to name a few. There are many other resources to check for lawyers.

(Slide 12)

Now, that you've selected outside counsel, you need to develop some policies and procedures for managing the cases in litigation that you're going to refer to that attorney. These are some of the areas that I think you should consider if you're going to develop either a policy statement for outside counsel, litigation guidelines or litigation management principles. What I'm talking about has a lot of different names, but the ideas and concepts are the same.

Staffing the case. Will the lawyer select the team or will you have some input into what kind of team should be on the case if a team should be on the case at all? For example, you don't want a paralegal doing research that a senior partner really needs to do. However, you do want a paralegal doing research that he or she is capable of doing under the supervision of a senior partner.

I think the most important principle in staffing a case is that the partner in charge of your litigation should be pushing the work down to the lowest level of competence appropriate to the file. And I underline appropriate to the file, because that doesn't mean, again, having a junior associate handling a complex piece of litigation.

A litigation plan. We believe that there ought to be a litigation plan in every file, no matter how routine the case is. And it should be accompanied by a litigation budget, which tells you for the strategy to be implemented this is what it's going to cost.

Retention of local counsel. Who gets the say in hiring local counsel if you need to go out of the jurisdiction to take a deposition? You may want to control the selection of local counsel. Get that in your policy statement up front so that your outside lawyer understands.

The same applies to assistance from the client. Agree on what you are going to expect of your defense counsel and what they should expect of you. For example, it must be more efficient overall for the claim department of your company to do investigation, fact gathering, answers to interrogatories, things like that.

Therefore, you can avoid some of the heavy legal expense that you'll incur if you abandon the case, so to speak, to your outside counsel and throw all of the work to the lawyers. Again, get some understanding with the firms that you're using and the attorneys you retain as to what assistance they can expect from you.

Communication with the client. Do you want frequent status reports? If so, you need to tell the outside lawyers that. If you don't want to be notified at every little bend and turn in the litigation road, then that also has to be communicated.

(Slide 13)

Discovery. Who is going to handle certain types of discovery, such as visits to the accident scene or witness statements? Furthermore, what kind of discovery can the lawyer undertake without your approval? That has to be communicated and there should be an understanding about it.

Media coverage. In high profile, high exposure cases, it's almost inevitable that the press will come calling with unpleasant questions. Now, you can defer to your outside counsel, but your company may have a CEO who thinks that he has a strong public relations department, and he may prefer to have the public relations department, the claim department or the law department handle questions from the press. So, again, if you've got a policy on this, communicate it to your outside counsel.

Conflicts of interest. Outside counsel should be told that everything that has even the appearance of a conflict of interest should be brought to your attention.

Finally, billing. I put that last, but, indeed, it's not least, because it's such an important area of managing the legal activity in a file and, therefore, controlling expense that it deserves a set of procedures created and developed separately from the other procedures that relate to outside counsel.

One last point about procedures for outside counsel. If you go to the trouble of developing good procedures, communicate them, send them outside, either in a policy statement, in litigation guidelines or principles, in a retention letter or an assignment letter. Don't keep those good policies that you've developed internal to the claim department. Because if your outside counsel doesn't know your systems and procedures and your expectations, then, you're going to have some trouble winning the cost battle.

(Slide 14)

Questions as to billing procedures and rates should be handled up front. It will make you more comfortable and it will make your attorney more comfortable to get out of the way any kinds of questions that you have about billing. However, as you go down the road and you review bills that are submitted on an interim basis, any time you have a question, you should feel free to pick up the phone and question the attorney on a particular item in the bill.

Rates -- are they going to charge by the hour, by the task, or by the phase of the litigation? What are the different rates for the various lawyers in the firm? Do you want to get into negotiation for a blended rate, where the senior partner and the junior associate rates are blended together to give you one rate? Who is going to authorize increases in rates? All of these items should be covered in procedures related to rates. Fees. Here, we get into an interesting area of some creative billing arrangements. You might want to suggest to your outside counsel that instead of the typical hourly rate charged for legal work, that you agree up front that for a better than expected result you'll pay a premium, but for a worse than expected result you will expect some kind of discount. This is just one kind of new and different billing arrangement. There are lots of others. This is a whole area that many insurers are now studying closely.

Billing format. The billing format is probably the most important area of billing procedures, because to me the bill is the financial expression of the legal activity in the file. And if you want to control expense, you've got to control activity. And you need to get information on a relatively frequent basis that allows you to evaluate what's going on and where you want to go from here. The billing format needs to be itemized so that the information is in sufficient detail for you to evaluate the timing, the results of the work and the cost.

(Slide 15)

This is a form of invoice that I recommend with the initials of the attorney or paralegal at the left, then the date on which each legal task is performed, the time value incurred, and a description of the services performed.

Some law firms, utilize a billing mechanism kept in exactly this format, so it is not difficult for them to submit their itemized bills in this format. On fact, they even keep way over in the right margin the money value of the time spent.

At the bottom you need a summary. The summary should show you who is doing what and spending how much time on it. Then you can determine whether or not the pyramid effect is working.

Thus if you have a case where you've got a lot of associate time and a small amount of partner's time, if the supervision of that case is appropriate, that's probably a good example of the pyramid effect working efficiently. You have the guy at the highest billing rate spending less time than the people lower down who are doing more of the less sophisticated legal work on the file. In the alternative, if you want only one lawyer and a paralegal on a case, then you might not see the pyramid effect work in the same way. But the summary is important to give you an idea as to how the firm is managing the case.

(Slide 16)

Other procedures in the area of billing include travel. Are you going to allow the outside

counsel to travel first class or are you going to insist on coach? Get that understanding in your procedures up front.

Use of multi-city offices. If the law firm has an office in Los Angeles and you need to take a deposition there, but their rates are so high that you'd prefer to choose local counsel yourself, you should cover that in your billing procedures.

Disbursements, are you going to be charged for over-time clerical work? I suggest that if you call at the end of the day with a sudden question and you need an answer tomorrow morning in writing and the lawyer and the secretary will be staying over-time, then the clerical overtime should be charged to you.

On the other hand, if your matter has simply been shoved to the end of the day because the lawyer was busy, then I certainly don't think that you ought to be charged for clerical over-time.

And finally, the timing of the statement. The issue here is not the frequency with which the lawyer submits the bill. For example, monthly, quarterly or semi-annually. And it's not the threshold at which the bill is submitted, i.e., when the fees incurred reach $3,000, $4,000, $6,000, $10,000, that is the issue.

The issue is that the one time when it's too late to see the bill is at the end of the case. And so, if the first bill you see is when the case is being closed, you've lost the battle. What you do want is for the bill to come in on a frequent enough basis so that you know what's going on in the file and know when to call a halt to the work, increase the work, or make some other adjustment to the strategy of the case.

The conventional wisdom in the claims industry is that law suits, unlike wine, don't improve with age. They just cost more. And that's why you don't want the file sitting around without a bill covering the work that's being done, because you literally won't have the information you need to manage the case.

(Slide 17)

Litigation budgeting is an area that might be of some interest to actuaries. This is an estimate typically set up by the outside counsel. This is not an expense reserve on an individual case basis. It's a formal budget that should go into the file, submitted to the carrier, the claim department or whoever is managing the litigation, that tells you for the strategy or plan that you and the outside counsel agreed to, this is what it's going to cost.

Who should prepare the budget? I think it should be prepared jointly, but outside counsel should take the first crack at it. It should be prepared as soon as possible, as early in the case as you can make some of the assumptions that I'll talk about in a minute, but at the latest, when it becomes reasonable to make those assumptions.

The basic mechanics of the budget include a list of tasks. How many depositions? How many expert witnesses? The timing. How long is it going to take for each of those tasks? What will it cost? If you're going to take ten depositions instead of five, how much will that cost? And finally, the probable result. What can you expect if you're going to double the number of depositions?

The budget ought to be prepared in sufficient detail for you to measure progress against the initial forecast and make corrections and adjustments, just as you would in budgeting

for any other segment of your business.

For an individual case, litigation budgeting is basically a cost benefit analysis and a risk balancing act. You can decide how much legal effort should be invested compared to the probable result. Are you willing to spend more money on expenses, on your defense counsel, to limit the risk of loss or do you prefer to take on more risk of loss to control cost? That's what litigation budgeting is about. It gives you the alternatives and you can determine which way to go in any particular case.

When it's done on an entire inventory, it becomes a method of forecasting expenses. It's a very useful expense control technique, for individual cases and for your entire inventory.

(Slide 18)

One thing I do want to say about litigation budgeting is that the process is really more important than the product. It's the discipline and planning that you're imposing on defense counsel. Lawyers don't like to plan. And I've heard many lawyers who speak on panels with me say that they don't like budgeting. They do it because the carrier or the client insists on it. It does however, help defense counsel and you to focus on the cost of the case right at the start.

The other point I want to make is that a budget has to be flexible. Defense counsel has, under the insurance policy, the duty to defend the insured. And, therefore, defense counsel needs to be able to expand the amount of work, and come to you for authority and approval, but not feel that that budget is a cap on fees. It has got to have some flexibility.

(Slide 19)

Some of the variables and assumptions that go into litigation budgeting are these. I want to go through them quickly and probably touch on only a few. Jurisdictional issues, whether the case is going to stay where it was filed in state court or get moved to federal court. That ought to be factored into the budget, because the costs are different.

Discovery and proof. Are you going to retain three experts or will one suffice?

The opposition. What's the plaintiff's counsel like? Has he had a successful track record in this type of litigation? Your defense counsel should be able to tell you what that situation is and how much it will affect the expense of the litigation.

(Slide 20)

The judge. Is the judge likely to grant a motion to dismiss or not? And then are you going to be up against that judge at trial or will there be a new judge assigned to the case? That also should be factored into the budget.

The nature of the case. Is it very complex? Are there new issues of law? Will research help or not? Potential for settlement. I suggest that most litigation budgeting should be done phases, so that you don't have to budget for the trial phase, which you know is going to be expensive, in a case where you think there's a high likelihood of settlement.

Then what you should do is budget for the pleadings and discovery and pretrial phases,

and hopefully the budget will show you that it is in everybody's best interest, and particularly your's, to get the case settled early on.

Relationship between the client and counsel. If you're going to depend on the law firm's paralegal to do work that your claim department could do, that should be factored into the budget, because it's going to be more expensive.

(Slide 21)

If you've gone to the trouble of preparing policies and procedures for defense counsel and to developing litigation management programs, you should have litigation management information systems to track the data that is developing. Otherwise, you're going to have very little idea as to the success of your programs.

These are some of the fields of information that we recommend go into your system. Description of the case. Description of the parties involved. The date of suit. The date the file was opened. The date the incident occurred. The date it was first reported.

As much information as you can get into your system is what I would recommend, because you will find ways in the future to use that information. Information on counsel. Where is the firm located? What are the rates of the various attorneys? What are their areas of specialization? Why are you using them? For what particular reason have they been selected. Is it because they did a good job on a previous case or you're about to try them for the first time? Again, more information in to the system.

(Slide 22)

Legal expenses tracked throughout the case. This is going to help you in the future analysis on whether you should send more cases to staff counsel, or whether you should send more cases to a particular law firm. You'll be able to compare results and costs firm by firm and lawyer by lawyer for various product lines.

So, again, keeping legal expenses in the system throughout the case, not only for your closed inventory, but on your open inventory, is critical. And I think that the record of expenses should be maintained on a lawyer by lawyer basis, not on a law firm by law firm basis.

Because remember what I said 20 minutes ago, choose a lawyer, not a law firm. You need to keep the data on how individual lawyers are performing and what their results look like compared to the cost of that particular attorney.

An evaluation of the work done by counsel. This can be done, it can be coded, and it can be put into your system. You can go through a performance appraisal of every attorney on every single case, which you actually should do at the close of the file, and that information should be put into the system if it's properly designed.

(Slide 23)

Here we come to the reality that is it takes time to litigate a case. For those of you who can't see, this is a lawyer speaking to the CEO who has died, "Good news, sir. We won the litigation." Well, it dragged on for years and years and, as I said before, the longer a case is around the more it costs.

(Slide 24)

So, what many companies are beginning to do now is to consider alternative dispute resolution techniques. Some way to control the expense and the problems associated with the litigation system, our traditional court system, including unpredictability, costs, run away juries all those things that we have little or no control over as lawyers or as claims people.

Some of the ADR techniques that have been developed include informal procedures, such as mediation, where the parties meet without counsel, that can be very effective. Keep the lawyers out of the room entirely. Court sponsored ADR, either voluntary or mandatory arbitration. Private forums, such as ENDISPUTE, AAA, the Insurance Arbitration Forums, where for a fee you can get a mediator or rent-a-judge. There are many opportunities for the application of ADR to your litigation.

And, finally, ad hoc methods, such as a mini-trial, where the parties agree to a condensed trial. You present the case to a judge, but you summarize the evidence. You don't introduce five days of testimony. You summarize it in maybe an hour or so and then the counsel make opening statements and closing arguments, and the judge decides the case.

ADR, I think, is here to stay. The next decade is going to be the test as to whether we can successfully take some of these cases out of litigation or prevent them from ever going into litigation. Remember what I said before, in the United States we call our lawyers to sue before we call our opponents to talk. ADR is a way to help us call our opponents to talk.

(Slide 25)

This is a cartoon that appeared in the New Yorker magazine in 1984. The hospital pediatrician is addressing the infants in the nursery. The bassinets are lined up before him in rows, and he's reading from his clipboard and taking care of some housekeeping items, and he's saying, "Attention, please. At 8:45 a.m. on Tuesday, July 29, 2008, you're all scheduled to take the New York Bar Exam."

The lawyers are not going away. Litigation costs continue to increase at an alarming rate. You heard about it from Jack Burn. You heard about it from John Kollar. You're going to continue to hear about it.

We think that these litigation management techniques, when applied by a claim department that in earnest wants to control allocated loss adjustment expense, can help control the problems associated with the increase and also hopefully control some of problems associated with underreserving for expenses.

(Applause)

MR. KOLLAR: I think now it's time to talk about page 76. Hopefully, a lot of you have seen the report already, so I won't have to spend a great deal of time on it, especially since it's five to 3:00.

I had hoped that we could have some preliminary 1988 numbers when we got together today, but unfortunately that's not the case. We are working on them, but we don't have them as yet. So, we will have to go with the old 1987 year-end reserves.

Let's take a look at the Schedule P lines, carried reserves as a percentage of needed, according to our ISO calculations.

A couple of things to point out. First of all, that's total LAE (loss adjustment expense), that is both allocated and unallocated. As we said earlier, reserves are not available at this time on Schedule P.

So, we see that the losses are a couple percent inadequate; not bad. But look at the loss adjustment expense -- 33 percent inadequate. Keep in mind that earlier in the presentation, part 1, I mentioned that those ratios of allocated loss adjustment expense to losses were only as good as the reserves. To the extent this is true and carries through to allocated, not just total LAE, we're understating the problem with the numbers that were there in the first part of my presentation -- understated allocated is a bigger problem than what we thought it was.

(Slide)

Let's look at it by line a little bit. Auto liability. Okay. This is the loss adjustment expense reserve adequacy, 6 percent inadequate.

(Slide)

Worker's comp, 20 percent inadequate.

(Slide)

Multi-peril, 32 percent inadequate.

(Slide)

Here we go again. GL, 44 percent inadequate.

(Slide)

And med-mal, 50 percent inadequate.

So, there's a problem there and it varies by line, and it's very significant, and this can mask the effects that we talked about in the first part. We may be understating the problem. Let's take a look at some other information.

How about payment patterns? We took a look at industry payment patterns as a percent of ultimate. First of all, auto liability. Well, we look at the losses (in yellow) and allocated loss adjustment expense. Now, this is available because this is paid data. This is just paid reported data out of Schedule P.

After one year, a third of the losses are paid for auto liability, but only 12 percent of the allocated loss adjustment expense is paid. After three years, 83 percent of the losses are paid and 54 percent of the allocated loss adjustment expense. After five years, 96 percent of the losses, but only 87 percent of the allocated. So, you're not talking about the same pay out patterns here. They are drastically different. You have to recognize that. Whenever we analyze any data, we have to look at that. We can't just look at the paid ratios and say, ah-ha, there it is. You know, we can't figure out that this is what the reserve should be. It doesn't work that way.

And the pattern for auto liability, by the way, is similar for multi-peril and also for worker's compensation. (Slide) We looked at general liability. And general liability

losses after one year, 11 percent, allocated loss adjustment expense paid, 3 percent paid. Three years, 33 percent losses paid, 24 percent allocated. Five years, 58 percent losses paid, 53 percent allocated loss adjustment expense.

(Slide)

And one shot at med-mal. The numbers are pretty comparable for med-mal. When I say "comparable," I should say the losses and allocated loss adjustment expense. Maybe we found a line with the same pattern.

(Slide)

Okay. Before we picked on lawyers a little bit. Maybe it's time to pick on actuaries a bit like Jack Byrne did. Okay.
We've had a big increase in the number of fellows and associates, but, gee, we didn't do so well on the reserves. Maybe we could do a little bit better. Maybe we should do a little bit better.

(Slide)

Why not try and do it right on allocated. It's going to be easier now. It's going to be more obvious if we don't do it right with Schedule P being split out some. Hopefully, everyone won't just take the allocated and dump it into the bulk so it disappears.

Well, first of all, it's not bad to get the reserves right.
You know what your liabilities are. It's reasonable from a financial point of view. Maybe you even use that loss reserve data for pricing. It might not hurt to have accurate data to start with. You might be able to do a better job.

Public credibility. Well, we say allocated is a problem. We say defense costs are a problem. Many articles on it, many publications, many speakers talking about how bad a problem it is. And yet, we're not sure what the magnitude of it is. Different sets of numbers. The first part of the presentation showed one thing and the second part suggested that we're short by quite a bit. It wouldn't be bad to have one set of good numbers.

Reinsurance availability. That may be tied into the pricing some. If the primary company can't do a good job of determining what its allocated loss adjustment expense reserves are, maybe the reinsurer would prefer not to provide coverage for that company or maybe the reinsurer would like to cut back. It may impact the availability of reinsurance for the defense costs.

The changing world. Things are changing all the time now. We're talking about tort reform, all sorts of measures taking place that have a tremendous impact on allocated loss adjustment on losses. Well, if we're going to respond to them, be able to adjust for them in our pricing and our reserving, then we have to know what they are. We have to be able to identify them separately and accurately.

Hopefully, we've presented an idea of the magnitude of the problem and also indicated that it's pervasive. It extends through and affects all parts of our operations.

I'd like to turn it back to Stu now.

(Applause)

MR. LERWICK: Thank you, John, Lisa. At this point, we do have a few minutes left for those who may have some questions and would like to follow up on some of the points that were made in the presentations.

QUESTION:

(Inaudible)

ANSWER: I'm sorry. I can't hear you. QUESTION:

(Inaudible)

ANSWER: No, we do not adjust for that. We really don't have -- you know, we can't really break it down to that extent. You know, the data that we have is total. It's not identified separately.

QUESTION:
(Inaudible)

ANSWER: I'd ask the audience. How many insurers are doing that?

MR. LERWICK: I guess I can comment here on behalf of one carrier that has gone through a number of gyrations on billing arrangements going from end of case to interim and back. It does have an effect, at least it has for us. But I have to say that it's somewhat overrated in the sense that the basic underlying trends still seem to be there.

I think it's something that individual carriers that know that they're doing this can make an adjustment for and should make an adjustment for. But I don't know that it -- I would not suspect that it invalidates John's findings at all.

Other questions? Yes, here.

QUESTION: This is for Mr. Kollar. I see on your graph for '87 and '88, 33 percent of the incurred loss is general liability. Now, do you have any additional information on set lines? In other words, I'm speaking now in terms of, say, the so-called personal liability --

(Inaudible)

MR. LERWICK: Repeat the question.

ANSWER: Okay. Let's see if I can repeat the question. Let's see, are the ratio of allocated loss adjustment expense to losses for personal liability lines greater than for owners, landlords and tenants.

QUESTION: In general.

ANSWER: In general. We have not split it out that way as yet. that's one of the things that we want to look at in the defense cost study as we continue our analysis. Right now we just have totals. If we can split it out, too.

MR. LERWICK: Other questions?

MR. KOLLAR: I'll add one comment to that, too, one additional thing. We probably would have to do that with some of the rate making data that we have if, in fact, we can do that. Rather than financial data.

MR. LERWICK: I guess, if I can, I'm going to slip in one question here for Lisa. You described sort of the situation that we're facing now in mechanisms that are being employed to deal with the escalation in litigation in claims departments of insurers. How would you contrast what is happening today and the measures that insurers are taking with what was done, say, ten years ago and what's the environment like or the climate like from the point of view of someone who has been involved?

MS. KRAMER: Well, the climate is greatly improved. Ten years ago a few of the biggest property casualty carriers and the most sophisticated had some of the techniques, alternative dispute resolution was certainly not on the table yet, litigation budgeting wasn't there, staff counsel, however, was, and most of you or many of you are with companies where some kind of house counsel operation has been around for ten to twenty years. Litigation budgeting wasn't, ADR wasn't, litigation management information systems were far less sophisticated than they are today, and the procedures related to outside counsel, I think, were a skeleton of what they are today.

So, the claims industry has come a long way, particularly in the last decade, because of the, you know, dramatic impact that legal expense is having on ALAE.

MR. LERWICK: Other questions? Ed?

QUESTION: Lisa, how do you know when you're getting an extra dollar of benefit from --

(Inaudible)

ANSWER: That's a legitimate question. What you do, I think, is divide your cases into three categories and they will generally fall into one of these three categories. There will be the obvious high exposure case where it is self-evident that every dollar you spend on outside counsel is going to eventually save you some money.

I mean, the amount of discovery that goes into the case, the amount of research that goes into the case, the number of experts retained, all of that will be expensive, but the exposure in the case is so high and, you know, leaving it in a jury's hands is such a tremendous risk, that it is very likely you can, you know, put aside those cases and know even though there are certain ways to manage even the legal expense in those high profile cases or high exposure cases, still, you know, they are not the main problem.

On the opposite end of the spectrum are the routine cases where you will very quickly, much faster than you think, drive through that point where each additional dollar you're spending in the attorney fee area is not saving you anything on the loss side.

For example, a routine slip and fall case. I mean, it takes so much to get that case anywhere near a courtroom that you don't want to do that. I mean, it's just out of the question.

So, the routine cases lump themselves together quite naturally. The high profile cases, they lump themselves together pretty naturally. The problem is in the middle. All those cases and I venture to say they probably range from 50,000 of reserve or exposure

or whatever number you want to put -- or name you want to put on the value of the case, 50,000 up unto around 250,000.

All of the carriers that I've ever dealt with, worked for or consulted with, have problems in that middle range. You're absolutely right. How do you quantify the savings that you can achieve versus what you might risk on the indemnity side? It is very difficult to do.

MR. LERWICK: I think we're just about out of time and I'm going to take the speaker's prerogative here and insert one last question though. I would like Lisa to comment, I think you're familiar that there was a study done by Tillinghast regarding survey of various carriers, a sampling of companies, looking at how they conducted their loss reserving process and loss expense reserving. And I wonder if you'd comment on that. Particularly, I think they came to some findings regarding case reserving of loss expense.

MS. KRAMER: Well, I think in general, I'm familiar in a kind of passing way with that survey and, you know, the results are somewhat confidential. But I think as a general point, we can say that of the companies surveyed, a very small number were case reserving for allocated. But those companies had the best track record on controlling expense and controlling ALAE. So, I think the point we can make is that there's a very small percentage of the insurance industry that is taking the information available that I talked about and getting it into their systems and using it to forecast for the future.

MR. LERWICK: Okay. I think -- we're about out of time. Hopefully, this has been informative for you and you will leave here determined to put what you've learned to use and do a better job and give higher priority to this category of reserves.

One last administrative detail again, it's just a reminder to complete the evaluation form. Probably now is a good time when it's fresh in your mind.

Thank you all.

(Applause)

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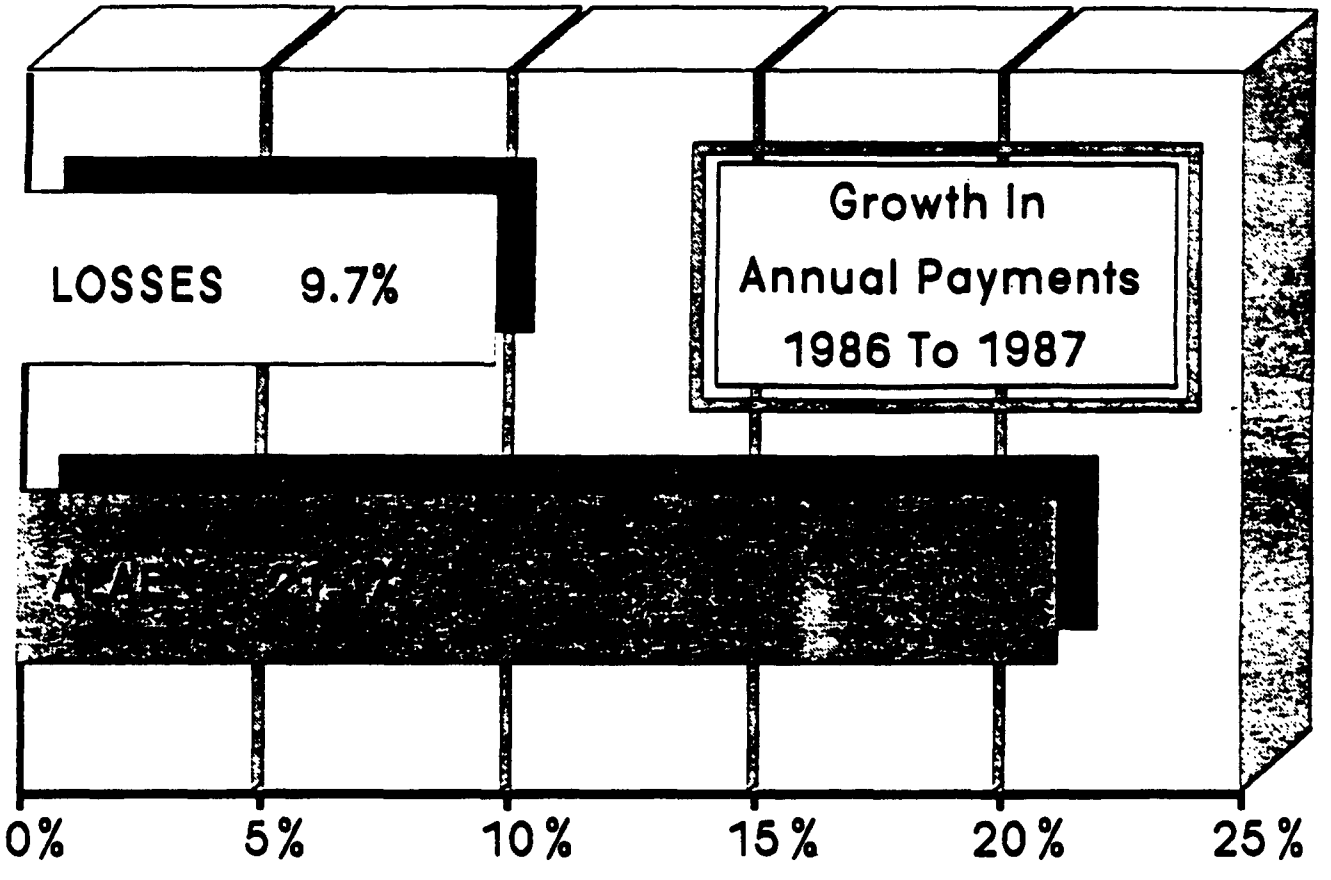
THE CASE FOR LITIGATION MANAGEMENT

492

MEDICAL MALPRACTICE

38 Specialty Companies



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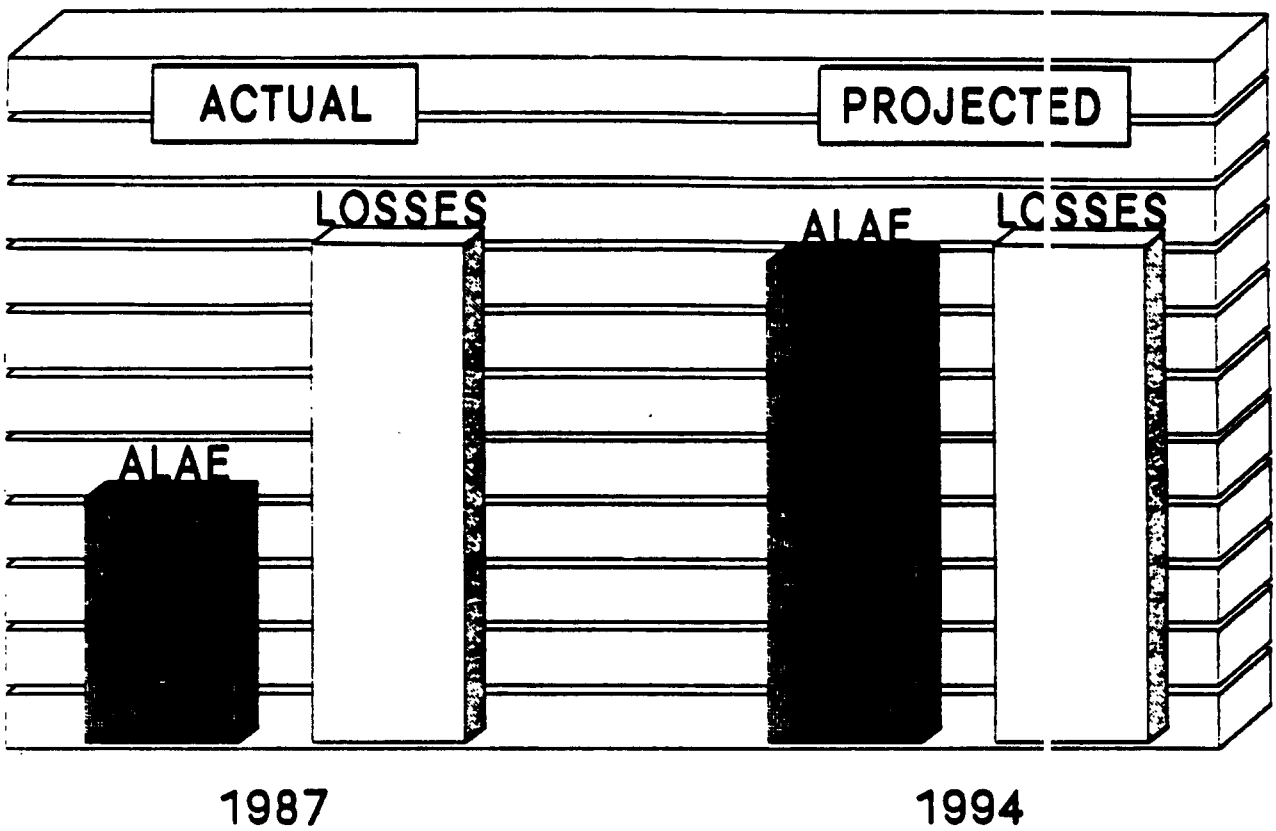
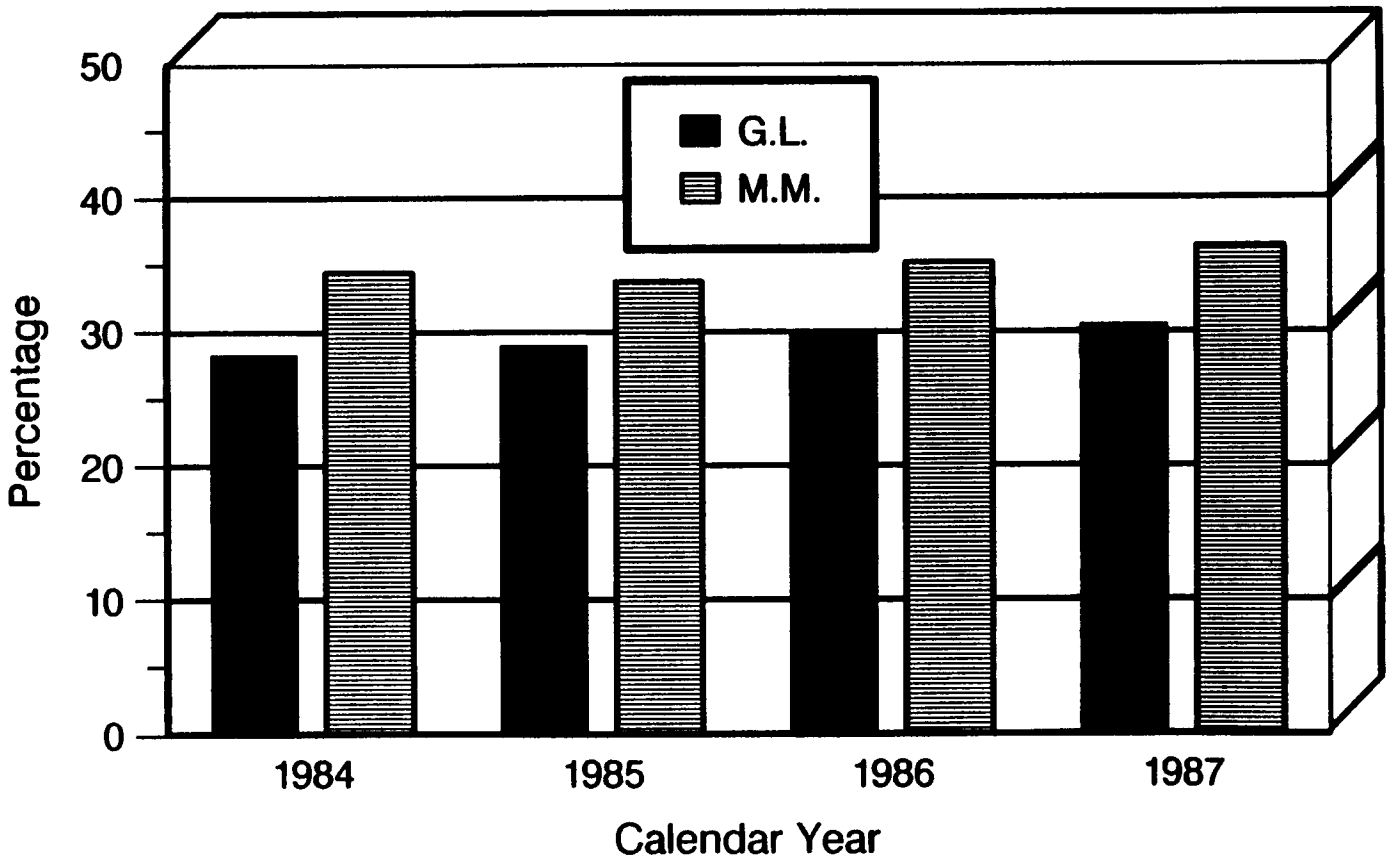
MEDICAL MALPRACTICE

38 Specialty Companies

COMPARISON OF ANNUAL PAYMENTS

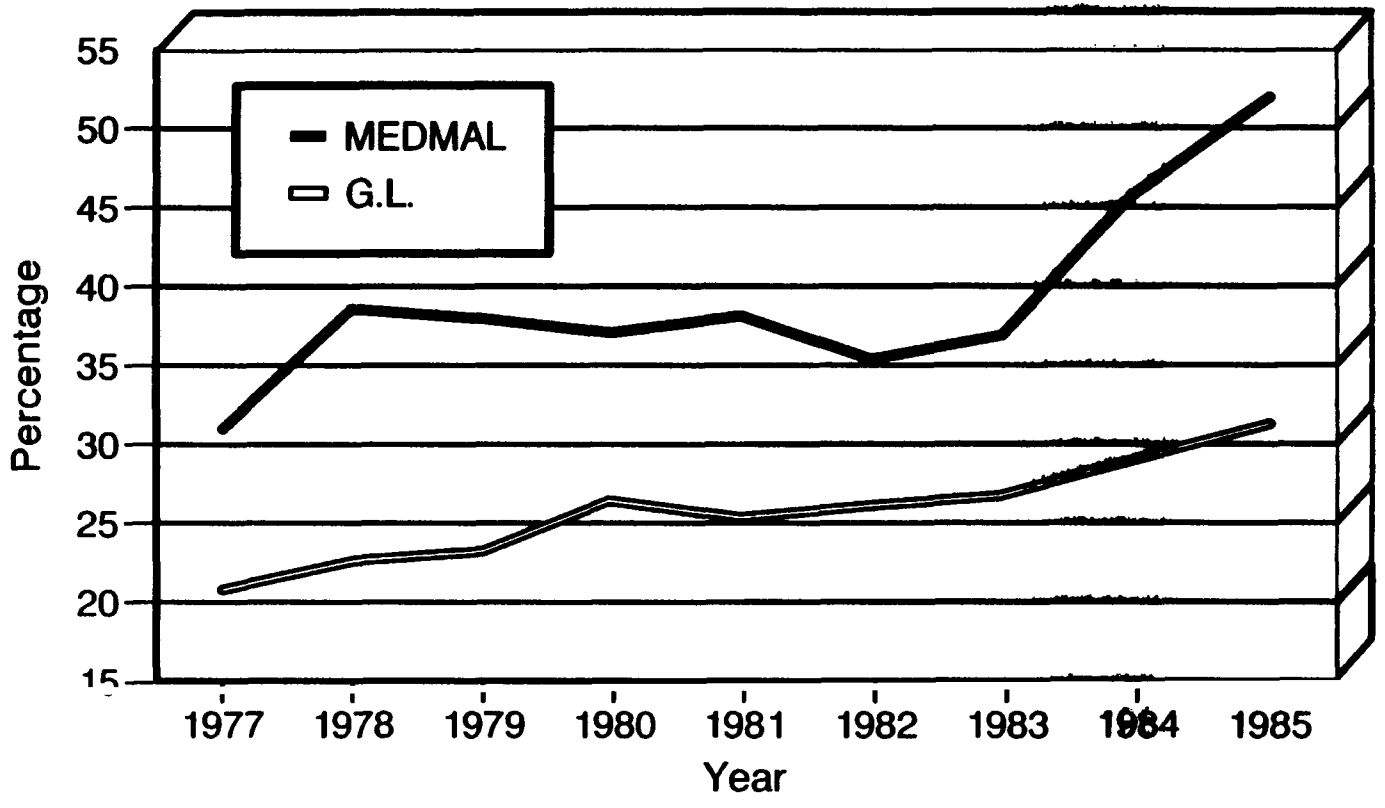


ALLOCATED LOSS ADJUSTMENT EXPENSE AS A % OF LOSSES PAID



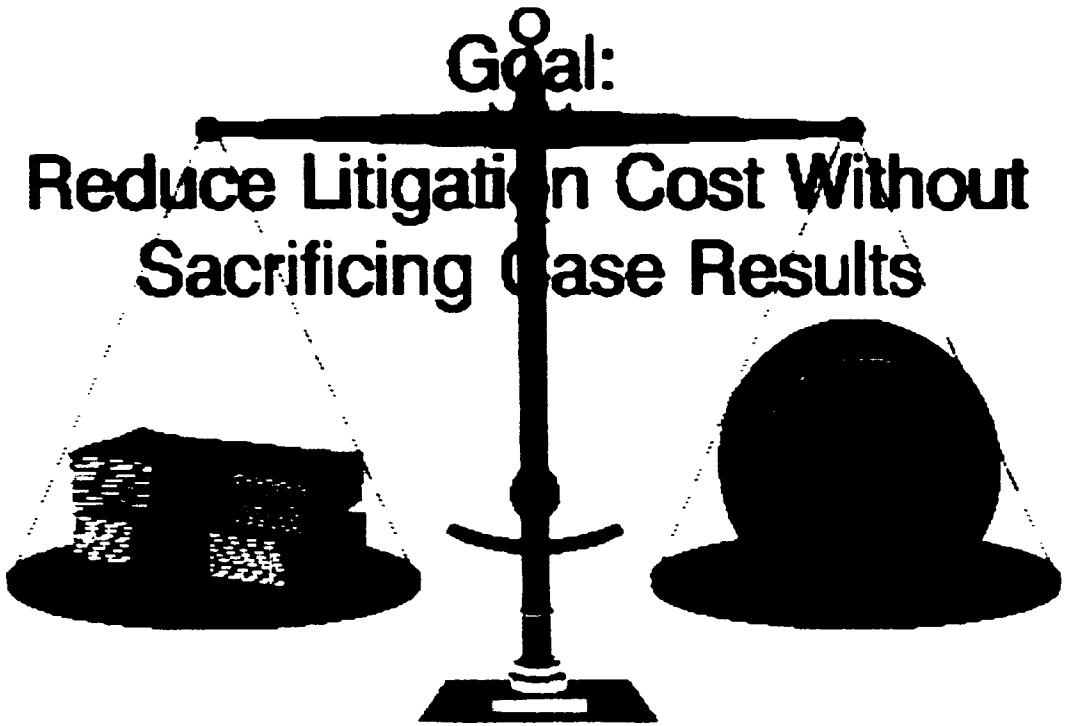
RATIO OF PAID ALAE TO PAID LOSS

Medical Mal/General Liability



Based on Accident Year Data Evaluated at 36 Months

LITIGATION MANAGEMENT



LITIGATION MANAGEMENT ISSUES

- Create Or Expand In-House Litigation Capabilities
- Selection, Retention, And Control Of Outside Counsel
- Alternative Dispute Resolution (ADR) Procedures

7

LITIGATION MANAGEMENT ISSUES

- Development Of Litigation Budgets
- Litigation Information System

(8)

CRITERIA FOR SELECTING OUTSIDE COUNSEL

- Previous Experience with the Lawyer or Firm
- Area of Expertise
- Track Record
- Location of Firm

CRITERIA FOR SELECTING OUTSIDE COUNSEL

- Availability
- Fees
- Responsiveness to Client
- "Chemistry"

(10)

RESOURCES FOR IDENTIFYING OUTSIDE COUNSEL

- Previous Experience
- Referrals From Other Lawyers
- Referrals From Your Colleagues
- Martindale-Hubbell Legal Directory

11

POLICIES FOR OUTSIDE COUNSEL

- STAFFING THE CASE
- LITIGATION PLAN
- RETENTION OF LOCAL COUNSEL
- ASSISTANCE FROM THE CLIENT
- COMMUNICATION WITH THE CLIENT

(12)

POLICIES FOR OUTSIDE COUNSEL

- DISCOVERY
- MEDIA COVERAGE
- CONFLICTS OF INTEREST
- BILLING

13

BILLING PROCEDURES

- Questions
- Rates
- Fees
- Billing Format

(14)

[FORM OF INVOICE]

Attorney	Date	Hours	Description of Services Rendered
DEF	01/02/80	0.4	Review Judge's Order; conference w/WXY re Order.
WXY	01/02/80	0.3	Conference w/DEF re Judge Smith's Order.
DEF	01/30/80	0.3	Draft amended complaint.
WXY	01/09/80	0.3	Discussions w/DEF re status and strategy, adding parties.
WXY	01/10/80	0.1	Review complaint prepared by DEF.
DEF	01/16/80	2.7	Prepare for pre-trial conference.
DEF	01/17/80	4.1	Prepare for hearing, research bad faith issues; court appearance; conference w/WXY; prepare order.
MNS	01/17/80	2.0	Preparation of documents at DEF's instruction.
WXY	01/17/80	0.2	Discussion of pre-trial w/DEF.
DEF	01/18/80	1.5	Meeting w/Judge Smith; memorandum to client re status.
		11.9	Total Fees $ 00.00

Date	Description	Disbursement
01/19/80	Copying expenses @ ___ ¢/page.	$ 1.20
	Total Disbursements	$ 1.20

Summary By Attorney	Classification	Hours	Rate/Hour	Totals
W.X. Young	Partner	.9	$ 00.00	$ 00.00
D.E. Faircloth	Associate	9.0	$ 00.00	$ 00.00
M.N. Summers	Paralegal	2.0	$ 00.00	$ 00.00
	Total Fees			$ 00.00
	Total Disbursement Charges			1.20
	TOTAL THIS STATEMENT			$ 00.00

(15)

BILLING PROCEDURES

- Travel
- Multi-City Offices/Performance of Services Out of Town
- Disbursements
- Timing of Statement

16

LITIGATION BUDGETING

- Who Should Prepare the Budget?
- How Early to Prepare the Budget?
- The Basic Mechanics
- What Level of Detail?

17

Litigation Plan and Budget

Privileged & Confidential

Case Name: _____

	Description of Activity	Responsible Attorney/Paralegal	Time	Estimated Expenses
Pleadings				
Dispositive and Forum Motions				
Legal Research				
Investigation				
Discovery* (including related motions)				
Miscellaneous**				
Trial Preparation				
Trial				
Total				

* Please itemize including, for depositions, the witness name and locale
** Please itemize

LITIGATION BUDGETING
VARIABLES AND ASSUMPTIONS

- Prefiling Inquiry
- Jurisdictional Issues
- Procedural Issues
- Discovery and Proof
- The Opposition - Strategy and Tactics

19

LITIGATION BUDGETING
VARIABLES AND ASSUMPTIONS

- The Judge - Judicial Temperament
- Nature of the Case
  - Complexity of Legal and Factual Issues
  - Novelty or Unsettled Status of the Law
- Potential for Settlement
- Relationship between Client and Counsel

LITIGATION MANAGEMENT INFORMATION SYSTEMS FIELDS OF INFORMATION

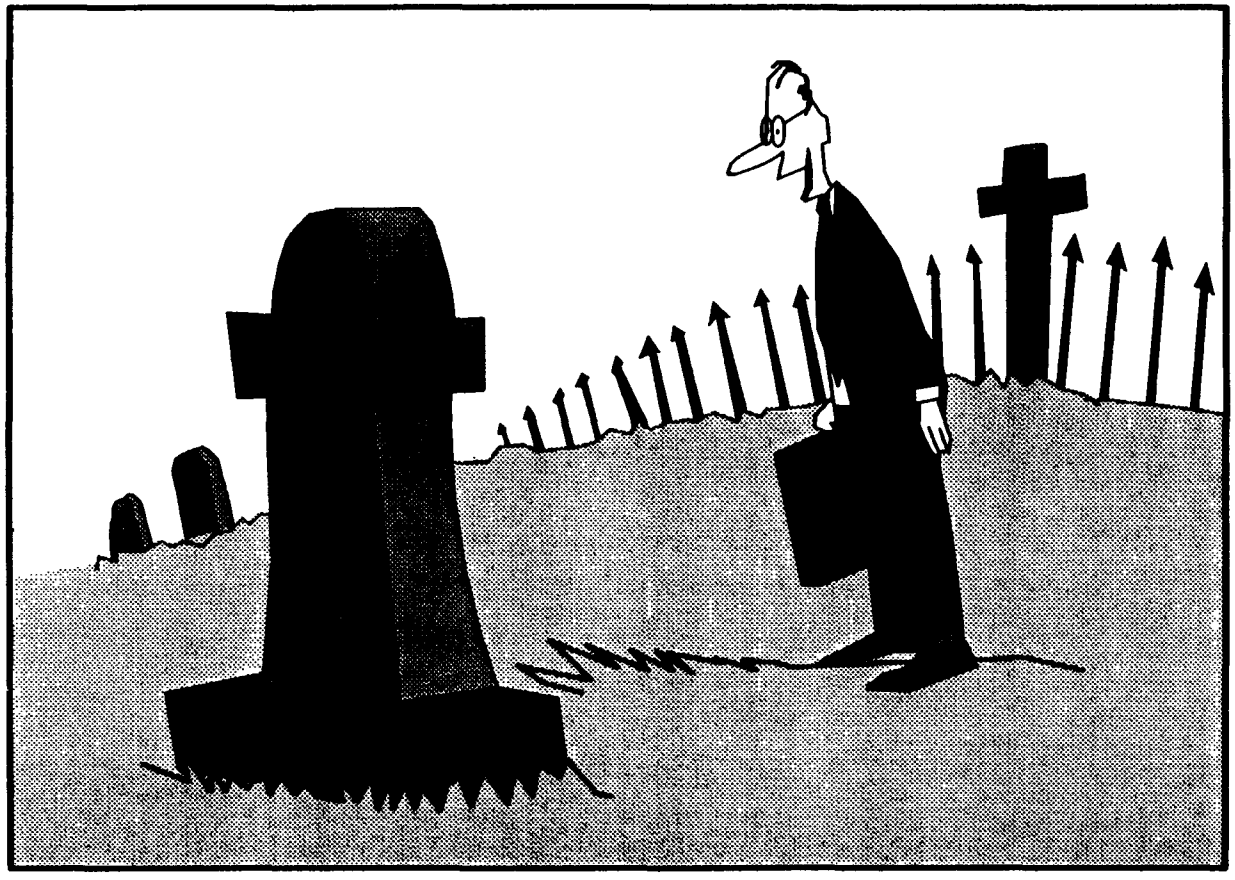
- Description Of the Case
- Description Of The Parties Involved
- Date Of Suit
- Date File Was Opened
- Information on Counsel

21

LITIGATION MANAGEMENT INFORMATION SYSTEMS FIELDS OF INFORMATION

- Legal Expenses Tracked Throughout The Case
- Report On Case Activity And Results
- Evaluation Of the Work Done By Counsel

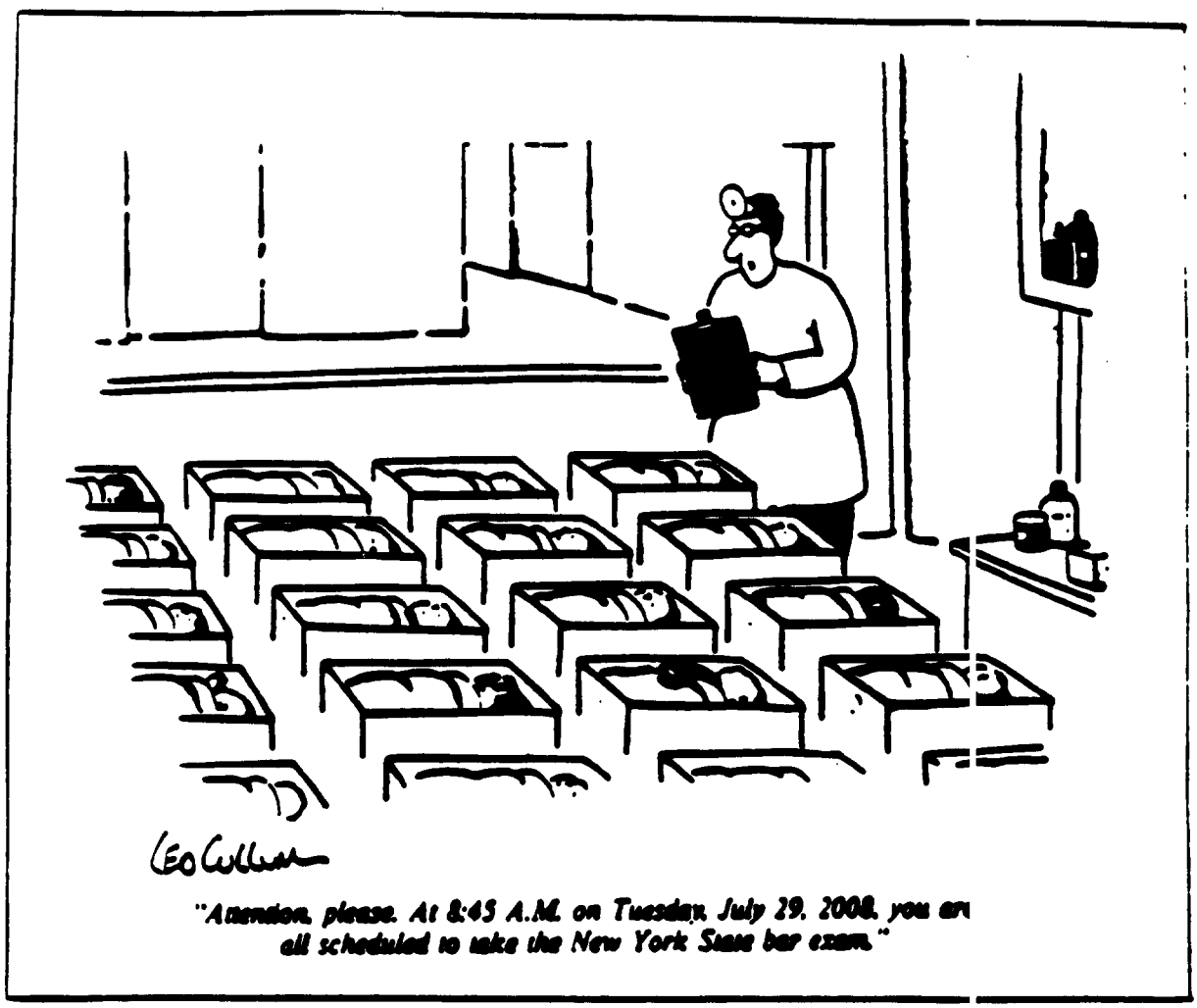
(22)



"Good News, Sir . . . We Won The Litigation!"

ALTERNATIVE DISPUTE RESOLUTION TECHNIQUES

- Informal
- Court Sponsored
- Private Forum
- Ad Hoc Methods



"Attention, please. At 8:45 A.M. on Tuesday, July 29, 2008, you are all scheduled to take the New York State bar exam."

25

1989 CASUALTY LOSS RESERVE SEMINAR

3E: RESERVING METHODS FOR ASSUMED REINSURANCE

Moderator/Panelist

Nolan Asch
SCOR Reinsurance Company

Panel

Regina Berens
Prudential Reinsurance Company

MR. ASCH: My name is Nolan Asch. I'm senior Vice-President and Actuary at Scor Reinsurance Company and I'll be the moderator and a panelist in this presentation with Regina Berens from Prudential Re.

This is session 3E, Reserving Methods for Assumed Reinsurance. We plan on approximately 30 to 40 minutes for each of our presentations which will leave 10 to 30 minutes for questions and answers. If necessary we may cut into your half hour for refreshments.

There are feedback forms in your packages. As someone who ran a major seminar this year, these feedback forms are important and used constructively. So, I would encourage you to complete and return them to the registration desk or mail them back.

There are handouts in the front and in the back for those who don't have them. Okay... that's enough for the housekeeping.

I've never been known to be moderate and now I have the additional impossible task of following Jack Burns which is like following God. But anyway...I always did like a challenge...so here goes.

I'll be basically dividing my presentation into 3 sections. Firstly, I'll be talking about the importance of proper subdivision of the database. Secondly, I will discuss an objective and rigorous system for testing your formula IBNR reserve against actual results without circular reasoning. We will see how this is actually operated in the real world for an actual reinsurance firm over several years. Thirdly, we will explore the tests that regulators and others use to review loss reserves. We will expose some of the flaws, weaknesses and contradictions of these tests. Also, we will go beyond the numbers to show some useful new tools and dimensions that may supplement these tests, especially for reinsurers.

Now, we'll briefly discuss the subject of proper subdivision of your data base. I say briefly, not because I don't think it's important but because I would rather spend the time to talk about some current events. For those of you that are interested in what I had to say about subdividing data, in the 1986 and 1988 CLRS minutes, there is the text of my presentations when I spent the major part of the time talking about subdividing your data.

Here, (slide 1-1) we have a company that has a very, very stable world. They start out with one unit of losses. It could be 1 billion, 1 million or 1 hundred thousand dollars...it doesn't matter. In the second year of development they go to one-and-a-half units. In the third year they go to three units and then they never have any development again. What would you reserve for IBNR? If you follow the standard techniques it's very clear what the IBNR reserve should be. If you're using the standard triangulation methods, you will come out with 3.5 and that will be a lovely answer for your IBNR reserve. Right? Well, not quite so.

We do not really have one homogeneous portfolio here. We have a portfolio made up of two different subsets -- one is long tail and one is short tail. Of course you had no way of knowing that. The 1.6 in the second year of development in AY 85 is the first little tip of the iceberg that says that the distribution shift of business is just beginning to become apparent in your loss statistics. And if you read those old texts, you'll see that "right answer" could have been much greater.

The only point I'd like to emphasize to those of you in loss reserve work...and I don't tend to say something like ALWAYS...but ALWAYS search for subdivisions related to possible causes for variable loss development.

Now, the next group of studies that I'm going to show you relate to actual facultative casualty portfolio over a number of years for a reinsurance company. I can imagine which one that is. We actually broke down that portfolio and analyzed it along a number of dimensions -- automatics vs non-automatics -- auto liability vs general liability. We looked at it many, many ways before we finally had the right sort of subdivision of our data. But a lot of people do not try and do that often enough and I'm stressing it once again and then I'm going to go away from it.

Now, with this actual data we're going to perform some tests. And the tests I'm going to be talking about can be performed with any kind of data base. It doesn't matter if it's underwriting year, accident year or policy year. It doesn't matter, actually, if it's reinsurance or primary. It can be applied to any loss reserving IBNR method you want. We happen to be applying it here to the standard triangular IBNR methods that you've heard so much about.

But this type of testing doesn't restrict itself to that. It doesn't matter if you're using Bornhuetter-Ferguson or Fischer Lange or make up the loss ratios and subtract the difference. It doesn't matter what kind of technique you're using. You can always have this kind of information to go back after the fact and see how your IBNR reserves are testing out.

The simple premise and really the only premise of this testing mechanism is any loss prediction method must predict ultimate paid losses and case outstanding losses, and the pattern at which they emerge. The technique compares theoretically predicted losses, excluding IBNR, and I'm going to go back to stress that again, to actual losses, excluding IBNR, and makes detailed predictions of future years incurred losses.

Later these future predictions can be compared to actual outcomes to test either intuitively or scientifically the method. Is it consistently too high? Is it too low? Is its accuracy variable over the years? Is one year out of tune with all others? If so, why? Is it biased? Is it unbiased? All you really need are the predictions of ultimate losses for each year and a detailed pattern of loss development. Many people refer to this in the profession as squaring the triangle and I'm sure you've probably heard that term before.

What I'm doing is squaring the triangle, letting some time lapse and comparing the actual development, excluding IBNR, to the predicted development, excluding IBNR.

Now, we're going to start to look at something that we don't see enough of in the CLRS, some real live data from some real live companies and real live results.

So, right now (slide 2-1) you're looking at the cumulative and inception to date incurred losses at 12/85 by underwriting year for a reinsurance firm's facultative casualty portfolio. And I'll repeat again, this could be any kind of subdivision of data. It's very important to get the right subdivision of data.

We also tried looking at paid triangles, but in the world of excess of loss reinsurance, we had total failure in getting any type of reasonable pattern of loss development on a paid basis. It was very unstable and we went away from it. It was one of our many experiments that failed and we were unhappy with.

I want to emphasize again one more time, all the incurred losses you're going to look at in our predictions are excluding IBNR. These are as of 12/85 actual losses, excluding IBNR, for the portfolio.

Now, the next slide (2-2) shows many things, but the first thing it shows on the column called cumulative factor at 12/31/85 are the actual loss development factors that underlined the actual IBNR that the company booked for the portfolio. And you will notice that the first and second factors have in parenthesis "forced." That drives the two very important points.

First of all, you don't have to actually book the formula result to get the IBNR to make these tests work. You can go back retrospectively and make it come out right as they say. Secondly, is it can be applied to any kind of loss IBNR method. It doesn't have to be loss development.

Also, you will note that in your earlier presentation you had from Mike Covney, who spent some time talking about how using actual loss development patterns to set IBNR reserves can be dangerous because they're unstable. I agree with him, but I agree only for the first two years of development, even in excess of loss casualty reinsurance. And I think when you see the end of this whole presentation you'll see why.

However, for the first two years in excess of loss casualty reinsurance, I do not use any type of loss development or loss driven methods to set IBNR. Because there I think it is too stable. But after that, I think that problem, at least in my experience, tends to be overstated.

So, to try and help you interpret this, actually to read a few things off the chart, the actual amount we used for the 1985 underwriting IBNR reserve was actually 8.7136 times the actual incurred losses inception to date. And what we've done in the next column, cumulative IBNR factors, is turned those loss development factors into IBNR factors by subtracting one.

The column labeled "Inverse Percentages" is really no more than one divided by the cumulative factor. What we're saying here is that cumulatively 10.29 percent of any underwriting year will come out in the first year of development. That's 10.29 percent of the ultimate and 26.62 percent will come out after two years. That is the so-called 12/31/85 model that I'll be referring to repeatedly as I go through this.

The final column is the incremental LDF percentage. All that is, is taking differences. So, for instance, we're saying that in the second year of any underwriting year, the second year of development, we'll see 16.32 percent of all the ultimate losses for that underwriting year. That's really 26.62 minus 10.29.

One nice thing about this method is it doesn't take anyone familiar with advanced calculus or rocket science to follow it along.

The next slide (2-3) goes a little bit further. Now, we're going to combine those case incurred losses that we had on the first slide and those ultimate IBNR's. And we are really talking about the ultimate IBNR's being the IBNR we actually booked. So, now, we have ultimate losses estimated for every underwriting year as of 12/31/85 and those ultimate estimated losses.

And Jack Burns said it much better than I. "I was the guy who set them, I signed the loss reserve opinion. I said, yeah, that's what it's ultimately going to be, and unfortunately, I didn't retire early, I've been with the same firm for five years, and couldn't get out, so I have to stand by and face the music of my own discipline. "

The next slide (2-4) combines the ultimate estimated losses with the written premium as of year end '85 to come up with ultimate loss ratios.

Now, these ultimate loss ratios that I just stressed, are no way, shape or form influenced by any assumptions, any special factors, any underwriting judgement, any committee work, any top management playing some of those nice amusing tapes that are very real world that we just heard.

So, this is what we set up. It predicts what the ultimate loss ratio is going to be for all the various underwriting years, 1985 and prior as of 12/31/85. You'll note here that even the written premiums for 1983-84 were estimated. And in the world of reinsurance, even premiums take a lot of time to develop.

So, we actually had to make some projections back in year end '85 as to what these underwriting year premiums would be. And I haven't said it before, but our data is by underwriting year, which is I think the cleanest way to analyze excess of loss reinsurance data.

The next very interesting thing to do is to eyeball that column that says ultimate loss ratio. That's a very interesting and powerful column. And this is where I really get very angry with people that use too much reliance on expected loss ratio techniques, no matter which one it is. Any time you weight an expected loss ratio to dominate your loss reserve estimate, you are fixing your IBNR.

And if you eyeball those predictions, which turned out four years later and still running very, very true, you will find that over the course of a long period of time, here we have 1975 to 1984, the ultimate loss ratios on a portfolio of business can vary tremendously. We've heard a lot about this cycle. We know it exists. It's a fact. This is just taking that into consideration and saying that although in 1978 we had a 55 percent ultimate loss ratio and it's pretty well developed and we're pretty confident, that doesn't mean that 1983 can't have a 242 percent ultimate loss ratio.

In fact, that's exactly what we took into account and predicted when we booked our reserves.

So, I'm talking about a very responsive IBNR methodology, and that's a little scary. So, we need some caveats. And so I'm going to repeat again what I said before. One very important caveat is I'm not urging you to go out and do this sort of thing for the most recent underwriting year or maybe even the most recent two, maybe three if you're cautious, because you can get very variable and false indications.

In the early stages of development, especially in excess of loss casualty reinsurance, you cannot -- probably should not use this method for the first and second underwriting years. You can have some wonderful incorrect indications. I'm not too competent in that.

But after those first two years and things begin to settle down a bit, I have done a lot of testing over the last five years, and at least I've had some good experience that I'm going to share with you now.

The next slide (2-6) begins to get into actual predictions and what is the technical sense. This is the technical sense. Actually, how do these predictions come in and how do they fit into the model? I'm going to leave you with some homework so you won't get bored, but with those other sheets of paper you have it is a very trivial exercise to answer the question. What is going to be the 1984 underwriting year predicted case incurred losses for calendar year 1987? At year end '85 that was a prediction.

Later on here, I'm going to show you how it actually worked out, so we can actually test this model and see how it performed.

So, this slide is just talking about one of the many, predictions that the method gives you, which is really a simple method. It doesn't sound like this was a hard exercise, but in December of '85 it was challenging. That was done in December of '8! with December '85 data, with December '85 factors, December '85 reserves and December '85 losses. So, you just combine the ultimate '84 underwriting year factor which is in your handouts (2-5) with the factor of 14.05 percent, which is also in your handouts and you get the prediction.

Okay. Now, we're going to get to the meat of the test. We're going to see how this model has actually operated in some real world testing. Right now we're looking at the 12/31/85 model's predicted losses for calendar year '87. These were predictions made at 12/31/85 of actual losses, all excluding IBNR. These predictions were all excluding IBNR.

And the next two -the next columns compare the actual 1987 calendar year losses excluding IBNR for the portfolio with the predictions. First, we're going to show the differences and then we're going to show the percentage differences.

Let's make one simple thing very clear. The important element here is not the dollar differences. As a matter of fact the dollar differences are irrelevant. What really counts is the percentage differences so you normalize it for any size portfolio.

And if you look at each individual underwriting year here, there are a lot of variances. If the object of this exercise was to predict the detailed numbers for each underwriting year's emergence, I wouldn't feel very good about what I'm seeing. I have a minus 53.8 percent variation actual versus expected for the '76 year emergence. And a minus 57.1 percent for 1977. But luckily I don't care about that at all. What I do care about is what happened in the aggregate. Did the loss reserve for the company's prediction turn out right or wrong?

And to test that out, we can take a look at the emergence for all underwriting years, '85 and prior in calendar year 1987. And as you can see, we predicted in the model, or you can see in your handouts (2-6) maybe better, $16,182,554 and we actually got $15,696,499. And that's a discrepancy of only three percent. At the time I made these predictions at year end '85, if you would have told me in a time machine that I was going to do that well I would have laughed a lot. I wouldn't have believed it possible.

This issue of underwriting year by underwriting year versus the total portfolio gets to the credibility issue. Even though we're not the largest reinsurance company in the world, we are analyzing about a $20 million portfolio of facultative casualty business we're analyzing here. Even in that fairly small portfolio, it seems as if some of these old traditional methods are doing a pretty good job of predicting the future. I would also note and it helps the analysis, that our book is quite stable and homogeneous.

Some more comments on this slide (2-6). If you look at the issue of bias and I didn't put the totals up there with you, but if you took a look at the number of years with minus signs and plus signs, which I think is interesting, you'll find that six years are underestimated and four years are over-estimated. I kind of like that and you'll see that throughout most of these tests. We don't seem to be consistently biased either upward or downward in our individual predictions, which is very comforting.

Okay. Let's go to some more testing.

Here, slide 2-7, is another set of predictions. These predictions were made for the calendar year 1987. This time they were made at year end 1986. The so-called 12/31/86 model. And we ran this for the company at the end of '86. We predicted calendar year '87, excluding IBNR, and '87 is, of course, now history and we can actually look at it.

Once again, if you look at any individual underwriting year's prediction, the percentage of variances are scary. But if you look at the total portfolio again, we have only a two-and-ahalf percent variance between our prediction and the actual. We're also happy to say that the actual is less than we predicted. That's nice too. That's also going to be true for all the comparison tests that are made for this firm.

What else am I saying here? Is this method a failure if the percentage differences are big? As a matter of fact, I think it might be doing you the biggest favor of all. Let's do a quick thought experiment and say we have predicted $9 million of losses and got $18 million. Well, in that case, the feedback system here is sending you a very, very powerful and clear message that is easy for a lot of executives to understand and hard to refute. That means it's beginning to look like that loss reserve we set up doesn't look good at all.

As a matter of fact, the only way you could talk your way out of that is to say that the pattern of loss development was somehow changed and suddenly we're writing all short tail business and we're not writing long tail business anymore. So, ceteris paribus, in this thought experiment, the loss reserves are testing out as emerging to be only one-half of what they needed. That's one way of explaining the situation where the actuals are running tremendously above the predicted.

The only other way is to say that this is all not credible. But in my opinion, that's an argument I don't buy very often. I generally write that off as a hand waving argument. Again, I'll repeat, we have only a $20 million portfolio of facultative casualty business which is not the largest in the world, and it does seem to behave fairly well.

Okay. Let's go on. Let's talk about calendar year 1988.

And by the way, I don't make this point very strongly, but obviously all these models don't just predict calendar year 1987 and 1988 for the portfolio. We're predicting emergence of losses all the way into the 21st Century, and every year that we redo the model we are predicting those calendar years into the 21st Century again and again. So, you can expand your model to do that among other things.

But, anyway, on to the testing. For calendar year '88 based on the model of 12/85, which is in this particular slide (2-8), we have 14.398 million in predicted losses and we actually saw only 11.546 million. So, it's about 19.8 percent better in total.

Once again, if you were to look at the number of years of minuses and pluses and percentage differences, they are about equal. The magnitudes are great per year, but once again no one's loss reserve opinion has anything to do with any individual year but the aggregate.

There aren't many humans I can think of that can accurately predict in detail each of these underwriting years' emergences in each calendar year. But if it's a multi-billion dollar company, and some of you are that, I'm not, I suspect you could get into predicting many more subdivisions than you suspect with some accuracy. But there are always limits to this, obviously.

The next slide (2-9)takes a look at another prediction for calendar year 1988. This one is the 12/86 model and you can see again we have only a 3.8 percent variance. To my mind, I'm still almost shocked that the model has performed up to this level.

I never really anticipated it, but it has been very gratifying to see it working that way. I'm not saying that it's fool proof and I'm not saying we couldn't have massive variations in the future.

The next slide (2-10) is a very brief summary of all the testing we've been discussing. A very quick summary of the four macro predictions that were made at year end '85 and '86 for calendar years '87 and '88, and show how they turned out.

I'm now going to state what I call the golden rule in using this particular type of test. The greater the percentage by which your theoretical models predicted case incurred losses consistently exceeds the actual over a credible time period, the greater your models indicated reserve redundancy. Conversely, the greater percentage by which your actual losses exceed your theoretical losses consistently over a credible time period with credible data, the greater the indicated inadequacy of your model's reserve methods.

There is always a stated caveat, which I have mentioned before. I'd be very, very shy about using any of these predictions for the very first or maybe second year of development for any underwriting year. You should use other techniques there. Also, you must always relentlessly subdivide your data into the smallest credible, yet homogeneous subgroups that relate to causes of variable loss development patterns.

I think these slides bring into focus concretely how this method can be applied to many real world situations. I can trace my historical losses by underwriting year, by calendar year, by any type of data or subset I want to.

By the way, you can naturally adjust your data, and you've heard about this in other sessions, for anything you want to such as frequency trend, inflation, changing the variables, different subdivisions, anything that you want to include. And again, I'll reemphasize, you should not just blindly accept convenient triangular data bases and just go to work on them.

I've often compared the process of setting accurate ultimate IBNR reserves for long tail business, like excess of loss reinsurance, to successfully launching a rocket to the moon. This technique allows mid-flight corrections that are essential. I don't think you can ever accurately predict in detail the losses that will be out there in 25 years.

However, after over four years of use and testing in a very challenging situation in a fairly small company, for our excess of loss casualty reinsurance business, these

forecasts have tested our far closer to actual losses than I would have ever hoped at the time I made the predictions.

The model also would allow you to look at many, many analyses and side issues that could be put on top of it. Is it indicating IBNR corrections up or down? Are you missing some important data elements? It will tend to highlight systematic and unsystematic discrepancies between your model and the real world. It can be applied to any IBNR technique, not just the standard triangular one, but any technique that predicts ultimates and has a predictive pattern that can be tested using this model.

Okay. That's the end of the second part of my discussion.

We're actuaries. We're satisfied with the adequacy and professionalism of our loss reserve formulae and estimates. However, it doesn't end there. Often we must convince others who may be less proficient in these arcane areas and may be using flawed yardsticks to measure our performance.

Let us now hold a brief theoretical discussion on how circular reasoning, which keeps bothering me, can flash false signals on loss reserve adequacy throughout the industry. Let's conduct a very simple thought experiment, which Einstein was very, very fond of. Let's consider a firm, any firm in the insurance business with a total loss reserve of 10 units. It could be 10 billion, it could be 10 million, it could be 10,000.

This firm sets up a loss reserve of that amount. And the triangle begins to emerge and they begin to see loss development. Let's say this firm, very fortunately, still has only 10 units of incurred losses after one year or two years and they keep looking at their development and it's 10 units again and again and again. The paid plus case plus IBNR is 10 units.

So, now we're in some far future year, or maybe not so far future year, and the firm is grappling with what they have to do with their IBNR reserves. Should they increase them or should they decrease them? Well, they could go either way obviously. Let's consider two cases, case A and case B.

In case A, our firm decides that they're going to increase the IBNR reserves by one unit. So, now they have total incurred losses of 11 units. Testing these results with any of the standard tests used by the industry, whether it be the Iris test of the NAIC, Schedule O and P of the annual statement, or the SEC 10K, you would say, ah, now, you've got a reserve problem. Now, you have $11 for case plus IBNR and there's an inadequacy in your loss reserves. You're heading for trouble. You're 10 percent inadequate.

Okay. Let's put that aside and let's assume that they took the other approach, and they decrease their IBNR reserves by one unit and have nine units of incurred losses. If the firm had done this more irresponsible thing and reduced their IBNR, all the tests would now say, ah, the firm started out with $10 of liabilities when they first set the reserves, $10 the second year, and now it's 9. Well, this firm is really well reserved. As a matter of fact, they're redundant. That's the way all these tests work. And they bother me a lot. They're very perverse, they go in the wrong directions, they tend to encourage people doing the opposite of what they should be doing.

Okay. We've got a problem. We're going to try to seek an aid in compensating for these deficiencies in the "official loss reserve adequacy tests" by starting to consider paid loss development data as it relates to incurred loss development data for the same firm.

The next phase of our discussion will center around two mythical reinsurance companies and one real reinsurance company. We will use the current Schedule P, Part II data to analyze their accuracy of loss reserve estimation retrospectively.

Slides 3-1 and 3-2, I guess you can put them right on top of each other. The only thing different about these two slides is the name of the firm.

You can see for yourself that everything is identical. Their apparent profitability and loss reserve adequacy are identical. Their loss ratios are identical, except one of them happens to be called Reliable Re and the other one happens to be called Renegade Re. And we'll get into that, as to why they have those mythical names in a little while.

But looking at the annual statement you can't tell them apart. As a matter of fact, they could be the same company under two divergent loss reserving philosophies and practices.

Okay. Now, we begin to see maybe why these may not be the same firm. Now, we're going to refer to the current paid data on Schedule P, Part III to analyze these two firms a little further. We assume the two firms have identical distributions of Schedule P business. I know the format of Schedule P is to change this year, but all the data needed to perform this analysis I'm talking about is still going to be there. It will just take a little more digging to get at it.

Slides 3-3 and 3-4 show the data for Reliable Re and Renegade Re. As you can see, and as you read from 1982 to 1988 years, you can see that the portion of the constant 60 percent loss ratio that has been paid at the same stage of development begins in 1982 at the same distribution for both firms, i.e. the shaded 15 percent you see in this slide 3-3 here.

So, both firms start out with a 60 percent loss ratio and end that way. But Reliable, starts out with a 15 percent paid, 45 percent reserve, and ends up many years later in calendar time with 5 percent paid and 55 percent reserve.

Whereas, his twin, Renegade Re, and it seems people often can't tell the difference between the two, starts out also with paid 15 percent and reserve of 45 percent, and ends up in 1988 with 25 percent paid and 35 percent reserve. Each one of these across the row is the first year of development.

And if you look at all of these exhibit in detail you'll see both companies start out with the same paid reserve in '82 for all maturities and you see them constantly going in one direction for one and constantly going in the other direction for another

Now, if the tails for these two firms are truly identical and I think it will help you to imagine these firms are really the same firm under two divergent potential loss reserve philosophies, then it's now obvious, (although the annual statement says their earnings and reserve adequacy levels and profitabilities are the same) that the earnings, reserve levels and profitability of Reliable Re are much greater than those of Renegade Re. And here we have annual statements and development of Schedule P that shows exactly the same thing.

Okay. How powerful and dramatic are these differences? That depends on how large the loss ratios are and how persistent and dramatic the trend of change in the paid to reserve distribution is across time. I've selected these exhibits for clarity and ease of exposition. However, I believe all the quantities are not unreasonable or unrealistic for real life situations we've seen in the industry over time.

Now, the next two slides, 3-5 and 3-6, represents a proper normalization of Exhibits 3-3 and 3-4. Going from 15 percent paid to 5 percent or 25 percent paid doesn't look so dramatic on the surface. However, when you start looking at it in the way of 3-5 and 3-6, and you see that 25 percent of the total incurred losses after one year of development in 1982 as is in the case of Reliable going down to 8 percent of their stated loss ratio. And then Renegade has gone up to 42 percent over the same period.

That is a very, very, significant discussion of just what their ultimate loss ratios may end up versus 60. Quite a big difference. And I think it's more rigorous to analyze these trends.

Are there any caveats about this little trick that I'm talking about? Well, as always, there are some, but not too many and not too difficult to uncover. You might want to jot some of these down since they're not in your handouts. These are the only four caveats I've come up with. There may be more, but I don't think there are many.

The first caveat is obviously any significant change in the distribution of business. Any increase in the share of slower paying lines will cause the percentage of paid at each stage in development to go down naturally over time. That could negate here, for instance, the positive indication for Reliable Re. If they are really changing the distribution of business and going to slower paying lines, then it's not showing a more favorable reserve. It's something else. Or it could still be more favorable reserve, but it needs to be offset.

Secondly, any transactions that might distort the paid patterns. Here I'm thinking of historical occurrence financial reinsurance or loss portfolio transfers either assumed or ceded. They need to be backed out of your data base to get a clear picture of what's going on.

Thirdly, discounting of loss reserves. Obviously any change over this six year period, 1982 to 1988, any change in company policy here would distort the pattern. If they had the same policy, whether it's discounted or un-discounted, there would be no distortion.

Last, and very least for big companies, but not so least for small companies are the shock paid losses. This is especially important for smaller firms. One large loss can distort your payment patterns if it's large enough in relation to your firm. If you're a multi-billion dollar entity it doesn't come into question much, but the smaller you are the more important this gets.

Okay. Can you compare your own company's patterns along this dimension to industry averages. You've got this interesting thing about looking at paids to incurreds and breaking it out and analyzing it, but, okay, what does this mean. You need some sort of reference point or bench. Yes, you can. AM Best published Best's Casualty Loss Reserve Development Tables. There is a special series of reinsurance companies, as well as the primary companies for auto liability, GL, worker's comp, medical malpractice, and multi-peril. The data for almost every individual firm is included, as well as several sets of very interesting industry average data for comparison purposes. So, you can compare yourself to all the stock companies or all the mutual companies, or any sort of an industry group that you think is appropriate for you to be compared to.

By the way, all the theory and technique I'm talking about, applies equally well to primaries, as well as reinsurance. We've got this new little trick. We see what it means. We see that we can compare ourselves to industry averages. We can see we can

look at any company. Has anybody officially endorsed this thing? Well, I can now say yes.

Reinsurance Association of America has a joint subcommittee on financial tests. It has made comments after serious study regarding special interpretations or nuances regarding reinsurance relative to the NAIC IRIS Solvency Test. I was honored to be a member of this committee and, obviously, was actively advocating this particular type of analysis.

With respect to IRIS ratios 9 and 10, the one year and two year reserve development to surplus ratios, this is part of their report which has been approved by the board of directors of the RAA and has been transmitted to the NAIC. But in this current world, I don't know if I'm even supposed to say that. They haven't responded.

"When analyzing a reinsurer, attention should be given to the relationship of paid to incurred losses. The difference represents the change in reserves. For example, if paid loss ratios are increasing while incurred loss ratios remain constant, this indicates that smaller reserve increases are being made despite increasing levels of payment. Given the same distribution by line of business, the higher the ratio of paid losses to incurred losses for an accident year at the same maturity level, the more unfavorable, should be the interpretation of the test stated reserve adequacy.

Conversely, the lower the ratio of paid losses to incurred losses for any accident year at the same age, all things being equal, the more favorable should be the interpretation of the test stated results adequacy. The data to perform this analysis can be found in Schedule P. As a caveat, any special transactions or mix of business changes that blur this analysis must be considered."

Okay. What about the real world? Well, I happen to know something about one real world reinsurance company, the one I work for. So, the next nine slides will talk about the data that we've been discussing in this format that's fairly easy to put together from published data for an actual reinsurance company.

Well, the data has some ambiguities, blips and warts. It's not the ideal pattern. They can't come out with all these nice smooth patterns that we go around for discussion purposes. But the firm is not subject to any of the four distortions and caveats I mentioned earlier. So, one of the caveats apply to this firm.

So, slide 4-1 shows a firm with an apparently slight developed inadequacy for the 1984 year. It started out originally at 77.5 and went to 97.4. Although compared to others I'm not so sure that was so terrible. After that it shows redundancy for '85. This is total Schedule P lines going from initial estimate of 96 down to 71. And for '86 and later years looks to be very, very stable and quiet.

The next two slides I don't want to focus on too much, but what they do is show some of the Schedule P sublines development. And as you would not be surprised to see, you have the same patterns, but much more erratic development when you subdivide your data down to smaller sub-portfolios. We're getting down to fairly small portfolios here. So, you see things happening with greater amplitude in the same direction. But they show the same apparent conclusions.

Okay. That's something that you get automatically in the annual statement.

Slides 4-4 through 4-6, and we'll start with 4-4 which is the most significant of these, show the paid versus reserve change distribution of the incurred losses for '82 through '88, which is a direct parallel of the game we set up with Reliable Re and Renegade Re.

Slides 4-7 through 4-9 are much more instructive. We actually take a look at what percentage of the total incurred losses at each stage of development.

Okay. Now, 4-7. We'll stay on that one for a while, because that's probably the key, at least in my mind, for the discussion purposes of today.

4-7 is total all Schedule P lines, although it says total all lines. This is normalized in highlighting changes over time, in the distribution of incurred losses between paid and reserve. Again, this is similar to what we had before for Reliable Re and Renegade Re.

Although it is not a perfect pattern, it is extremely gratifying to me to see the paid proportion declining at all maturities since I took over the loss reserving function in 1984. If you start going off to the right, beginning, comparing '82, '83, to the later years, you can see how those percentages that are paid out of the incurred estimates -- well, after one year they drop off the table, but you can see after two years and three years, and to a lesser extent, four years, they begin to show favorable declines.

And it's especially gratifying to note this trend for the '86 and later years where you can see, I think, even more dramatically for '86, '87 and '88 all six of those entries, the 0, 1, 2, 3, 9, the 18. If you look to your left and compare them to the prior history, they really show dramatic, decreases.

Of course, it's also satisfying to note that this particular firm has applied a consistent actuarial loss reserving formula over the past five years, has actually booked that formula, has stood by the formula, has tested the results for five years, and as you saw in slides 2-1 through 2-10, this firm has had the discipline of having voluntarily tested our calendar year actual losses for '87 and '86 versus the model, and saw how the model tested out. And also you see how the paids are shrinking as a percentage of the incurred.

The testing methods I have illustrated here do not use IBNR to test IBNR. That is a very big problem with so many of the tests. How can you possible use an IBNR to test an IBNR? IBNR is subject to one major management decision and at lunch we heard much more eloquently than I could say how sometimes those management decisions do and don't get made the right and wrong way.

But it's discretionary and many different decisions can be made. You really have to get away totally from using your IBNR to test your IBNR. The testing systems I have talked about today are not overly difficult to establish. They can be used on any appropriate subset of data, on any formula or system of loss reserve settings. The most striking part of this presentation is that the techniques do seem to work well in casualty excess of loss reinsurance.

This line of business is very difficult and a very demanding area to be successful in making predictions. We've been extremely well satisfied with its operation for over four years at my particular company.

Thank you very much for your time and I'll turn the discussion over to Regina Berens, vice-president of Prudential Reinsurance.

1989 CASUALTY LOSS RESERVE SEMINAR

3E: RESERVING METHODS FOR ASSUMED REINSURANCE

Moderator & Panelist: Nolan E. Asch
Sr. Vice President & Actuary
SCOR Reinsurance Company

ACC/YR						
1981	1.0	1.5	3.0	3.0	3.0	3.0
1982	1.0	1.5	3.0	3.0	3.0	
1983	1.0	1.5	3.0	3.0		
1984	1.0	1.5	3.0			
1985	1.0	1.6				
1986	1.0					

ALWAYS

SEARCH FOR SUBDIVISIONS
RELATED TO
POSSIBLE CAUSES FOR
VARIABLE LOSS DEVELOPMENT

FACULTATIVE CASUALTY

U/W YR	INCEPTION-TO-DATE INCURRED LOSSES AS OF 12/31/85
1975	$2,314,248
1976	$6,708,207
1977	$3,071,247
1978	$11,292,736
1979	$7,910,927
1980	$7,156,216
1981	$20,175,598
1982	$11,155,306
1983	$16,459,863
1984	$6,067,682
1985	$1,178,145

FACULTATIVE CASUALTY

DEVELOPMENT POINT	CUM FACTOR @12/31/85	CUM IBNR FACTOR @12/31/85	INVERSE %	INCREMENTAL LDF %
1ST	9.7136 (FORCED)	8.7136	.1029	.1029
2ND	3.7572 (FORCED)	2.7572	.2662	.1632
3RD	2.9633	1.9633	.3375	.0713
4TH	2.0922	1.0922	.4780	.1405
5TH	1.7251	0.7251	.5797	.1017
6TH	1.4871	0.4871	.6724	.0928
7TH	1.3253	0.3253	.7545	.0821
8TH	1.2038	0.2038	.8307	.0762
9TH	1.1353	0.1353	.8808	.0501
10TH	1.1180	0.1180	.8945	.0137
11TH	1.0780	0.0780	.9276	.0332

FACULTATIVE CASUALTY

UNDERWRITING YEAR	CASE INCURRED @12/31/85	ULTIMATE IBNR @12/31/85	ULT EST LOSSES @12/31/85
1985	$1,178,145	$10,265,933	$11,444,078
1984	$6,067,682	$16,729,698	$22,797,380
1983	$16,459,863	$32,316,150	$48,776,013
1982	$11,155,306	$12,183,339	$23,338,645
1981	$20,175,598	$14,628,580	$34,804,178
1980	$7,156,216	$3,485,959	$10,642,175
1979	$7,910,927	$2,573,454	$10,484,381
1978	$11,292,736	$2,301,293	$13,594,029
1977	$3,071,247	$415,622	$3,486,869
1976	$6,708,207	$791,568	$7,499,775
1975	$2,314,248	$180,511	$2,494,759

FACULTATIVE CASUALTY

U/W YEAR	ULT EST LOSSES @12/31/85	WRITTEN PREMIUM @12/31/85	ULT LOSS RATIO @12/31/85
1984	$22,797,380	$20,022,928 (EST)	113.86%
1983	$48,776,013	$20,106,671 (EST)	242.59%
1982	$23,338,645	$21,755,723	107.28%
1981	$34,804,178	$21,329,241	163.18%
1980	$10,642,175	$20,561,843	51.76%
1979	$10,484,381	$24,317,304	43.11%
1978	$13,594,029	$24,424,957	55.66%
1977	$3,486,869	$15,937,338	21.88%
1976	$7,499,775	$10,143,950	73.93%
1975	$2,494,759	$7,769,305	32.11%

FACULTATIVE CASUALTY

1984 UNDERWRITING YEAR

PREDICTED CASE INCURRED
FOR CALENDAR YEAR 1987

$22,797,380 X .1405 = $3,203,432

FACULTATIVE CASUALTY
CAL YR 1987 PREDICTIONS USING MODEL @ 12/31/85

U/W YEAR	EXPECTED YTD 12/31/87	ACTUAL YTD 12/31/87	DIFFERENCE	% DIFF
1975	$0	($318,889)	($318,889)	
1976	$542,655	$250,719	($291,936)	-53.8%
1977	$115,727	$49,671	($66,056)	-57.1%
1978	$185,568	$1,688,119	$1,502,551	809.7%
1979	$525,171	($570,341)	($1,095,512)	-208.6%
1980	$810,603	$294,858	($515,745)	-63.6%
1981	$2,857,591	$4,232,665	$1,375,074	48.1%
1982	$2,164,665	$1,696,050	($468,615)	-21.6%
1983	$4,961,166	$2,918,858	($2,042,308)	-41.2%
1984	$3,203,432	$3,554,633	$351,201	11.0%
1985	$815,976	$1,900,156	$1,084,180	132.9%
TOTAL (85 & PR)	$16,182,554	$15,696,499	($486,055)	-3.0%

538

FACULTATIVE CASUALTY
CAL YR 1987 PREDICTIONS USING MODEL @ 12/31/86

U/W YEAR	EXPECTED YTD 12/31/87	ACTUAL YTD 12/31/87	DIFFERENCE	% DIFF
1975	$94,791	($318,889)	($413,680)	-436.4%
1976	$254,007	$250,719	($3,288)	-1.3%
1977	$117,687	$49,671	($68,016)	-57.8%
1978	$242,096	$1,688,119	$1,446,023	597.3%
1979	$270,786	($570,341)	($841,127)	-310.6%
1980	$698,298	$294,858	($403,440)	-57.8%
1981	$1,477,387	$4,232,665	$2,755,278	186.5%
1982	$332,910	$1,696,050	$1,363,140	409.5%
1983	$3,022,946	$2,918,858	($104,088)	-3.4%
1984	$3,400,349	$3,554,633	$154,284	4.5%
1985	$4,553,950	$1,900,156	($2,653,794)	-58.3%
1986	$3,346,126	$1,670,142	($1,675,984)	-50.1%
TOTAL (86 & PR)	$17,811,333	$17,366,641	($444,692)	-2.5%

FACULTATIVE CASUALTY
CAL YR 1988 PREDICTIONS USING MODEL @ 12/31/85

U/W YEAR	EXPECTED YTD 12/31/88	ACTUAL YTD 12/31/88	DIFFERENCE	% DIFF
1975	$0	($13,271)	($13,271)	
1976	$0	($44,361)	($44,361)	
1977	$252,297	($1)	($252,298)	-100.0%
1978	$451,178	$471,231	$20,053	4.4%
1979	$143,129	$154,301	$11,172	7.8%
1980	$533,075	$298,567	($234,508)	-44.0%
1981	$2,650,997	$655,999	($1,994,998)	-75.3%
1982	$1,916,215	$3,055,598	$1,139,383	59.5%
1983	$4,523,987	$3,006,866	($1,517,121)	-33.5%
1984	$2,318,795	$2,155,744	($163,051)	-7.0%
1985	$1,608,094	$1,805,731	$197,637	12.3%
TOTAL (85 & PR)	$14,397,767	$11,546,404	($2,851,363)	-19.8%

FACULTATIVE CASUALTY
CAL YR 1988 PREDICTIONS USING MODEL @ 12/31/86

U/W YEAR	EXPECTED YTD 12/31/88	ACTUAL YTD 12/31/88	DIFFERENCE	% DIFF
1975	$0	($13,271)	($13,271)	
1976	$260,129	($44,361)	($304,490)	-117.1%
1977	$126,757	($1)	($126,758)	-100.0%
1978	$432,115	$471,231	$39,116	9.1%
1979	$255,482	$154,301	($101,181)	-39.6%
1980	$182,971	$298,567	$115,596	63.2%
1981	$2,468,728	$655,999	($1,812,729)	-73.4%
1982	$958,707	$3,055,598	$2,096,891	218.7%
1983	$534,436	$3,006,866	$2,472,430	462.6%
1984	$2,942,245	$2,155,744	($786,501)	-26.7%
1985	$2,363,798	$1,805,731	($558,067)	-23.6%
1986	$2,201,116	$695,359	($1,505,757)	-68.4%
TOTAL (86 & PR)	$12,726,484	$12,241,763	($484,721)	-3.8%

SUMMARY

INCURRED LOSSES
PERCENTAGE DIFFERENCES
ACTUAL VERSUS PREDICTED

542

CALENDAR PERIOD	MODEL PREDICTIONS MADE AT: 12/31/85	12/31/86
1987	- 3.0 %	- 2.5 %
1988	- 19.8 %	- 3.8 %

RELIABLE REINSURANCE COMPANY

ANNUAL STATEMENT FOR THE YEAR 1988
SCHEDULE P - PART 2 - SUMMARY

INC'D LOSS AND LOSS EXP % REPORTED

	1983	1984	1985	1986	1987	1988
AY 1983	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
AY 1984		60.0%	60.0%	60.0%	60.0%	60.0%
AY 1985			60.0%	60.0%	60.0%	60.0%
AY 1986				60.0%	60.0%	60.0%
AY 1987					60.0%	60.0%
AY 1988						60.0%

RENEGADE REINSURANCE COMPANY

ANNUAL STATEMENT FOR THE YEAR 1988
SCHEDULE P - PART 2 - SUMMARY

INC'D LOSS AND LOSS EXP % REPORTED

	1983	1984	1985	1986	1987	1988
AY 1983	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
AY 1984		60.0%	60.0%	60.0%	60.0%	60.0%
AY 1985			60.0%	60.0%	60.0%	60.0%
AY 1986				60.0%	60.0%	60.0%
AY 1987					60.0%	60.0%
AY 1988						60.0%

RELIABLE REINSURANCE COMPANY

SCHEDULE P - PART 3 - SUMMARY

PERCENTAGES

Summary Data from Schedule P - Part 1 - Summary

	1982	1983	1984	1985	1986	1987	1988
Prems Earned	100%	100%	100%	100%	100%	100%	100%
Loss & LAE	60%	60%	60%	60%	60%	60%	60%
Loss & Loss Expense through 1 year							
Paid:	15%	14%	12%	10%	8%	6%	5%
Reserve:	45%	46%	48%	50%	52%	54%	55%
Loss & Loss Expense through 2 years							
Paid:	20%	18%	16%	14%	12%	10%	XX
Reserve:	40%	42%	44%	46%	48%	50%	XX
Loss & Loss Expense through 3 years							
Paid:	25%	22%	20%	18%	15%	XX	XX
Reserve:	35%	38%	40%	42%	45%	XX	XX
Loss & Loss Expense through 4 years							
Paid:	30%	26%	22%	20%	XX	XX	XX
Reserve:	30%	34%	38%	40%	XX	XX	XX
Loss & Loss Expense through 5 years							
Paid:	35%	30%	25%	XX	XX	XX	XX
Reserve:	25%	30%	35%	XX	XX	XX	XX

RENEGADE REINSURANCE COMPANY

SCHEDULE P - PART 3 - SUMMARY

PERCENTAGES

Summary Data from Schedule P - Part 1 - Summary

	1982	1983	1984	1985	1986	1987	1988
Prems Earned	100%	100%	100%	100%	100%	100%	100%
Loss & LAE	60%	60%	60%	60%	60%	60%	60%
Loss & Loss Expense through 1 year							
Paid:	15%	18%	20%	21%	22%	24%	25%
Reserve:	45%	42%	40%	39%	38%	36%	35%
Loss & Loss Expense through 2 years							
Paid:	20%	22%	24%	26%	28%	30%	XX
Reserve:	40%	38%	36%	34%	32%	30%	XX
Loss & Loss Expense through 3 years							
Paid:	25%	28%	30%	32%	35%	XX	XX
Reserve:	35%	32%	30%	28%	25%	XX	XX
Loss & Loss Expense through 4 years							
Paid:	30%	32%	34%	36%	XX	XX	XX
Reserve:	30%	28%	26%	24%	XX	XX	XX
Loss & Loss Expense through 5 years							
Paid:	35%	40%	45%	XX	XX	XX	XX
Reserve:	25%	20%	15%	XX	XX	XX	XX

RELIABLE REINSURANCE COMPANY

PERCENTAGES – PAID TO INCURRED

	1982	1983	1984	1985	1986	1987	1988
AFTER 1 YEAR:	25%	23%	20%	17%	13%	10%	8%
AFTER 2 YEARS:	33%	30%	27%	23%	20%	17%	
AFTER 3 YEARS:	42%	37%	33%	30%	25%		
AFTER 4 YEARS:	50%	47%	43%	37%			
AFTER 5 YEARS:	58%	50%	42%				

RENEGADE REINSURANCE COMPANY

PERCENTAGES – PAID TO INCURRED

	1982	1983	1984	1985	1986	1987	1988
AFTER 1 YEAR:	25%	30%	33%	35%	37%	40%	42%
AFTER 2 YEARS:	33%	37%	40%	43%	47%	50%	
AFTER 3 YEARS:	42%	47%	50%	53%	58%		
AFTER 4 YEARS:	50%	53%	57%	60%			
AFTER 5 YEARS:	58%	67%	75%				

SCOR REINSURANCE COMPANY

ANNUAL STATEMENT FOR THE YEAR 1988
SCHEDULE P - PART 2 - SUMMARY

INC'D LOSS AND LOSS EXP % REPORTED

	1983	1984	1985	1986	1987	1988
AY 1983	75.5%	66.2%	72.1%	75.7%	74.5%	75.1%
AY 1984		77.5%	67.6%	99.4%	101.5%	97.4%
AY 1985			96.6%	94.6%	85.4%	71.6%
AY 1986				64.4%	72.8%	70.0%
AY 1987					70.5%	68.7%
AY 1988						68.0%

SCOR REINSURANCE COMPANY

ANNUAL STATEMENT FOR THE YEAR 1988
SCHEDULE P - PART 2A - AUTO LIABILITY

INC'D LOSS AND LOSS EXP % REPORTED

	1983	1984	1985	1986	1987	1988
AY 1983	64.1%	64.6%	83.8%	97.1%	87.8%	89.4%
AY 1984		66.3%	63.3%	103.8%	104.1%	99.0%
AY 1985			157.7%	132.2%	100.9%	84.5%
AY 1986				60.6%	65.3%	71.5%
AY 1987					63.0%	71.4%
AY 1988						71.3%

SCOR REINSURANCE COMPANY

ANNUAL STATEMENT FOR THE YEAR 1988
SCHEDULE P - PART 2B - OTHER LIABILITY

INC'D LOSS AND LOSS EXP % REPORTED

	1983	1984	1985	1986	1987	1988
AY 1983	83.3%	97.8%	86.8%	81.6%	92.2%	89.9%
AY 1984		95.0%	81.5%	118.7%	119.8%	113.2%
AY 1985			75.6%	81.0%	79.6%	67.3%
AY 1986				76.7%	75.7%	68.1%
AY 1987					75.0%	67.9%
AY 1988						67.5%

SCOR REINSURANCE COMPANY

SCHEDULE P - PART 3 - SUMMARY

PERCENTAGES

Summary Data from Schedule P - Part 1 - Summary

	1982	1983	1984	1985	1986	1987	1988
Prems Earned	100%	100%	100%	100%	100%	100%	100%
Loss & LAE	112.0%	75.1%	97.4%	71.6%	70.0%	68.7%	68.0%
Loss & Loss Expense through 1 year							
Paid:	12.8%	16.0%	0.1%	3.5%	0.2%	1.0%	1.5%
Reserve:	99.1%	59.1%	97.2%	68.1%	69.7%	67.7%	66.5%
Loss & Loss Expense through 2 years							
Paid:	40.3%	26.2%	19.9%	12.8%	2.2%	6.5%	XX
Reserve:	71.7%	48.9%	77.4%	58.8%	67.8%	62.1%	XX
Loss & Loss Expense through 3 years							
Paid:	70.0%	38.5%	37.5%	33.4%	12.3%	XX	XX
Reserve:	42.0%	36.6%	59.9%	38.2%	57.6%	XX	XX
Loss & Loss Expense through 4 years							
Paid:	80.5%	50.9%	58.6%	48.2%	XX	XX	XX
Reserve:	31.4%	24.2%	38.8%	23.4%	XX	XX	XX
Loss & Loss Expense through 5 years							
Paid:	79.7%	57.5%	71.0%	XX	XX	XX	XX
Reserve:	32.2%	17.6%	26.4%	XX	XX	XX	XX

SCOR REINSURANCE COMPANY

SCHEDULE P - PART 3A - AUTO LIABILITY

PERCENTAGES

Summary Data from Schedule P - Part 1 - Summary

	1982	1983	1984	1985	1986	1987	1988
Prems Earned	100%	100%	100%	100%	100%	100%	100%
Loss & LAE	86.4%	89.4%	99.0%	84.5%	71.5%	71.4%	71.3%
Loss & Loss Expense through 1 year							
Paid:	6.8%	13.9%	0.0%	3.5%	0.0%	2.8%	0.0%
Reserve:	79.7%	75.6%	99.0%	81.0%	71.5%	68.6%	71.3%
Loss & Loss Expense through 2 years							
Paid:	36.2%	37.5%	22.3%	19.6%	3.3%	7.7%	XX
Reserve:	50.2%	52.0%	76.7%	65.0%	68.2%	63.7%	XX
Loss & Loss Expense through 3 years							
Paid:	49.6%	49.3%	47.5%	53.7%	16.4%	XX	XX
Reserve:	36.9%	40.1%	51.5%	30.8%	55.1%	XX	XX
Loss & Loss Expense through 4 years							
Paid:	62.2%	70.2%	70.0%	67.7%	XX	XX	XX
Reserve:	24.2%	19.3%	29.0%	16.8%	XX	XX	XX
Loss & Loss Expense through 5 years							
Paid:	67.1%	77.4%	80.4%	XX	XX	XX	XX
Reserve:	19.3%	12.0%	18.5%	XX	XX	XX	XX

SCOR REINSURANCE COMPANY

SCHEDULE P - PART 3B - OTHER LIABILITY

PERCENTAGES

Summary Data from Schedule P - Part 1 - Summary

	1982	1983	1984	1985	1986	1987	1988
Prems Earned	100%	100%	100%	100%	100%	100%	100%
Loss & LAE	187.6%	89.9%	113.2%	67.3%	68.1%	67.9%	67.5%
Loss & Loss Expense through 1 year							
Paid:	-1.2%	8.5%	0.0%	1.7%	0.1%	0.0%	0.1%
Reserve:	188.8%	81.4%	113.2%	65.6%	68.0%	67.9%	67.4%
Loss & Loss Expense through 2 years							
Paid:	22.4%	11.9%	15.5%	4.7%	0.3%	0.0%	XX
Reserve:	165.2%	78.0%	97.8%	62.6%	67.7%	67.9%	XX
Loss & Loss Expense through 3 years							
Paid:	63.1%	29.7%	30.4%	22.6%	9.7%	XX	XX
Reserve:	124.5%	60.2%	82.8%	44.7%	58.4%	XX	XX
Loss & Loss Expense through 4 years							
Paid:	88.2%	41.1%	58.1%	40.8%	XX	XX	XX
Reserve:	99.3%	48.8%	55.2%	26.5%	XX	XX	XX
Loss & Loss Expense through 5 years							
Paid:	113.2%	53.0%	77.7%	XX	XX	XX	XX
Reserve:	74.4%	36.9%	35.6%	XX	XX	XX	XX

SCOR REINSURANCE COMPANY

TOTAL – ALL LINES

PERCENTAGES – PAID TO INCURRED

	1982	1983	1984	1985	1986	1987	1988
AFTER 1 YEAR:	11%	21%	0%	5%	0%	1%	2%
AFTER 2 YEARS:	36%	35%	20%	18%	3%	9%	
AFTER 3 YEARS:	62%	51%	39%	47%	18%		
AFTER 4 YEARS:	72%	68%	60%	67%			
AFTER 5 YEARS:	71%	77%	73%				

SCOR REINSURANCE COMPANY

AUTO LIABILITY – PART 3A

PERCENTAGES – PAID TO INCURRED

	1982	1983	1984	1985	1986	1987	1988
AFTER 1 YEAR:	8%	16%	0%	4%	0%	4%	0%
AFTER 2 YEARS:	42%	42%	23%	23%	5%	11%	
AFTER 3 YEARS:	57%	55%	48%	64%	23%		
AFTER 4 YEARS:	72%	79%	71%	80%			
AFTER 5 YEARS:	78%	87%	81%				

SCOR REINSURANCE COMPANY

OTHER LIABILITY – PART 3B

PERCENTAGES – PAID TO INCURRED

	1982	1983	1984	1985	1986	1987	1988
AFTER 1 YEAR:	-1%	9%	0%	3%	0%	0%	0%
AFTER 2 YEARS:	12%	13%	14%	7%	0%	0%	
AFTER 3 YEARS:	34%	33%	27%	34%	14%		
AFTER 4 YEARS:	47%	46%	51%	61%			
AFTER 5 YEARS:	60%	59%	69%				

Good afternoon.

I'm Regina Berens and I've been with Prudential Reinsurance for the last four years. I've been setting reserves on reinsurance business since 1978. At the time, I wondered if I was making the right career move going out of Private Passenger Auto ratemaking and into the reinsurance business. It's turned out to be so entertaining I haven't worried about Private Passenger Auto since.

I'm going to go over some considerations in reserving which are more qualitative than quantitative. I'm not going to cover the report lag method, which was covered more than adequately in an earlier session. We've set aside time for questions on either Nolan's or my remarks after that.

You must all be here because you've figured out that reinsurance is different from primary business, which is more than some people know. So -what makes reinsurance different?

First, of course, it's the longest of the long-tail lines. This leaves us with the obvious problem of trying to make an estimate of ultimate losses based on little or no experience reported to date. The subtler problem is that if it takes you four or five years to figure out what's going on, your company has been making bad underwriting decisions the whole time and now you're stuck with the consequences.

Another aspect that complicates reinsurance reserving is that the types of contracts written are limited only by the collective creativities of the market and your company's underwriters. In fact, the reserve analysis is driven by contract type before we even start to worry about Annual Statement lines of business. At a minimum, you should analyze Pro Rata (or Quota Share) business separately from Excess of Loss experience. In addition to the difference in timing of reported losses between the two, the data on Excess business is frequently better because individual claim detail is reported. Pro Rata is usually reported on a "bordereau" basis, and you're less likely to get credible accident-year and line-of-business detail.

Excess business should be split between working-level covers and higher levels (catastrophe

CLASSIFICATION OF DATA

- At a minimum: Pro Rata vs. Excess
- Accident or Contract Year?
- Annual Statement Lines: Irrelevant?
- If credible data available: Working-level X/S vs. High-Level (e.g. Cats)
- Long-tail vs. Short-tail Contracts
- Contracts with Credible Accident-Year, etc. Experience vs. Bordereau-Reporting
- "Different" Contracts.
  WHAT ARE "DIFFERENT" CONTRACTS?

or clash covers, for example)- again, because of the difference in reporting patterns.

If you've got enough data, you might then want to sub-divide by line of business. Usually Property lines vs. Casualty vs. other lines is enough. You may want to go further and separate Medical Malpractice from the rest of the liability lines, or isolate specific contracts, but don't fall into the trap of slicing your data into too many pieces. It should be done only when the experience is sufficiently large to justify it and the experience is so different that it distorts results on the other contracts if it's left in.

There are a lot of peculiar contracts out there in the reinsurance market and some of them should be treated separately for reserving purposes. Before you dig into the data, ask about them.

SPECIAL CONTRACT TYPES

- High Aggregate Deductibles
- Funded Covers
- "Clean-cut" Cancellations
- IBNR Provision Reported
- Aggregate Limit on Contract
- Stop- Loss Contracts

My favorite time bomb is the contract where the ceding company picks up a large aggregate deductible before the reinsurer is liable. I'll give you a real-life example: a contract written in the London market ten years ago protecting the ceding company for $50,000 excess of $10,000 per claim, after a "deductible" to the ceding company of about $1 million. The business covered, unfortunately, was U.S. casualty business. For the first three calendar years on the contract, losses to the reinsurer were zero. The reinsurer was so happy that they kept renewing it. Then the bomb exploded. The ceding company had paid the first $1 million and the reinsurer was liable for its share on every claim after that. There were an awful lot of them. Note that you wouldn't have uncovered this time bomb with a paid loss triangle or even an incurred loss triangle until it was too late. You have to ask about it.

Find out if the company reinsures entire portfolios on a runoff basis and, if so, how the premium and losses are coded by year. Since a runoff contract can cover multiple accident years, sticking the experience from the contract in a single year will give you alarmingly fast development on that year.

I'll briefly mention some contract types which might cause you to over-state your reserves if they're not isolated. (I'm covering them briefly because over-stating your reserves is not a big problem in the reinsurance business.)

Funded Covers- where the ceding company is expected to reimburse the reinsurer for most of the losses under the contract over the long run. Instead of basing a reserve on expected ultimate losses under the contract, you need to take into account the probability that the the ceding company will walk away from the contract while the Fund is in a deficit position or, heaven forbid, become insolvent while the Fund is in a deficit position. We all know those probabilities are zero- or at least they were at the inception of the contract. This type of contract is written to stabilize the results of the ceding company over the long run.

Contracts which report an IBNR provision. Use it if you trust it, or add a judgmental amount to it, or don't book it at all, but don't reserve on top of it unknowingly.

Contracts cancelled on an "IBNR Free" basis. This is also called a "clean-cut" cancellation, and it is particularly common in the European market.

Contracts with an aggregate limit to the reinsurer's liability. Check the reported claims under these contracts and compare the amount to the aggregate limit; the difference should be your reserve.

RETROCESSIONS

- What Types Apply to book?
  Quota Share on Whole Book
  Cat/ Clash Protection
  Specific
  Stop Loss
- How are Retros Coded?
  "Mirror Image" by Line/Yr?
  Not likely!
  Are all Retros in the system?

Another area you should explore is what retrocessions apply to the book and how they're coded. Retrocessions on a reinsurer's book can be simple quota-share arrangements covering a well-defined segment of the business, which is pretty easy to figure out. They can also be catastrophe or clash covers, in which case you should find out where the ceded premium and loss recoveries are coded. (They aren't always coded to every line of business and accident year that they cover.)

There are also specific retrocessions applicable to one contract or a small group of contracts. These (as well as catastrophe and clash covers) may not even be in data you get out of the computer since it

takes a pretty sophisticated computer system to handle them.

In any case, with the increasing requirements to calculate reserves on a Direct/ Assumed/ Ceded basis for statutory reporting, you need more than just a meaningful bottom-line net reserve. Calculating reserves on gross assumed business and on your retrocessions, then subtracting one from the other, will not only enable you to fulfill statutory requirements but also to measure how effective your retrocession program is.

Keep in mind that retrocessions, unfortunately, were generally an afterthought in the design of some reinsurance systems. If all you can get is data net of retrocessions, which happens frequently, don't assume that the retrocessions are a "mirror image" of the assumed reinsurance experience. The retrocession contract may define contract year and line of business in a manner inconsistent with the assumed experience, so you may have a loss coded to one contract year or line of business and the recovery on that loss coded to another year, or line of business, or both.

It makes sense in any kind of reserve analysis to talk to people in other areas of the company, but it's imperative for reinsurance. You also need to know what questions to ask. I learned early on that if your question is too general, you won't get the answer you think you got. As an example, you can see from what I said earlier asking for "net" data is like going into an ice-cream store with 31 flavors and asking for a single-dip ice cream cone. There are people who will scoop out whatever flavor is closest to their hand and give it to you. Then there are the true saints of the business who say, "Net of what"? Quota share retrocessions? Catastrophe protection? Commission and brokerage? Specific retrocessions? All of the above? Some of the above?

If I get my point across this afternoon, you'll know how to focus your questions.

UNDERWRITING QUESTIONS

- Changes in Mix of Business
- Special Contract Types (Discussed earlier)
- Retrocession arrangements (Ditto)
- Changes in Rate Adequacy- Yours and Ceding Company's
- Availability of Pricing Data

First, talk to the underwriters. Ask if there have been changes in the mix of business. This will affect your decisions

about how to group the data. If the pro rata book has been 80% property for the last ten years, there may be no need to break down the pro rata results further. If, on the other hand, your company has decided to write catastrophe instead of working-layer business in the last couple of years, you may have to split your Excess book by layer. The underwriters may also be able to answer some of the questions we mentioned earlier about retrocessions.

Ask about changes in rate adequacy- both yours and the ceding company's. This is particularly important if you're reserving to an ultimate loss ratio on the most recent year or otherwise using premium as an exposure base. The reinsurance pricing cycle has had some crazy extremes over the last five years. We can get hit twice- the market may be demanding a smaller percentage of the subject premium for an excess layer at the same time that ceding companies are reducing they premiums they charge.

Make sure you reflect changes in expected loss ratio from year to year-- not just changes in the actual rates-- and factor in the effects of changes in contract conditions when you can. What you're trying to measure is how the loss ratio is moving compared to inflation, and not just what they've done with the rates.

The underwriters may also be a source of pricing data. In the past few years, it's been a little easier to obtain data from the ceding company which shows either actual experience on the contract or "as if" experience to show what it would have been had the contract been in existence. This data can be extremely helpful, with two qualifications. First, beware of "as if" experience. The type of business a ceding company writes for a given class may change once it's protected by the proposed contract.

Second, don't fall into the trap of reserving too many individual contracts. The underwriters love it, but unless you have unlimited resources your focus should be on bottom-line accuracy and timeliness. It makes sense to set reserves on an individual contract only when it's so large and so unique it can't be lumped in with the rest of the business and analyzed.

Now that you've exhausted the underwriters, who else can you talk to?

On to the Claim Department.

Reinsurance claims personnel, like primary claims personnel, are responsible for estimating the ultimate settlement values of large claims. This may simply mean that they record the estimates of the ceding company as they come in, in which case they may not have much to say. On the other hand, they may be involved in making their own estimates of ultimate settlement

CLAIMS QUESTIONS

- Are adjustments made to reserves reported by the ceding company?
- Are claim audits conducted?
- Are cases closed with structures settlement or annuity purchases?
- How are asbestosis, toxic waste, etc. exposures monitored?
- Any changes in these areas over time?

values independently of the ceding company. If the reinsurer believes the ceding company's estimate is too low, they sometimes set up an additional amount. Ask if this is a practice in your department and, if so, how long they have been doing it. If they've begun only recently, it should be treated as a form of reserve strengthening when analyzing the adequacy of present reserves.

Some claim departments also conduct audits of ceding companies to assess their claims practices, ask about changes in reserving and settlement practices, and check for claims which the ceding company should have reported to them. Again, this is an area where changing practices can cause distortions in the development patterns.

Ask about the treatment of "structured-settlement" type claims, where the case has been settled by an agreement to pay the claimant specified amounts at specified periods into the future. In practice, the ceding company usually buys an annuity from a life insurance company which conforms to the agreed settlement. The purchase price of this annuity is treated the same as any other paid loss amount when calculating the reinsurer's share.

Since no one can accurately predict when a case will be closed with a structured settlement, the initial reserve may be much higher than the purchase price of the settlement annuity. Ask your claims people if structured settlements appear to be an increasing part of the liability claims. If they are, you may see more negative case development in those lines.

Ask about how your exposure to asbestosis, toxic waste and other large, atypical claims is monitored. This is a sensitive area. Many companies are afraid to say too much about estimates they've made for these cases because of concerns that the simple act of making an estimate may be interpreted as an admission of liability. At the very least, if your data includes experience on these claims, it should be isolated and analyzed separately.

The classic question which must be asked in any of the above areas is if there have been any changes over time which would

distort claim settlement patterns you might derive from your data.

SYSTEMS/ ACCOUNTING

- How many times have you switched to a new system?
- Do you make "bulk entries" or accruals, not broken out by line or by year?
- Any mass hiring of new accounting personnel?
- How are corrections to past transactions handled?

Other areas you may want to question are your systems and accounting departments. As I mentioned before, reinsurance systems are a relatively new area and your company may have gone through one or more changes of computer systems. Each change can result in backlogs of unprocessed data, large "bulk" entries (i.e. not broken out by year or by line) to get numbers into the system fast, and other problems. Sometimes, large numbers of new accountants or temporary workers are hired to input transactions. If you've ever seen a statement from a ceding company--preferably one in another language, a foreign currency, six lines of business and four contract years, from a country where commas are used instead of decimal points and vice versa, it takes only a little imagination to picture what can happen when a new employee under pressure to process lots of transactions attacks it. So, it helps to have that historical perspective even if you have a hard time figuring out how to adjust your data for it.

I've seen classic errors where claims are reported in Kuwaiti Dinars, where they use commas instead of decimal points, and the Kuwaiti Dinar is worth about $3 U.S. If the accountant doesn't know that and you sort of forget to tell them, you get these huge entries that don't really belong there. Another favorite horror story of mine was a claim denominated in Italian Lire, which are worth a fraction of a cent, recorded as the same number of Pounds Sterling.

Ask the accountants about adjustments for past errors. Can the prior period to which they actually belong be determined- or do corrections all show up in your data in the accounting period in which they were booked? They may also not have been broken out correctly by line of business or by underwriting year.

If you haven't left the company after getting the answers to all of these questions, you now have some background information to use when deciding how to group your data and which method you

want to use. Again, the handouts list some of the popular methods and a few guidelines about when and when not to use them.

LOSS TRIANGLES

- GOOD FOR:
  Some working-level excess.
  Some pro rata business.
- NOT APPROPRIATE FOR:
  High-level (e.g. catastrophe) business.
  Contracts with high aggregate deductibles.
  Pro rata contracts reporting on a bordereau basis.
  Funded covers.

Everybody knows about methods which use paid and incurred loss triangles- I think. Before you stake your professional reputation on them, make sure you've resolved all your questions about the data so you know how seriously to treat them. This applies especially to pro rata business, where accident-year detail may not be credible. They're also difficult to use for high-level excess, since development is so slow that you don't have much data. The primary drawback of these methods is that several things can be going on at once-- in increase in the number of reported claims, deterioration on claims already reported , an increase in the average length of time it takes for claims to be reported to you-- and paid and incurred loss triangles don't tell you which factors are involved.

Another popular method is the use of RAA factors. RAA is the Reinsurance Association of America. They have been collecting incurred loss experience by accident year from reinsurers since 1956-- for Excess of Loss business only, separately for Auto Liability, Medical Malpractice, Workers' Comp., Asbestosis, General Liability excluding Asbestosis, and Casualty not Otherwise Classified.

RAA FACTORS

- GOOD FOR:
  1. Some excess business, particularly after 2-3 years of development
  2. Some pro rata business, if adjustments are made for faster reporting
- NOT APPROPRIATE FOR:
  1. Very high-level excess business
  2. Low- volume or immature experience
  3. Pro rata business where results are reported on a bordereau basis

Every two years, a report of incurred loss triangles and age-to-age factors is sent out to member companies;

copies are also available from RAA's office in Washington, D.C. Please note- this is not an endorsement. I mention it because RAA is one of the few sources of historical data, and it is a popular source when little else is available. Let's go over its uses and limitations.

RAA factors could be used if you're trying to set ultimate losses on excess business in which the mix of business and retentions is comparable to that of the RAA experience. That's a lot of if's. It's more useful for data with a few years of development.

I'll repeat my example from last year because it's pretty enlightening.

RAA FACTORS- EXAMPLE

Ultimate Premium= $1 million
Reported losses (24 mos. of development)= $100,000

RAA 50% Confidence Interval (GL Excl. Asbestosis) % of Ultimate Losses Reported:

(16%, 17%, 28%)
$100,000/ .28 = $ 357,000
$100,000/ .17 = $ 588,000
$100,000/ .06 = $1,667,000

Q: What's the ultimate loss ratio?

The RAA booklet provides the "Percentage of Ultimate" curves, which are a great temptation to use Note the confidence intervals. Suppose you have General Liability data with 24 months of development. Here is a slide showing variations in reporting patterns by company. The "average" percent reported, taken from the graph, is 17%. Taking the two sides of the 50% confidence interval, you might have 6% or 28% reported. Let's put some real numbers on it. If earned premium is $1 million and losses reported to date are $100,000, your ultimate losses might be $588,000. Or they might be $357,000 or they might be $1,667,000. And that's just the spread on the 50% confidence interval.

RAA factors might be appropriate for pro rata business if you've got experience by contract year and if you make adjustments for the fact that reporting is faster. They are not appropriate for very high-level excess business since it probably is not comparable to the mix of business being reported by the members of RAA. It's not appropriate, unfortunately, for low-volume or immature experience, as you saw from the example. It's unfortunate because that's probably when you need it most. It is not appropriate for pro rata business if you don't have results by contract year.

One thing you should note if you have the booklet is the graph of percentage-of-ultimate curves from the current study,

and from studies five and ten years ago. The curves are flattening out because losses are reporting more slowly. The lesson to be learned here is that 1986 after 30 years of development will not look the same as 1956 after 30 years of development. The current study has been delayed, so the factors you now have are getting a little outdated.

Finally- a big caveat- check your own company reporting patterns. If your own company has faster reporting because you've got lower attachment points or a different mix of brokered vs. direct market, using RAA factors to project your ultimate losses means you're getting hit twice. First, the factor is applied to a larger reported loss base than companies with the "average" RAA pattern would have at that point. Second, you're then applying tail factors which are too large because they assume that part of what your company has already got reported is still IBNR. The reverse, of course, will be true is your company has slower reporting patterns.

SELECTED ULTIMATE LOSS RATIO

- GOOD FOR:
  1. Business without credible data; immature years.
  2. A reasonability check on any other method.
- NOT APPROPRIATE FOR:
  Business where other methods used on credible data clearly indicate a different ultimate loss ratio.

Reserving to an ultimate loss ratio sounds a little primitive, but it may be the only thing to do with a new book of business. It would also make a lot more sense to reserve contracts with a high aggregate deductible to the ceding company (and therefore no claims reported for years) to an ultimate loss ratio than to throw the results into a paid or incurred loss triangle. It can also be used if you're getting a 20% ultimate loss ratio using all of your other methods and you don't believe it.

Unfortunately, it's generally used when the indicated ultimate loss ratio is 120%. After you get real experience, you should really try to use the indications from the data rather than hope the business is breakeven and cross your fingers. It's not appropriate, for example, if you've got a reported loss ratio of 100% after five years of development and your underwriters are still telling you that the business is going to break even. If you have credible data and you have other methods which clearly indicate a different ultimate loss ratio, then by all means, don't just blindly reserve to a selected ultimate loss ratio.

N. ASCH: Yes. I want to put a commercial in as the panelist as well as the moderator. The CAS now sponsors an annual ratemaking seminar every March. I was the Chairman of the Committee that ran it last year and I really can't emphasize enough how crucial I think that is to loss reserving specialists. It s absolutely crucial, as Regina laid out in some detail, that you really get to know what's going on with people like pricing actuaries and underwriters and other parts of the company.

Otherwise, loss reserving is just like that famous joke about the car being the insurance company and being driven by the chairman of the board while the underwriter is slamming on the brakes while the marketing guy is slamming on the gas, while they're all asking the actuary where to go, and the actuary is busy making out the map of where they've got to go by looking out the rear-view mirror to see where they've been. Unless you really have some feeling of what's going on with pricing and underwriting, your loss reserves are really just walking backwards into the future. You have no perspective.

QUESTION: How do you come up with estimated tail factors?

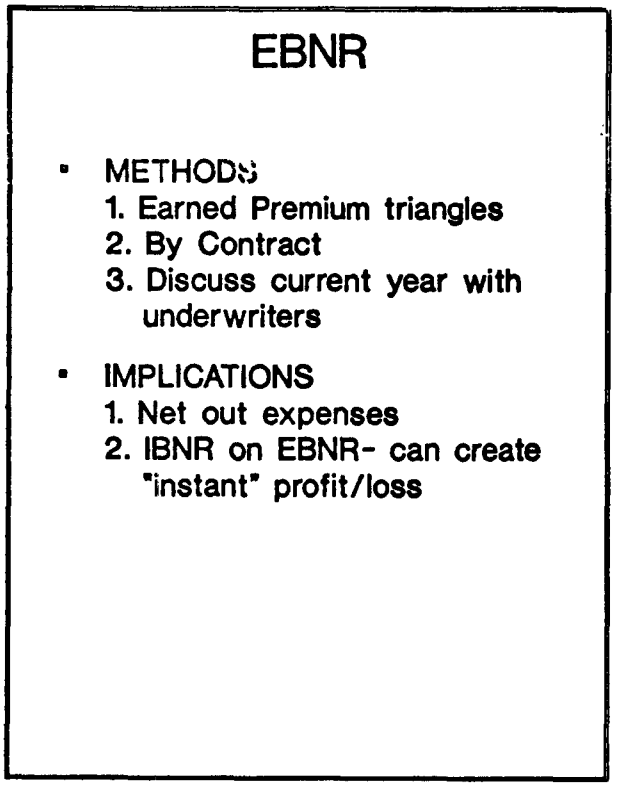
N. ASCH: First, a brief summary. A tail factor is a factor for loss development beyond the point at which your company history gives you any credible evidence of what to use. I will confess, in our company, all that stuff I showed and have great confidence in, is based on internal loss development and it works fairly well for a company our size, but for tail factors we use RAA all the way. It's kind of like Lyndon Johnson said- "I'm the only president you've got"- you know, these are the only credible industry results that are out there for excess of loss reinsurance. And I think it's actually better. I think it takes a bad rap from a lot of people too much. As you can see, we've had some pretty good experience by being guided by RAA tail factors.

So, my response, especially in excess of loss reinsurance, is using RAA and maybe making some adjustments, but I'd be very cautious about adjustments like, oh, we're really short tail, so our tail should be much less than RAA average or the converse.

R. BERENS: First of all, I should mention that most of our reserving is done with report lag methods where we actually fit mathematical distributions to histograms of claim report lags. So, the tail factor just sort of falls out of the distribution.

When I'm working with triangles, a lot of times I base it judgementally just on how the factors from the reported data are coming in. If the last age to age factor that you have is 1.2, then probably your tail factor is not 1.05. It's a bunch of factors that sort of gradually decrease from there.

N. ASCH: Maybe an alternative method, as one of my mentors when I first started in reinsurance said, is to always assume the



I've got a section on Earned But Not Reported Premium (EBNR) in my handout. Sometimes it's a surprise to people who aren't in the reinsurance business that we have premium as well as loss development. It's child's play to calculate compared to IBNR, of course. The things to remember: It's out there because that's the nature of the reinsurance business. Evaluate it. Set it up as an asset. Don't forget to set up IBNR on it! If you've got a profitable book of business, over-stating your EBNR will create "instant" profits; on the other hand, if your ultimate loss ratio is above breakeven, you're under-stating future liabilities if you under-state EBNR.

Well, that concludes everything I've learned in 10 years of setting reserves on reinsurance business. It's time for questions from the audience.

QUESTION: Regina, you spoke about the application of RAA data to individual companies. One of the things we've found is that the amount of ACR's is very important. There's a level of ACR's in the companies that are in the data base and not all companies have it. Would you care to comment on that?

R. BERENS: That's certainly an important consideration. I assume that by ACR's, you mean additional case reserves set up by the reinsurer as a supplement to the amount set by the ceding company. That's sort of another inherent assumption: that whatever your company is doing with additional case reserves on reported claims is consistent with what the RAA companies are doing in the aggregate, which is a tough assumption to test.

N. ASCH: Regina, how important do you feel that pricing levels, pricing changes and underwriting levels and changes are in the loss reserving process, especially in spotting turning points in your ultimate loss ratios?

R. BERENS: This is a topic I covered briefly in my remarks, but it is extremely important. My company goes through the process of making separate adjustments for changes in premium adequacy in pretty finely-divided segments of our book of business when reserves are analyzed. I was gratified to see that several of my former co-workers who made presentations here also adjust their exposure bases for changes in market conditions.

worst and then add on to it. So, maybe that's not too bad when it comes to these sort of things.

Okay. Regina, I'll give you another one. Do you have any particular techniques- and I think you hit upon this in part of your presentation- dealing with aggregate deductible and aggregate policy limits reserving. In one of the earlier sessions it was mentioned that it almost has to be done case by case and treaty by treaty. I tend to endorse that, but I think there's some real interesting aspects to handling it that are worth discussing.

MS. BERENS: That's basically what we do on the large ones. Case by case and treaty by treaty. I know our claims department monitors the claims that are under the aggregate deductible. We're watching them the whole time even though we aren't liable yet. My prior employer once requested such a list after the fact. It was presented by the company on thermal sensitive paper, which turned an opaque blue when it was exposed to the light, but in general the answer is if it's large enough, do it case by case.

MR. ASCH: Yes. I will endorse that. And particularly there are two kinds of mistakes that you can make or are commonly made, I think, with this type of business. One is not being aware of it until the aggregate deductible is exhausted. You have to track that because it's invisible and you have this $20 million -- I can think of one case with a $20 million aggregate limit excess of a $20 million deductible and right now the contract is five years old and it's at $18.9 million of aggregate losses. That deductible is going to be pierced soon.

Of course, the other side of the coin is once that aggregate limit is exhausted, you're finished and a lot of people get into their data bases aggregate limit policies and they start forecasting and developing or putting models on top of them. And if you have a $2 million aggregate limit and it's $2 million paid, it's over. And, of course, if you get those in your triangles and start doing things with them or putting them in your models, you're putting an extra IBNR.

Okay. Well, I won't force the issue any further.

(Applause)

1989 CASUALTY LOSS RESERVE SEMINAR

3F: COMMUNICATING WITH REGULATORS AND OTHER OUTSIDE ENTITIES

Moderator

Warren Cooper
Huggins Financial Services

Panel

Robert A. Brian
Conning & Company

Donald E. Danner
Ernst & Young

Karen Mitchell
New Jersey Department of Insurance

MR. COOPER: My name is Warren Cooper. I'm with Huggins Financial Services which, as you may know, is a practice of Ernst and Young. This is Session 31 and it's entitled Communicating with Regulators and Other Outside Entities.

The communication we are used to within our companies, those of you who have companies -- I did at one time -- learn that there is a lot of communication you certainly have to do on the inside. But in this day and age particularly it's equally as important to communicate outside and to communicate well, and to understand what that communication should be and what form it should take.

We have today with us a regulator, a public accountant and a stock analyst. All three of these communities, the communities that they represent, are very important to the insurance industry which, as Jack has said, wallows in the lack of public confidence.

Just one housekeeping note. We will have short presentations and then we'll have questions after the presentations and they can be addressed to the panel in general or to the individuals on the panel. This session is being recorded and it will appear in the transcript. Therefore, I would appreciate it, if you would ask your question into the microphone. If not, I will attempt to repeat it so that we can get it on the record.

I'd like to introduce our first speaker today, Karen Mitchell. Karen wants to be known only as the chief examiner for the great State of New Jersey. She is, in my opinion and the main reason I asked her to join this panel, one of the finest examiners in the United States. I should have some idea of that because for at least a short while I was in charge of the Examinations Division in the New Jersey Department. Karen.

MS. MITCHELL: Thank you, Warren. Good afternoon. I am happy to have this opportunity to say a few words concerning the casualty actuary's role in assisting regulators in monitoring the solvency of insurance companies.

I am the Chief Examiner of the State of New Jersey, as Warren has told you. As such, I have the responsibility to monitor the financial condition of all the insurance companies doing business in the State of New Jersey. I am not an actuary, but I do have the chief actuary's assistance on every job that we do.

Basically, I started out as a field examiner. I have been in the regulatory environment for over two decades, so I am familiar with the problems encountered in determining the adequacy of the reserves. In fact, when I started out we didn't have any casualty actuaries on the staff. That was in 1969. Therefore, the examiners in the field had to actually do all of the analysis to determine the adequacy of the reserves. We did like a retrospective basis -- we called it hindsight -- which didn't disclose the deficiencies or the extent of deficiencies in the liabilities established by the companies.

Basically, as time went by, we determined that a more detailed analysis had to be made by the Department. I guess it was in the late 1970's or the early 1980's that evidence of severe under-reserving emerged and I guess all regulators all over the United States really got a little nervous and wanted the assistance of the casualty actuary in assisting us in monitoring the solvency of companies.

In 1985 the New Jersey Department of Insurance promulgated a regulation requiring that all property and casualty companies doing business in the State of New Jersey should file a statement of opinion on the adequacy of the reserves by a qualified actuary.

Now, the NAIC -- I think their model only required a reserve specialist, but New Jersey required a qualified actuary and defined such as a Fellow of the Casualty Actuarial Society with -- let me think -- I think it was three years experience or an Associate of the Casualty Actuarial Society with five years experience. The main reason is because we wanted to be sure that the individual rendering the opinion actually had the expertise to do so.

Well, of course, we received a lot of resistance from the industry. I was inundated by telephone calls and letters asking for waivers, or they would be calling me explaining to me why they cannot comply or should not comply. Well, we couldn't grant any waivers so basically I am happy to say as of the last filing 90 percent of all the property and casualty companies filed their statement opinions before the deadline or on the deadline.

Now, that's not all of the problem, though. Basically the statements themselves -- we took a review of them and some of them are inadequate. They just don't give us the information that was required in the regulation. For instance, some of the statements did not have even the amount of the reserve liability for which the casualty actuary was supposed to be rendering an opinion. So, we're really asking the casualty actuary to really give us the information that we ask for in the regulation. It's very important.

The casualty actuary's role in assisting regulators does not end there, as you are aware. I have a few other items. They might sound elementary but basically we have problems in this area.

Number one, the casualty actuary should maintain proper work papers. These work papers should be in sufficient detail that a mathematically literate person, any person, could follow them. These work papers should be made available when requested by the Department because we need to use them in some cases to determine the extent by which we should make our review. It would help very much so.

Secondly, the casualty actuary should, or, has the responsibility to, inform their management to maintain the proper loss data. I'm going to tell you that that is a big problem. It should be at the level that would minimize the assumptions that a casualty actuary has to make.

Now, in the summaries and reports rendered by the casualty actuary they should state explicitly the assumptions that they are making, as many as possible, because we need to know that right up front.

Reinsurance. Now, the Department is assuming that the person rendering the opinion has actually reviewed all the reinsurance arrangements in effect during the experience period, and if they haven't, we're wondering why because we'd like to know what effect it would have on his opinion.

Last but not least is I'd just like to say this. It sounds small, but we would like the companies and the actuaries to maintain the underlying information, the data. Now, that means that the payments, the loss payments, case basis, and the format that the actuary who is rendering the opinion used. Because we'll go in afterwards and we'll find out -the company will tell us, "We don't have it in that format."
Well, your actuary was using that format and we don't have the underlying data. So, we would hope that you would assist us in that area.

In conclusion, I just want to say -- I guess like Jack Byrne said -- we cannot do the job of monitoring the solvency of insurance companies alone. We must rely on the expertise, the experience, the knowledge and the ethics of professionals such as the casualty actuary. If the casualty actuary performs their functions at the highest level of professionalism, then the regulator's job is much easier, and I would like my job to get easier.

Thank you.

(Applause.)

MR. COOPER: I would like to just add a footnote to what Karen has said. New Jersey's opinion rendering regulation is significantly different from that issued by the NAIC. We actually did impose the NAIC requirement on all companies licensed in the State of New Jersey. I think it was 1982 -- in fact, I'm sure it was 1982 because that was when I joined the Insurance Department in Trenton.

The first year was really quite amazing. This was when they referenced reserve specialists and such. We got one from a company president who had not really looked at the necessary language and wrote something to the effect, I'm president of this company and I know my reserves are good.

(Laughter.)

MR. COOPER: I sent it back.

Our next speaker is a Certified Public Accountant with Ernst & Young. He was educated at Juniata College with a degree in math and economics and then took an MBA from Indiana University in finance and accounting. He's been very active within the accounting field in the insurance area.

He's been a member of Arthur Young's domestic and international committees serving the insurance industry. He's been a member of AICPA committees dealing with insurance accounting and relations with actuaries. He's spoken at AISA meetings, at CAS meetings, and several other industry seminars. He has been handling insurance clients for 20-odd years for Arthur Young and now for Ernst & Young.

I asked Don to join us in this panel because he was the partner in charge of the audit when I was chief actuary for the INA Corporation, the Insurance Company of North America, which was then an Arthur Young client. As some of you know, Huggins was acquired by Ernst & Whinney last October. So, I went out of my way not to get anybody out of Ernst & Whinney. I was not aware that Ernst and Whinney and Arthur Young were going to become one organization.

So, I give you Mr. Danner.

MR. DANNER: Thank you, Warren. I'm not going to try to give you any language for the second opinions that Jack Byrne referred to at lunch time. I would just hope that none of us are giving either the first or second opinions of the nature that he discussed at lunch time.

As Warren indicated, about six months ago he gave me a call and asked me to become part of this panel. We had a client relationship that went back about 15 years. We've sort of been in touch with each other over the years through infrequent phone calls,

sometimes meeting at competing events for client service opportunities and spending some time together at meetings like this.

I sort of looked forward to the opportunity to work again with Warren and to get to meet Bob and Karen and work with them as well at this meeting. Little did I realize, as Warren indicated, that when he asked me to do that, it would be one of my first opportunities to spend some time working with a fellow partner for Ernst & Young, the merger formed by the amalgamation of Arthur Young and Ernst & Whinney to form the company which we hope will provide some additional opportunities and resources to bring service to the insurance industry.

I realized that a large part of actuarial science relates to predicting the future but, as Warren indicated and he assured me, he had nothing in mind relative to the merger when he asked me to join him today.

The word communication, as with many words in the English language, has different meanings to different people. I guess, in fact, this is one of the reasons why people either fail to communicate or miscommunicate in the process. So in order to sort of establish a level playing field before I continue with the rest of my comments, I'd like to just give you a definition.

According to the dictionary, it's any act which results in the imparting or interchange of thoughts, opinions or information. That's a pretty broad statement. This can occur through speech or writing either as the sender or receiver, but also includes indirect forms of communication such as hand signals or body language.

As I'm sure you're well aware, these kinds of communication processes can result in the transmission of messages or information you often are really not interested in conveying. We've all been a party to a conversation or an interaction where we've either given or received messages that were not intended.

As you can see, the definition of communication is a multifaceted one and really it would be impossible to deal with all the aspects of it in the time allotted today. What I'd like to do is break it down into several components.

First of all, I'd like to distinguish between required and voluntary communication from the CPA's viewpoint, and then I'd like to confine my remarks really to only two distinct modes of communication: the written word and the spoken word.

I won't spend any time talking about listening in any depth, but I want you to know that I feel pretty strongly that this may be the most important part of the communication process. It's a vital component. Any interchange with outsiders will be a learning experience to either party only if you're capable of putting aside the messages that you're trying to convey or the thoughts that you're trying to convey and listen to what the other person has to say.

The idea of projecting your own thoughts or ideas really forces you into failing to listen to what the other guy says. Believe it or not, that other person may just have information that's more valuable than what you have or which demonstrates that his ideas or thoughts are more appropriate than yours.

As I think Warren mentioned, and as was suggested in the program content, what I'm going to try to do is confine this to the interaction of the CPA with the consulting actuaries and other outside bodies such as the IRS, the insurance regulators, and outside financial interests such as investment analysts and the like.

One item that wasn't mentioned in the program content but I think is a vitally important segment of that chain of communication is the communication with members of the boards of directors.

I'm sure you'll see as we go through this and you listen to the other speakers and we go through the questions and answers, that you're going to find that there's a lot of expectation gaps between what we're looking for from each other and what we give to each other. I think meetings like this are really the opportunity for us to explore and narrow and eliminate some of those expectation gaps.

Let's first start with the required communications, substantially all of which, as you might expect, are in written form. The significant exception to this is responding to a subpoena or to oral testimony in an investigatory effort. It's obviously one that at least I would like to avoid and I'm sure many of you would like to avoid, at least in a defendant mode.

The skills and techniques in this arena are something that are very, very rigid and complicated and we're not going to spend a lot of time covering it today. But, suffice it to say, that one of the keys to avoid getting into that mode is to do the required communication and the voluntary communication in an effective and timely manner in order to avoid those kinds of situations.

From a required written communication standpoint with the insurance regulators, which is where I'll start, it's obvious that these vary state by state. But there is a common thread that goes throughout them. In general, they would include some or all of the following as responsibilities of the CPA.

If you are serving as either the auditor or the loss reserve specialist, in those states where it's permitted to do so, you will be required to provide most states with a written communique setting forth your responsibilities or your qualifications to discharge those responsibilities and this must be done before you even begin the work.

I would say also in this arena there is an emerging area of communication in that at least several of the states are now requiring that they be kept advised, much like the SEC is advised, where changes in these relationships are taking place.

Secondly, upon the completion of the work -- whether it be the audit of the loss reserve certification -- you have a requirement to report within a specified timeframe, usually by June 30th of the subsequent year, and submit your reports on the financial statements or the loss reserve certification. In addition, in most states you have the requirement to file any letter suggesting that improvements are needed in the internal controls, at least to deal with material inadequacies identified in internal controls.

The third area is more of a longer term area in that there is a requirement to retain all work papers for up to seven years, depending on the state again, and to make those work papers available to the state insurance examiners so that they can have them for their review purposes whether they be dealing with planning or executing their examination or conducting some sort of special review.

That's really the extent of the required communications with state insurance regulators, except in problem situations. Again, there are a number of states that have put forth requirements whereby the auditor must notify the state -and within a set timeframe from discovery you must notify the state -- where there are indications or evidence of either a substantial deficiency in capital or an insolvency situation. These are very key issues to be communicated on a timely basis and there are obviously difficulties in structuring that communication.

As to required communication with either the financial community or the independent actuaries, there really are none. There are no mandatory requirements. Yet, I would say that if you don't communicate with those parties -- at least with the consulting actuaries -- you're on a sure road to trouble. We'll talk some more about that when we discuss some of the voluntary communication routes.

As far as the IRS, again, there's really only one required communication. That's at the time of filing the initial income tax return. If the company is taking a position that is not backed up by substantial authoritative support -- and that's a tax word of art -- there is a requirement that a statement and disclosure to this effect must be included right in the tax returns. That's a responsibility, really, of both the company and the CPA signing the return.

The final ARCA of required communication I'd like to discuss relates to boards of directors. About a year ago the American Institute of CPA's issued a statement on auditing standards referred to as SAS-61 which formalized what the communication process between the auditor and the board of directors should be.

It covered quite a number of things, but I think the two that are key, at least with respect to loss reserves, dealt with the fact that the outside directors had to be advised of significant areas of estimate in the financial statements, as well as any significant adjustments that arise as a result of the audit process. There are darned few companies where loss reserves don't fit this criteria.

Normally this is done by preparing a written memorandum or a written report to the board and discussing it or supplementing it by oral discussion at the board of directors meeting, usually the audit committee of the board of directors.

As you can see, the written communication requirements are few in number but really very substantive, and compliance with them on the part of the CPA is critical.

Now, I guess again from my point of view, the most effective forms of communication are voluntary. These are the ones which will permit you to effectively discharge your responsibilities either as an auditor, a consulting actuary, or, if you're in the mode of monitoring the financial activities through the regulatory or financial analyst process.

Regardless of your role, you have to keep abreast of current and potential future events in the industry by being an avid reader of trade journals, the financial press and keeping on top of what's going on in many of the judicial social and economic events and trends. About the only thing that's really constant any more is change.

Unfortunately, this really is not limited to just a domestic scene, but has to be on a global perspective both because of the international scope of most companies and the fact that you can't avoid the impact of non-U.S. developments even if companies restrict their underwritings to only U.S.-produced business.

I think equally important in keeping the communication open is the participation in industry-related programs, such as this, where information is gained both in terms of new and progressive analytical techniques as well as learning about and gaining an understanding of what's going on in individual companies within the industry. I venture to guess that a large part of this takes place -maybe the biggest part of it -- over the coffee breaks, the cocktail hours, and maybe even down on Rush Street in the wee hours of the morning.

When it comes to voluntary communication with outsiders, at least with respect to specific client information, I think it's safe to say CPA's would be perceived as poor communicators, having little to say, and limit their activities to listening or reading what everyone else has to put forth.

Since we are dealing with confidential client information, our outgoing communication at a specific client level is generally restricted to the required communication unless we've been authorized by the client to do otherwise. Even in those situations we should be sure that the client is aware of what is going to be said. This is particularly true in dealings with the financial community and with the regulatory authority such as the IRS and the departments of insurance. Obviously here I'm talking about disclosure of individual entity information.

All these groups have the right to whatever information they want. They have their own regulatory information-gathering procedures. But the position of the CPA's is that this information should come through the company, whether it's provided by the CPA or not.

On the other hand, CPA's, as I think as you can tell from the program conference agenda, are very active in participating and providing information on a no-names basis or in preparing articles or case studies that become part of the industry literature either through publications or texts, all of which serve as key ingredients to the industry communication process.

Except in those situations where we as CPA's are providing assistance through state insurance departments in either their audit process or special investigations, or in some rehabilitation efforts, I believe our most active communication with the state insurance regulators occurs during our respective audit processes. Usually the state's exam is occurring at a date subsequent to our audit. As I mentioned earlier, the examiners do have complete access to our work papers, as well as any findings and reports which they can use in whatever manner they deem appropriate in structuring and completing their examination.

If the CPA is aware that an exam is scheduled for the year he or she is currently involved in, he should attempt to arrange a meeting through the client appointed contact to discuss any opportunities to minimize the duplication of effort. This could range from the scope and content of the review and evaluation of internal controls in the EDP operation or other financial and operating departments, discussing the scope and the controls over necessary third-party confirmation procedures, the sampling procedures being used in such area as the loss and loss expense activity, or the form and content of loss reserve development data.

While the CPA doesn't have access to the examiner work papers, it's really incumbent upon him to obtain and read any reports issued by the state examiner and to consider those findings in conducting and planning his next examination.

If an examination of a prior year by the state insurance department is in process while you're conducting the current year's audit -- and that's probably the norm, certainly the most prevalent situation -- the CPA should ascertain the status and any significant findings emanating from the exam. Again, this is usually arranged through a meeting set up by the client, with the client in attendance during the course of the discussion.

Another active communication role for the CPA in dealing with state insurance departments is to assist the companies in explaining or undertaking to explain the financial ramifications or accounting relative to contracts, agreements, or specific transactions in order to garner the necessary advanced approval from the state insurance regulators to avoid future problems.

With regard to voluntary communication with independent members of the board of directors, this is really usually an interactive process occurring at meetings of the audit committee, which usually take place three or four times a year. Generally you find yourself responding to questions raised as a result of written reports submitted either as to the scope of the audit, discussion of areas of estimation in the financial statements, or audit adjustments arising from the process, or the contents of the letters of recommendation for improvements discovered as a result of the audit process.

Again, this is done with management in attendance at those audit committee meetings, but you should be aware that the CPA is obligated to see that all these aspects of communication are covered and are covered in the required format irrespective of what management's wishes are.

The voluntary communication with the IRS really results from one thing, and that's usually an audit where the CPA is interacting in the IRS audit process and can be involved in either gathering the data that's requested by the revenue agent or responding to either observations or questions that have been raised by the revenue agent, and in the final analysis obviously dealing with the revenue agent in the discussion and resolution of adjustments proposed by the revenue agent. You're either being convinced or convincing the revenue agent of the propriety of the adjustments.

I've covered, I guess, everybody except the consulting actuary. The interaction between the CPA and the consulting actuary usually revolves around the loss certification process. In most of the situations with which I am familiar, the consulting actuary is involved in either giving comfort of the independent actuarial viewpoint to management or to the board of directors, or responding to the loss certification requirements on behalf of the company.

This kind of activity can go on in entities ranging in size from single line companies that are writing in very few states and have no in-house actuarial capabilities, all the up to the multi-billion dollar companies that are writing all lines in many countries and have large actuarial staffs of their own.

Regardless of the situation, if the accountant and the consulting actuary are involved in these situations, it's really incumbent upon the two to meet during the planning phase so that there is some general understanding regarding both what the objectives are of each person's effort and what the general work plan is.

The actuary is going to be interested in the work undertaken by the CPA to assure the integrity of the data base, to the understanding of the reserve-related systems and the loss related data and other information being used by the actuary in formulating his overall opinion. In addition, the actuary should be made aware of any areas of reserving

concern or changes in systems, practices or procedures which come to the attention of the accountant which could have an influence on either development already reported or future development.

These kinds of meetings, while they start with the initial planning meeting, have to be followed up with meetings during the course of both of our work efforts so that we can get an understanding of findings and resolve the differences in viewpoint which will occur over the course of performing the work.

Thus far I've talked about the whats and whens of the communication process, whether it be required or voluntary. I've said very little about the hows or the art of communication itself. Whether you be a writer or speaker or listener, whatever the case may be, there's plenty of seminars or other educational media dealing with this.

The one thought I'd really like to leave you with today is that we are all professionals. Each of us has our standards of principles which are embodied in the work we do on a daily basis. Each of us has our own complex analytical tools we use to assist in performing our work. Each of us has own professional jargon or terminology which is an integral part of our everyday life. On the other hand, very few of us have an understanding of all aspects of all the professions.

When we communicate I think we have to keep this in the front of our mind and try to bring the communication to a level where we can seek a common ground and have an understanding of what each other is saying.

I've tried to cover a lot and yet really only a little of the communication process. I hope I've given you some help in understanding at least how the CPA sees this process working among the various parties. Thank you.

(Applause.)

MR. COOPER: Our last speaker comes to us from Conning & Company where he is a senior vice president. Bob Brian is responsible for Conning's publications and has spent a lot of time as a stock analyst, a researcher and a consultant within that organization. Conning, of course, is an investment firm which specializes in the stocks of insurance companies.

Bob is an actuary. He became a Fellow of the CAS in 1970. He graduated from Trinity College in Hartford with a degree in economics. However, today he is going to talk to us less as an actuary, and his subject is going to be communication with the financial analysts on the subject of insurance reserves.

MR. BRIAN: As Warren said, Conning is a stock brokerage firm specializing in the insurance industry. Bill Conning was a retail stock broker in Hartford who got flooded with clients who owned baskets full of Travelers and CG and Hartford stock years ago and that's how Conning happened.

MR. BRIAN: At Conning currently I'm more in the publications area. I try to get out the Conning studies you see circulating. I've done an awful lot of consulting there and have done some stock brokerage, and stock analyst work. I'm going to talk about that mostly today because that's where you would probably interface with the people in the investment industry.

Loss reserves -- loss reserve analysis -- is an important part of our work in looking at a stock, that is, insurance companies to invest in. With all the changes going on in the industry today, the search for above-average companies and companies that are going to be around in the future in a growing, profitable way, is one of our most serious tasks. But loss reserves are only one of the things we look at. We look at the company in the context of the many significant changes -- what we would even call revolutionary changes -- are going on in the industry. I'll list them off just to go through it quickly.

We see a real consumer revolution that the insurance industry has on their hands. We don't think this one is going to go away. There might be little battles won and lost along the way with Proposition 103, but the industry has a real consumer revolution.

We think that there is a regulatory revolution with the challenges that we have to the McCarran Act. That seems to be coming up more and more strongly.

There is obviously a tax revolution. Just in talking to many of you today, you're starting to run out of your loss reserve offsets, you've become serious taxpayers. We think that there have been some significant changes to your industry from the point of view of tax.

We think there is very definitely a product revolution going on with the development of alternative markets. Many of you thought that the captive markets were going to go away. In commercial lines captive and self-insurance and the offshore companies now write 30 percent, perhaps, of the total commercial lines market.

We see a marketing revolution. We see standard agency companies now trying to find ways to garner specialized groups and find unique marketing techniques.

We see an expense revolution. We see companies trying to pare down their home offices, trying to cut fixed expenses. Living in Hartford, we especially see that, almost weekly.

As Jack Byrne was saying -- alluding to, anyway -- at lunch, we also see a balance sheet revolution, and that's where loss reserves come in. When I say a balance sheet revolution, I'm talking about debt, either through their holding companies or directly financing themselves through debt. This is something new. That debt has to be serviced and paid for. We have seen the use of aggressive investments, -- the high-yielding junk bonds.

Balance sheet analysis has become a high priority at Conning, and I think it will be important for both the life companies and the property casualty companies as we go along.

Therefore, we look at loss reserves in a very global sense. It's one of the items that we look at in looking at the company and in looking at the industry.

I went around the office and talked to our various stock analysts about their current thoughts on loss reserves and I thought I'd relate them to you. If you're talking to them, as I'm sure some of you are, you'll have some ideas as to what they might be thinking about.

Generally they seemed to think industry loss reserve levels currently are adequate. They have that feeling, whether it's right or wrong. Where are they getting it? It started with the medial malpractice report -- was it in Wisconsin? -- where there was a report that

ordered the companies to reduce medical malpractice rates. Then St. Paul came along and actually did. They reduced the medical malpractice rates in half a dozen states or so.

Now, in August, a report came out from Coopers Lybrand on Georgia tort reform, and that study is showing that tort reform in Georgia has reduced various types of claims anywhere in the range of eight percent to about 34 percent.

We look at some of the industry data coming out of Bests, and specifically look at incurred losses for the miscellaneous liability line which for the last six quarters, have been going down, maybe at about ten percent per quarter, versus at a year ago.

Whether they all add up to the industry reserves being adequate or not, I don't know. I'm just relating to you that some of the stock analysts see that and they say reserves must be adequate Myself, I look at those reserves and say accident year '86 and '87 maybe. I think there was a lot of heavy reserving done in those years after the heavy rate increases that you received in '84 and '85.

But when will that redundancy be released? I would imagine it's starting to come back out. During this part of the cycle I would imagine that the companies would be slowing down on their loss reserving -- the old calendar year/accident year comparison routine where the cycles get overstated and understated.

Then, of course, I think that there are significant differences among companies. You can't buy stock in the industry. You have to buy stock in individual companies. I think there are significant differences in loss reserve by company.

What are some of the issues that the stock analysts are looking at that if you're talking with them you might want to discuss? The number one issue with them is tort reform. They seem to be very optimistic about tort reform. I think when they say tort reform they mean it in the very broadest sense. They're talking about social reform as well as actual laws and regulations being changed. They're talking about uries and judges reading the newspapers and changing the way they act in the courtroom.

How is this going to play out? Is it going to have an effect on some companies? What's the story behind this medical malpractice thing in Wisconsin? Were those real claims that have been falling off, or have there just been fewer claims that never would have been paid anyway that fell out of the system?

There are a lot of questions that we have about tort reform and the impact of it on the companies. If it is playing out, if the juries are acting differently, if the judges are acting differently, what are the implications for the companies? Does this mean that the companies loss reserves are in fact generally adequate, and maybe in some cases are redundant and book values are understated? That's not a position, that's a question, but we're getting it because of all the news.

Another issue is Worker's Comp. As we look at Schedule P in the annual statements of the companies, it seemed to us that the Worker's Comp tail is getting longer and longer. It seems as thought the Worker's Comp combined ration is stuck at about the 120 combined ratio level. With our arithmetic, it takes about a 107 combined ratio in Worker's Comp to have a decent return on equity. At 120, there is not much hope for anybody continually writing Worker's Comp at that level.

The analysts are wondering if Worker's Comp is a decent line to be writing anymore? Is reform coming? When is it coming and when are the results going to get better?

Another major issue with the analysts is the discounting of loss reserves, both explicit and implicit. When we're comparing company's loss reserves and one company is discounted and the other isn't, we should know that. When we're putting a valuation on a company for sale or acquisition, we should know the discounting that goes behind the setting of those loss reserves. We would like to know more about that.

One of my first points was that balance sheet analysis is generally more and more important at companies like Conning Company. This is mainly because of the debt situation. It's also because of the quality of assets, the junk bond issues that you've all heard about, the real estate issues that you've all heard about, such that the analysis of liabilities and assets is becoming more and more important.

On the liability side, there's already been enough talk today about reinsurance collectibles, but one issue that hasn't come up much that my analysts threw out was, what is the situation on the loss reserves from the point of view of the Worker's Comp assigned risk plans and the automobile assigned risk plans? Are the companies properly reflecting that $400 million in the Texas assigned risk plan that just came out? Do companies have those figures in their books?

In many states -- you go right down the East Coast -- the figures are astronomical -- the size of some of the residual plans in Worker's Comp and auto. We ask: have the loss reserves been properly set to take care of the claims that are going to be coming out of those plans?

Those are some of the issues that we think about when we're looking at a company, that are somewhat tied into loss reserves.

What are some of our methods for looking at loss reserves? I know you all will go crazy when I say this, but we do use the annual statement for coming up with our opinions on the adequacy of loss reserves. It's one of the only tools you have if you're an outsider. So, we've sharpened up our pencils for years on Schedule P and we actually come out with some good analysis and results of the evaluation of loss reserves.

What are specifically some of the methods? First, we have a paid-to-incurred method. We look at the Schedule P by line, by accident year, at specific maturity points. As of 12 months, what's the trend in the paid-to-incurred ratio? At 24 months, what's the trend? All the way across the page, generally with the thought being if that paid-to-incurred ration jumps up, that's not good news because we doubt that you're paying claims faster. It means that for every incurred loss that's put up that there's less in reserves and more unpaid. It's just a red flag. It's not the end of the world. But we go through and do that by line, by year, for any company that we're looking at.

We also have a loss ratio method. Again, it's focused on Schedule P. We look at loss ratios by line, by year; trends within the company -- do they seem to show stability or instability. We look at that company versus the industry or maybe versus peer companies -- eight or ten companies that are similar to this company -- and look at that just to see whether or not we see any trends there.

For example, if the industry is reporting an 80 percent loss ratio for a given line for accident year 1988 and the company we're looking at is reporting a 60 percent loss ratio, that might be a red flag. Then we look back up into the paid-to-incurred ratio and if we

see that the paid-to-incurred ratio jumped at 12 months, then we have two pieces of evidence that something is going on here. In other words, the paid-to-incurred ratio indicates that something is different, the loss ratio indicates it as well.

We also make straight projections of paid losses out of Schedule P. This is another method, and that doesn't need any explaining.

We also do other things. We look at ratios of IBNR losses to earned premiums or IBNR losses to incurred losses. Or, whatever combinations we can come up. We compare these to the company's past history or we look at other similar companies.

After we do all that we do come up some idea, at least red flags, maybe even some pretty good predictions of loss reserve adequacy.

We knowt that there are many problems in using the annual statement for loss reserve analysis. For example, if you're talking with us, we would like to know more about the company's mix of business within a given line. When we look at your liability business, are we looking at bread and butter O, L, and T lines or are we dealing with architects and engineers, or is it products liability -- or, what is it that's in your other liability line?

We would also like to know of changes in the mix of business within your Schedule P, so that may explain away some of the blips that we might see.

Geographical spread of business is important as well, especially if you're in any of the states that don't seem to be doing as well as some of the others.

What changes have occurred in company claims procedures? Have in fact claim payments been speeded up? Is that why the paid-to-incurred ratio might have jumped? Have there been changes in reserving philosophies?

We also realize that in your Schedule P you throw together an awful lot of numbers from an awful lot of different sources of business. You have your large accounts business. You have your main street business. You have your manually rated risks. You have your retro rated risks. You have your assigned risks. There's a lot of different business in there, and to the extent that an explanation of what's in there would help us, we'd love to hear it. Of course, we don't always have that opportunity.

We try not to get bogged down in too much of this soft data. We try to forge through and make some conclusions in doing this.

Now, in kind wrapping up, just a few comments on who you're dealing with when you're dealing with stock analysts. I had this same situation myself at Conning, being one of the actuarial types, versus being the stock analyst. Remember, they're not actuaries most of them. Most of them are not accountants. Most of them are not insurance people. They're financial people. They're financial analysts.

They are interested in the bottom line. They're interesting in getting to answers quickly, and they're interested in forming opinions fairly quickly on your loss reserve situation.

I guess my advice would be to not speak actuarial jargon to the financial analysts. I doubt that they're that much interested in confidence intervals and in point-to-point development factors and things like that. They want it straight out. I think most of them understand more than you think they do, or they might understand your company in ways

that you don't in that they're looking at all the different lines of business and all your different subsidiaries.

But I would just keep in mind that your comments to financial analysts can affect not only their opinions on your reserves, but they can affect their opinions on the quality of your company because sometimes it's through asking questions on reserves that they formulate their ideas -- and how profitable is this group of business, how good is this company's pricing, how good is the underwriting? So many times the analysts use the reserve questions as a way of getting at many other subjects.

That's the end of my prepared comments. I hope it helps a little bit. Thanks.

(Applause.)

MR. COOPER: We now come to the question and answer period. I'm sure we've sat here for 45 or minutes and you've heard a lot of things. I'm sure it's -- I hope this has engendered some questions.

Who would like to ask a question? Yes, sir.?

QUESTION: Mr. Brian, if we look at them very simplistically, first of all, the paid-to-incurred ratio in the industry -- you say 8 percent in 1987 and 35 percent in 1988 -- for two years now you've seen incurred claims as an industry drop four percent --

(Inaudible.)

-- which is not a natural situation. Paid claims dropped 15 percent last year and 11 percent this year. These all suggest that the industry is loosening up on its reserve discipline. That is no surprise here in the industry, we've always done this in cycles.

But in the context of a question of management in 1985 and '86 and in order to do that again what's your assessment of the ability of this industry being able to cap next time around?

MR. COOPER: Let me just summarize the question. I hope I can summarize it correctly. Your question is that certain indicators seem to imply that in this particular cycle the companies are relaxing the reserve discipline.

QUESTION: Nothing has changed.

MR. COOPER: What does this mean in terms of the stock analyst's perception of the industry.

ANSWER: Well, I think that some things have changed, and it's not necessarily management. I think that all down the line many different parties are all going to be tougher this time.

For example, I think the accounting firms are not going to be signing off on statements this time that perhaps they signed off on during the last cycle. Among the actuarial people maybe they've learned a lot since the bottom of the last cycle, and they won't be signing off on reserves where they did during the bottom of the last cycle.

I think that there are a lot of external controls like that in place that might prevent the industry from doing it again, what they did in the last cycle. The reports that we're getting on pricing are not nearly as bad as they were during the bottom of the last cycle. During the last cycle there were horrendous reports about rate cutting. Well, I think markets are soft and there is a certain amount of pricing competition going on, but it doesn't seem as bad.

We get the feeling that this cycle is not as bad and won't be as bad. I agree with you, the numbers you were quoting on incurred losses growing at only about four percent, paids growing at 10 or 11 -- what does that say about reserves? It says reserves aren't going up by very much.

That was the point I was getting at when I said when are we going to run out of the reserve releases from the possible redundancies that were put up in '86 and '87? I think it's coming soon and I think that's one of the reasons Jack Byrne was right when he said that the combined ratio this year is going right back up to 112 or 114, or something like that.

My sense is that the industry is not going to do it again. I don't think they can afford to do it again. We just can't have the insolvences that we had a few years ago. I think there are a lot of controls in place now. I think the insurance departments are much tougher than they were half a dozen years ago.

Your question was how does this affect the ability to raise capital. I don't think it will get any worse, and it might get better. That's our assessment now, that the industry is not going to do themselves in again the way they did in the bottom of the last cycle.

MR. COOPER: Does anyone else have a question? Yes, Ray?

QUESTION: I have a question for Bob too. You mentioned that you have evaluated companies by looking at the Schedule P's. That concerns me a little bit because I work for a holding company which publishes a consolidated Schedule P which can really move you down the path and you'll wish you never.

Now, how do you deal with that problem?

(Inaudible.)

MR. COOPER: The question, if I may get it on the record is -- the gentleman has asked about the use of consolidated Schedule P's and how does the stock analyst deal with that.

ANSWER: With great care. You're right. That's one of the reasons I was saying that depending upon what gets thrown together in a consolidated Schedule P, you can just be looking at a bunch of mush. In that case, we try to get the Schedule P's for the individual companies. We realize there are limitations to that.

I know your companies have lots of different operations that would get all thrown together.

QUESTION: It's been our experience that most of the analysts who look at it come to us and ask questions.

ANSWER: Yes. Good.

QUESTION: -- and allow us an opportunity to explain the problems with the consolidated Schedule P.

ANSWER: Okay.

MR. COOPER: Anyone else? If not, I'm going to take the moderator's privilege in asking each one of our panelists a question. I'd like to start out with Karen.

Probably the greatest embarrassment to the State of New Jersey in the last few years has been the failure of Integrity of Paramus. There is no one person to be blamed for that. I guess I was around when all of this was going on, as well as anybody else.

But I noticed that in Jack Byrne's remarks today he made a rather interesting suggestion and I think a new one. That not only should the actuary opine as to the loss reserves, but he should also opine as to the collectability of the reinsurance and sign his name to it and then be prepared to stand behind it.

We all know that the primary reason for the failure of Integrity was its large amount of reinsurance in Mission. If we had had such a requirement as that, do you think it would have either forestalled or at least alleviated the situation with Integrity?

MS. MITCHELL: Well, let's just say this. That the reserves were also deficient and we received certifications when the reserves and the company still was deficient. So, I would not think that receiving such a certification at that time on the recoverable would have helped.

Basically I do not see the casualty actuary assisting in whether or not the recoverables are going to be received or collected. I think that basically what we have to do is actually look at that and determine it. I'm hoping that the new requirement will allow for such.

MR. COOPER: A question for Don. Has there been any substantial effect, do you believe, on the relatively new requirements of the SEC in the disclosure of reserve runoff in the 10-K?

MR. DANNER: I think, as Bob mentioned, that's one of the areas where management has to look at things a little differently than maybe they looked at it five or six years ago.

I think coupled with that -- not in direct response to your question -- is you have a different outlook on many boards of directors of companies, whereas in the past they had little or no involvement in the loss reserving process. Most of the clients that I deal with now, the audit committee is very actively involved in looking at and discussing that area of the financial statements.

So, yes, I think it will have an impact.

MR. COOPER: Just a further question, Don. Is there a particular scrutiny on the part of individuals other than the people who prepare the 10-Ks for that schedule?

MR. DANNER: Scrutiny in terms of the the SEC or in terms of the --

MR. COOPER: The public in general, as represented by the SEC.

MR. DANNER: My feeling is that there is not a lot by the general public, except perhaps some of the analyst community. There has been in my view little or nothing done by the SEC in really analyzing that material.

MR. COOPER: Would you pick up on that, Bob. Does the investment community go after the 10-Ks and look at the runoff schedules?

MR. BRIAN: Yes. Absolutely. We do play with the reserves a lot. Any place we can find information, we go looking for it.

MR. COOPER: For Bob, there's been a lot of talk about hidden liabilities with regard to environmental liability exposures. This will be a two-part question.

What does the analyst community feel about that? Secondly, what about the reserve implications of Prop 103 and similar legislation -- initiatives, legislation, whatever -- that has appeared in Nevada, New Jersey and other states?

MR. BRIAN: Well, environmental liability is scary. I think that's one of the reasons the insurance stocks don't trade at the multiples that some of us think they should. I think when all of us do our work and we say reserves are 10 percent short or adequate, that's within the context of a normal year. I don't think any of us are figuring into these comments the impact of some disastrous environmental activities or calaimation developments. I think it's built into the valuation, as compared to being built into the reserves.

Your second question is having to do with reserves and 103?

MR. COOPER: There's been a lot of discussion in the investment community with regard to the effect of 103 not only on prices but on the ability of the companies to maintain reserves at proper levels if their prices are going to be severely depressed.

MR. BRIAN: Again, among our analysts that's one of those soft things that gets factored in. I haven't seen any particular work done on it. All through this 103 thing the GEICO stock seems to be going through the roof. So, Wall Street doesn't always evaluate things the same way as an actuary would. But I have not seen any specific work on that regard.

MR. DANNER: Warren, on that one, the 103 situation, I think one of the things, if you're not aware of -- is that the SEC has really gotten their nose under that tent, if you will. They have been in communication with most of the major insurance companies suggesting that perhaps they shouldn't be recognizing any of those rates that are subject to rollback as part of their revenue recognition during the current period.

There is a very heavy continuing dialogue going on between the accounting profession, most of the major insurance companies, and the SEC. If in fact the SEC would prevail and not permit you to recognize any of those kinds of revenues, that is not only Prop 103, it's any rate filings that haven't been approved, and that could do a lot to tailor the bottom line.

MR. COOPER: Also, the regulatory community has obviously acted most strongly in the State of Iowa where their draft regulations -- defining how companies stopped writing in California.

Do you want to comment on anything, Karen?

MS. MITCHELL: Well, you know that is going to be up in New Jersey for a vote. I'm going to wait and see what is going to happen. I'd rather not comment on that before I have the problem.

(Laughter.)

MR. COOPER: Very well said. Yes, sir.

QUESTION: I have a question for Karen. In the context of --

(Inaudible.)

-- which is basically a Xerox of the Prop 103, how does New Jersey deal with what I deal with, which is an even bigger embarrassment, the failure of the JUA?

MS. MITCHELL: Well, let's just say that's --

QUESTION: How do you pay a $3 billion bill?

MS. MITCHELL: I'm really not the one to answer that question.

MR. COOPER: Yes. As one who had the distinct pleasure -if that's the word -- of installing that JUA into operation, I do think it's an unfair question for Karen. I think one must go to the Commissioner's level to find an answer to that question.

Any other questions from the audience? Yes, Roy.

QUESTION: I want to follow-up on the comment you made about pollution liability. We make allowances for that, and most of our companies now write policies with what we call absolute pollution exclusion, absolute environment impairment liabilities. Now, whether those will hold up or not in the future is conjectural. I think trying to build something into the reserves to anticipate that is a little like putting away catastrophe reserves for a hurricane that hasn't happened yet. I think it would be frowned up by our auditors if not the regulators.

MR. COOPER: The comment was that basically everybody is worried about the environmental liabilities, but they are basically contingent liabilities at this point because we don't know the rules of the game, and, therefore, it would probably be disallowed by the auditors. Perhaps Don would like to comment on that.

ANSWER: All I can say is you're right.

(Laughter.)

MR. COOPER: Anybody else? We have a few minutes left, if anybody would like to ask another question of our fine panel here.

If not, then I would like to ask you to give them a round of applause and thanking them for coming to visit us.

(Applause.)

1989 CASUALTY LOSS RESERVE SEMINAR

4B-2: RESERVING FOR AUTO WARRANTY PROGRAMS

Panel

Wayne D. Holdredge
Tillinghast/Towers Perrin

Gary V. Nickerson
Universal Underwriters Group

MR. HOLDREDGE: This is a 40-minute session entitled "Reserving for Auto Warranty Programs." My name is Wayne Holdredge. I'm a Tillinghast consultant, I spend a significant portion of my time evaluating automobile extended warranty programs. Gary Nickerson, Actuary and Vice President of Universal Underwriters, is also here. His company insures automobile extended warranties, and Gary has been involved in evaluating them for his company.

To my knowledge this is the first time this topic has been presented at a casualty loss reserve seminar. The reason it has received so little attention in the past may be lack of knowledge or interest rather than lack of importance. A list of companies that in some way are, or have been, involved with this product includes many familiar names. Such companies as Metropolitan, Prudential, Aetna, Travelers, GEICO, Continental and Maryland Casualty are among those currently involved. There is no way to determine how much premium is written from this product from publicly available information. Sometimes it is recorded as general liability premium and included on the general liability premium and included on the general liability line for statutory reporting. Other times it is shown as auto physical damage. Sometimes it is listed separately or mixed with other warranty-type coverages and shown as a write-in. Consequently, no one knows just how much premium is written each year. From my experience I would estimate the annual written premium is well over $100 million dollars.

For the next 40 minutes, we are going to introduce you to extended auto warranties. Gary will begin by giving you some background about such things a what is covered and who is protected. He will explain some things about this product that are important to understanding the actuarial issues. I will follow by explaining why this product is interesting from an actuarial perspective. We expect to have a few minutes left at the end for questions.

Without further ado let's begin. Here is Gary Nickerson.

MR. NICKERSON: Well, there are some unique features to this product, and in fact this session is a little different from most of the sessions that you are attending over the two days in that most of the other sessions are on general topics or methods that can be applied for a lot of different areas of insurance. This session deals with one product in particular, auto warranty programs or extended service contracts.

Because of some of the unique features of this type of product, there are some actuarial issues that are very different than for other casualty products.

Let's first of all take a look at the product itself and see some of the coverage issues, and then Wayne will talk about the actuarial issues.

I will assume we are talking about an insured program of extended service contracts. There are possibly programs out there that are not insured programs, but I will assume we are talking about an insured program.

You can see we have some overheads. There are copies of all of the overheads that will be distributed. In fact, it was even my intention to distribute them at the beginning and I forgot.

MR. HOLDRIDGE: Shall I pass them out?

MR. NICKERSON: Yes, if you will. so it will save you on some note-taking.

(Exhibit)

First of all, what does this product cover? It covers the peril of mechanical breakdown. In other words, this is health insurance for cars.

In a lot of ways cars are like people. The older we get, the more likely it is that something is going to have to be fixed, and that is the way it is with cars. In fact, that is a very important feature of this product. It has a big influence on the actuarial issues involved with this product.

What does it pay for? Primarily it is paying for the cost of repairs. This would include both parts and labor. Some contracts will also pay for towing and the expense of a rental car.

In an insured program who is insured? There is more than one way of dealing with this type of insurance. One way is a traditional arrangement between an insurance company and a car owner. This would be under the guise of mechanical breakdown insurance.

Another way of insuring this product that is very common is an indirect way. This is a service contract reimbursement insurance policy. Here the insurance is between the insurance company and the auto dealer. The auto dealer will issue service contracts to car buyers. Those contracts themselves are not insurance; however, they are indirectly backed up by the insurance between the insurance company and the auto dealer.
The car owner cannot tell too much difference between the two, but those are two different ways of dealing with this as an insurance program.

The measures of exposure are a little more complex than some insurance products in that it is two dimensional. This is a very important feature of this product, the fact that both time and mileage are important components of exposure.

Limits to this coverage are usually expressed in both time and mileage. For example, a limit to an extended service contract might be thirty-six months and fifty thousand miles, whichever comes first. It is always whichever comes first.

We must never forget that both of those components are very important. Don't become too enamored with just the time part of it, for example, thinking that, well, this is a three-year contract and that over there is a four-year contract. The mileage associated with that limit is very significant.

What components are covered? It varies a lot from contract to contract. I would say that the extended coverage falls into three main categories. One would be power train coverage only. This is very basic coverage and it would be bare-bones type of coverage.

The broader form of coverage would be power train and other named components and the broadest of all would be comprehensive or all-risk type of coverage.

Manufacturers' warranty have a major impact on coverage. For new programs manufacturers' warranty acts as an indirect deductible. A complicating factor is that there is a lot of variation by manufacturer.

This next overhead gives a sample.

(Slide)

It gives you a warranty comparison of 1989 models for three different manufacturers. You can see that they are all very different. There is not too much of a pattern of consistency from one to the other.

Ford, for example, has twelve-month, twelve thousand mile warranty for all components. It has an extension for power train components up to seventy-two months, sixty thousand miles.

GM and Toyota do not make any distinction on the type of component. Everything is covered for whatever their limit is, in GM's case, for example, thirty-six months and fifty thousand miles. In some ways it is more coverage than Ford and in some ways it is less, depending on the component.

To make this even more complicated yet, for a given manufacturer we see a variation in the term of their warranty over time.
This overhead gives you an illustration of General Motors' warranty over the last four years.

(Slide)

As you can see, back in 1986 all components were covered for twelve months, twelve thousand miles with the exception of power train for thirty-six months or thirty-six thousand miles.

In 1987 the power train coverage increased. In 1988 it stayed the same, two years in a row, a record.

In 1989 it changed again. The coverage for power train components actually contracted but all other components were extended rather significantly.

Since this acts as an indirect deductible on new car programs, these variations over time and also among manufacturers have a very major effect on this product. It has a very major effect on the extended service contract, so any actuarial analysis would have to take account of that.

Another coverage issue I will bring up would be the fact that new car programs are very different from used car programs. They have different actuarial characteristics, so any type of analysis of data would typically separate these two programs as well as the other things we have been talking about.

The last coverage feature I will address would be that of deductibles. This would be a deductible per claim. They might be present on the manufacturers' warranty. They can also be present on the extended service contract and it can vary by component with a lot of variation. Anything that can vary does, so deductible and the size of deductible is another variation in coverage that is significant for us.

That brings us now to our actuarial issues. Since this is a Casualty Loss Reserve seminar we are interested in the liabilities.

There are two liabilities of interest for us to estimate, the loss reserve liability and the liability for unearned premium reserve. For probably every other session besides this we are talking about loss reserves, not unearned premium reserves, and it is because the under premium reserve is very straightforward. You can calculate it using the pro rata

method. There is nothing to talk about. There is nothing to do. It is just plugged in by formula. Loss reserves, on the other hand, are very complex and there are a lot of interesting things to delve into.

Wayne is now going to explain to us why for this program it is exactly the opposite.

WHAT DOES IT COVER?

- PERIL: MECHANICAL BREAKDOWN
- IT PAYS FOR:
  - -REPAIR (LABOR & PARTS)
  - -TOWING
  - -RENTAL CAR

WHO IS INSURED?

- MECHANICAL BREAKDOWN INSURANCE CAR OWNER
- SERVICE CONTRACT REIMBURSEMENT INSURANCE
- AUTO DEALER

MEASURES OF EXPOSURE

- TIME
- MILEAGE

COVERED COMPONENTS

- POWER TRAIN
- POWER TRAIN AND OTHER NAMED COMPONENTS
- COMPREHENSIVE

MANUFACTURERS' WARRANTIES

- IMPACT ON COVERAGE
- VARIATION BY MANUFACTURER
- VARIATION OVER TIME

WARRANTY COMPARISON
1989 MODELS

MANUFACTURER	ALL COMPONENTS MONTHS/MILES	POWER TRAIN MONTHS/MILES
FORD	12/12,000	72/60,000
GM	36/50,000	36,50,000
TOYOTA	36/36,000	36/36,000

WARRANTY COMPARISON

GENERAL MOTORS

MODEL YEAR	ALL COMPONENTS MONTHS/MILES	POWERTRAIN MONTHS/MILES
1986	12/12,000	36/36,000
1987	12/12,000	72/60,000
1988	12/12,000	72/60,000
1989	36/50,000	36/50,000

DEDUCTIBLES

- MANUFACTUER'S WARRANTY
- EXTENDED SERVICE CONTRACT

NEW VS. USED

ACTUARIAL ISSUES

- LOSS RESERVES

- UNEARNED PREMIUM RESERVES

Gary mentioned that this product presents an interesting actuarial issue. Although we are at a loss reserve seminar, it is not loss reserves, as we generally use those terms, that are interesting from an actuarial perspective. Loss reserving, i.e., reserves for claims that have occurred, for this product is relatively simple. Usually a decision about whether a claim should be paid, or denied, is made as soon as the claim is reported (generally within a few days of the occurrence). Application of the basic loss reserving methods is likely to produce reliable estimates of the ultimate payment on claims that have already occurred.

The more interesting, and more challenging, issue is the unearned premium reserve. In theory, premiums (at least the pure premiums) should be taken into income, i.e., earned, according to the pattern by which covered losses occur. For most property and casualty coverages, the assumption that losses are expected to occur evenly throughout the term of the policy, which is usually one year or less, is a reasonable assumption. There are very few property and casualty coverages for which losses would not be expected to occur evenly throughout the policy term, and in those cases the differences are small enough to allow the simplifying assumption to be reasonable. In many respects, this product resembles a life insurance or long-term health insurance product since the probability of loss generally increases throughout the policy term.

(SLIDE 1) In the case of auto service contracts, and mechanical breakdown insurance, the assumption of covered losses occurring evenly throughout the policy term is not reasonable for two reasons:

1. Manufacturers' warranties cover a very large proportion of the mechanical breakdowns during the early portion of the contract term. These factory warranties are from one year to seven years depending upon the manufacturer and the components covered, as Gary has already shown you. As much as 90% - 95% of the losses during the manufacturer's warranty will be covered by the manufacturer's warranty.

2. The incidence of mechanical breakdowns varies over the life of a vehicle. For example, there may be a relatively high probability of breakdown early in the life of a new car (until the initial bugs are worked out). Then the low probability of breakdown begins to rise as the car ages and parts begin to fail.

The combined affect of these two factors results in relatively few loss occurrences during the early portion of a new car contract (while the factory warranty is in place) and significantly more losses during the later portions of the contract (after the manufacturer's warranty expires and as the car begins to deteriorate mechanically).

Earning the premiums (and for these purposes we will refer to premiums as pure premiums, which are often referred to as reserves by those operating in this field) evenly throughout the term of the contract is likely to result in a very poor match of revenues and loss payments. (Slide 2) Here is an example of the expected loss occurrence pattern for a 6 year/60,000 mile service contract with a 3 year/50,000 mile manufacturer's warranty. At the end of one year only 3% of the losses have occurred. If the premium is earned evenly,

i.e., pro rata, throughout the six-year term, approximately 16% of the premium would be earned. Even if the coverage is perfectly priced (defined for these purposes as the ultimate ratio of losses to premiums of 100%), at the end of one year 3% of the losses compared to 16% of the premiums would produce a ratio of 19%. Such an attractive result may raise doubts in the minds of those that don't understand this coverage about whether the product was overpriced.

At the end of two years the ratio of losses to pro rata earned premiums would be 24%, further confirmation of a potentially overpriced product. The ratio will continue to look attractive until near the fourth year, at which time this perfectly priced product will appear underpriced until all losses are incurred and all premiums are earned.

In theory premiums should be earned in the same proportion as the losses occur. In this example, using the correct premium earnings pattern will produce a consistent ratio of losses to premiums of 1.00. Pro rata earnings produced ratios of from less than 20% to over 110% during the term of the contact. Even if there are no regulatory requirements for earning premiums, it will be difficult, if not impossible, to make optimal business decisions until all contracts have expired unless losses and premiums are matched as nearly as they can be.

An interesting actuarial exercise is the determination of the patterns by which service contract premiums should be earned. (Slide 3) If a large and reliable data base is available, simply determining the patterns by which losses occur for each plan is sufficient. Arraying the losses in the familiar

loss development triangle, determining report-to-report development factors and development factors to ultimate will give us the necessary information to determine the appropriate premium earning patterns. This slide shows a typical example of the determination of the premium earning pattern. Many of the problems we have with similar loss reserving techniques, such as what tail factor to use if data is incomplete and how to combine the report-to-report factors to produce reliable projection factors for the future, exist here also.

The correct premium earning patterns for auto service contracts are not trivial. Each combination of time and mileage limits produces a different earnings pattern. We already have seen an example of how a pro rata earnings pattern produces less than optimal results. (Slide 4) For used cars, which usually have much shorter time and mileage limitations, a pro rata pattern may produce fairly reasonable results. However, earning patterns for new car plans are more interesting. (Slide 5) Some companies use the simplifying assumption of earning the premiums according to the reverse rule of 78's. While this may produce more satisfactory results for new car plans than a pro rata pattern, the differences still can be significant. For example, look at the pattern produced by the reverse rule of the 78's for the 6/60 plan we looked at earlier. The reserve rule of 78's produces the same earning patterns for all plans with the same time limitation. (Slide 6) We can see from this slide that the loss occurrence pattern varies significantly by mileage limitation. (Slide 7) Also the manufacturer's warranty significantly affects the loss occurrence, and hence the premiums earnings, patterns.

Understanding the importance of properly earning the premiums is only a small portion of the problem in this case. There is no widely accepted publicly available data base from which to develop earning patterns. No rating bureau or statistical agent captures and publishes loss data in a format that will permit the determination of premium earning patterns. Such a data base would need to include many years' data. However, manufacturers' warranties have not been constant for a long enough period of time to allow complete data to be captured and evaluated in order to determine prices for new plans. In addition time and mileage limits of the extended service contracts have been changed often over the past several years.

The question of how to determine premium earnings patterns for new time and mileage limitation combinations and manufacturer's warranties remains. The earnings patterns, in addition to the prices, must be determined before the contracts are sold. The only effective way to determine such patterns and prices prospectively is through computer modeling. Modeling such things as mileage driven, loss probability over time, losses covered by the manufacturers' warranties and numerous other variables can produce patterns that, although perhaps not precise, are more accurate than any rule of thumb of which I am aware.

In addition to the problem of proper premium earning patterns, there is the potential problem of a deficiency in the unearned premium reserves. If a reliable accurate earnings pattern were known, and prior to the expiration of all service contracts, the ultimate loss projections from the in-force contracts indicated an underwriting loss was expected, how should such an underwriting loss be treated? The principles of statutory accounting would

indicate that such a liability, or at least a corresponding segregation of surplus, should be shown. There may be state insurance departments that require such a treatment of the deficiency in the unearned premiums, but I am not aware of them. In fact, in one particular case of which I am aware a state insurance department not only didn't require such a handling of an obvious deficiency, they specifically requested such a liability or segregation of surplus not be shown. For GAAP accounting purposes the deficiency in the unearned premiums should be shown.

We would like to stop at this point to allow time to discuss any part of what Gary and I have talked about that is of interest or any other questions you may have on this topic. If there is sufficient interest, at a later Casualty Loss Reserve Seminar, Ratemaking Seminar, or at a CAS meeting, we could have a more complete discussion of the topic. Such things as the data necessary for a complete data base for pricing and determining earnings patterns could be discussed.

CASUALTY LOSS RESERVE SEMINAR

Session 4B - 2

RESERVING FOR AUTO WARRANTY PROGRAMS

Why Service Contract Losses Do Not Occur Evenly Throughout Contract Term

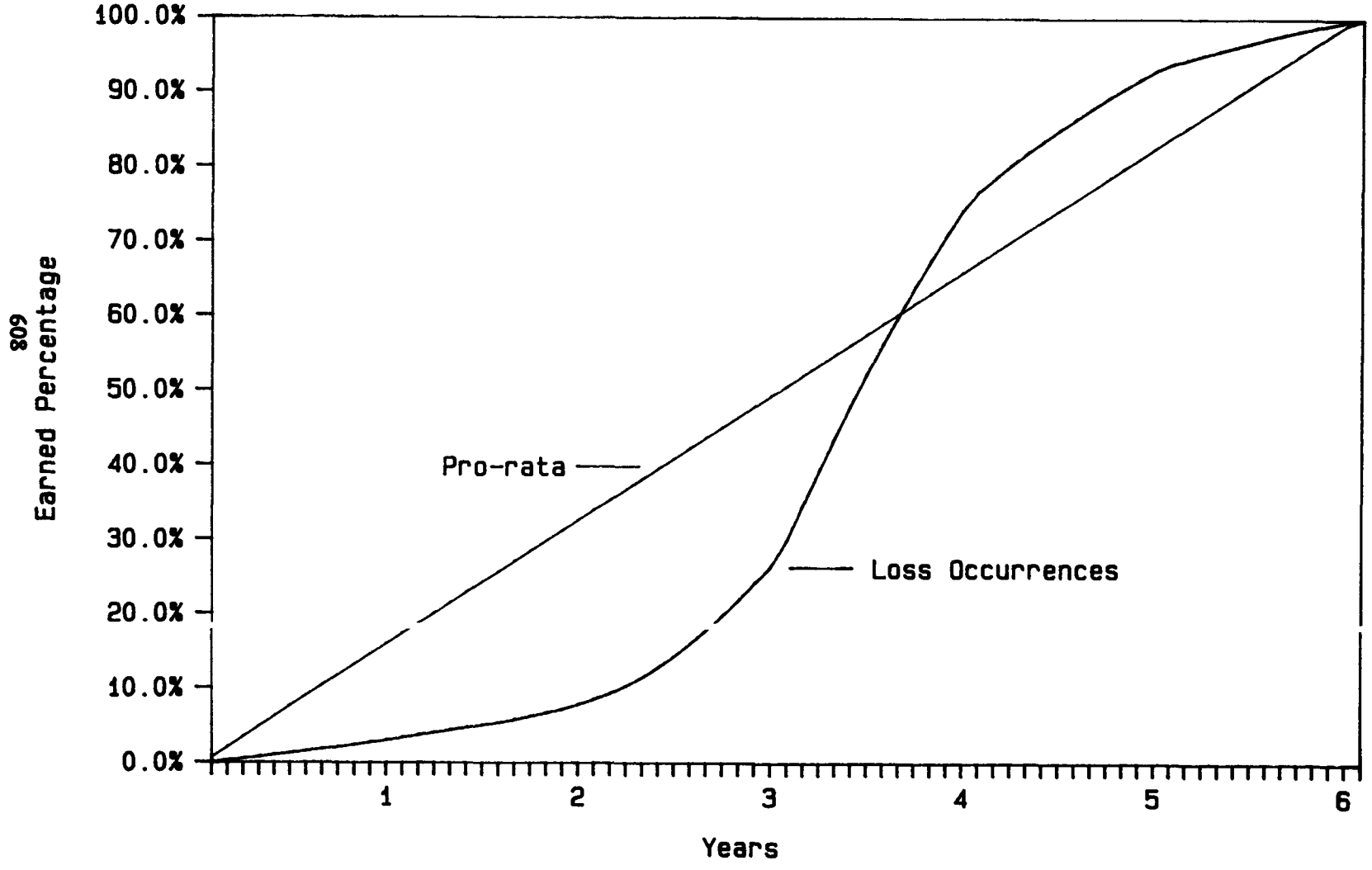
- **Manufacturers' warranties cover a large proportion of mechanical breakdowns during the early portion of the contract term. Example: 6 year/60,000 mile service contract covering a new car with a 3 year/50,000 mile manufacturer's warranty.**

- **Likelihood of a mechanical breakdown changes as a car ages. Typically a high initial incidence of breakdowns is followed by a low loss frequency which gradually increases over the life of the car. Also, in general, the average paid claim increase as the car ages.**

CASUALTY LOSS RESERVE SEMINAR

SESSION 4B-2-RESERVING FOR AUTO WARRANTY PROGRAMS

6 Year/60,000 Mile Service Contract
with 3 Year/50,000 Mile Manufacturer's Warranty



Company A
Incurred Losses

Effective Year	Evaluation Point 1	2	3	4	5	6	7	8
1	0	5,315	15,718	25,388	35,094	46,693	51,785	63,873
2	69	17,997	33,726	73,039	110,116	136,860	166,041	
3	1,116	13,455	41,588	73,681	97,378	127,798		
4	0	15,575	38,121	58,376	79,291			
5	1,509	19,528	39,378	64,562				
6	827	22,319	49,154					
7	1,524	17,316						
8	3,542							

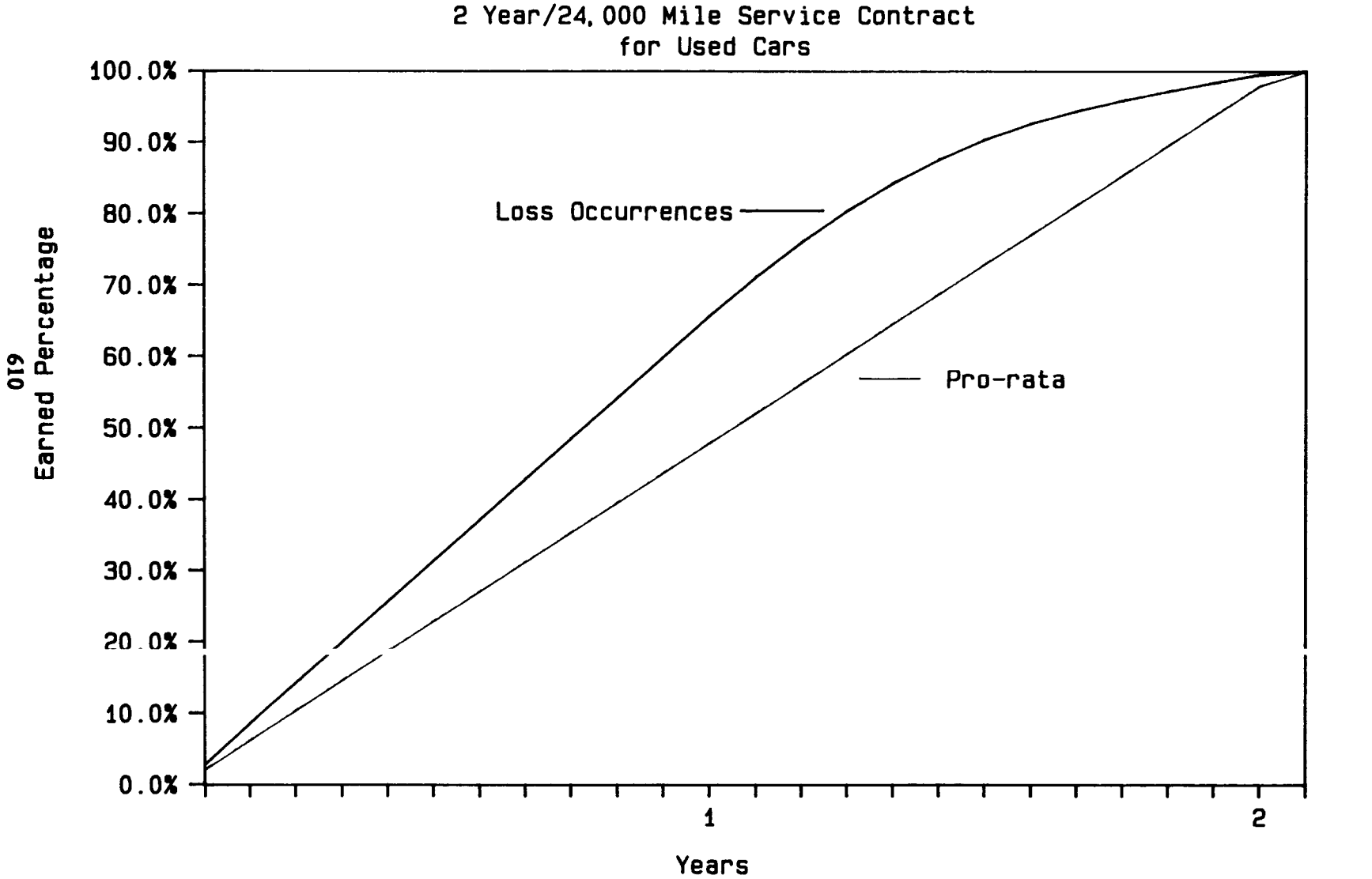
	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-ult
Average Report to Report Factors:	15.878	2.230	1.671	1.387	1.313	1.214	1.162	1.245
Selected Factors:	15.000	2.250	1.670	1.390	1.320	1.210	1.160	1.155

	1-ult	2-ult	3-ult	4-ult	5-ult	6-ult	7-ult	8-ult
Factors to Ultimate:	177.463	11.177	4.967	2.975	2.140	1.621	1.340	1.155

	1 yr	2 yr	3 yr	4 yr	5 yr	6 yr	7 yr	8 yr
Percent of Ultimate Incurred Losses:	0.006	0.089	0.201	0.336	0.467	0.617	0.746	0.866

CASUALTY LOSS RESERVE SEMINAR

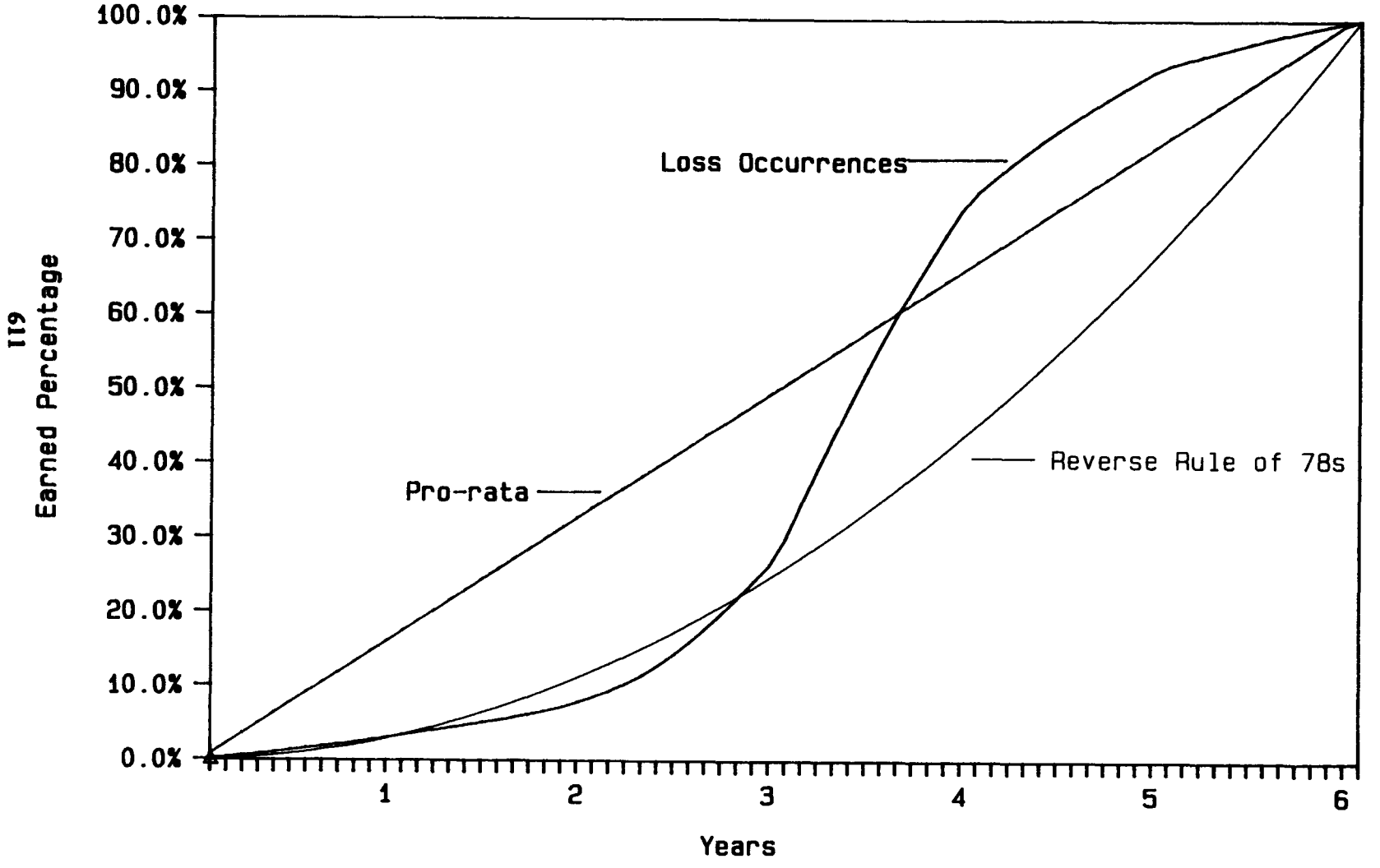
SESSION 4B-2-RESERVING FOR AUTO WARRANTY PROGRAMS



CASUALTY LOSS RESERVE SEMINAR

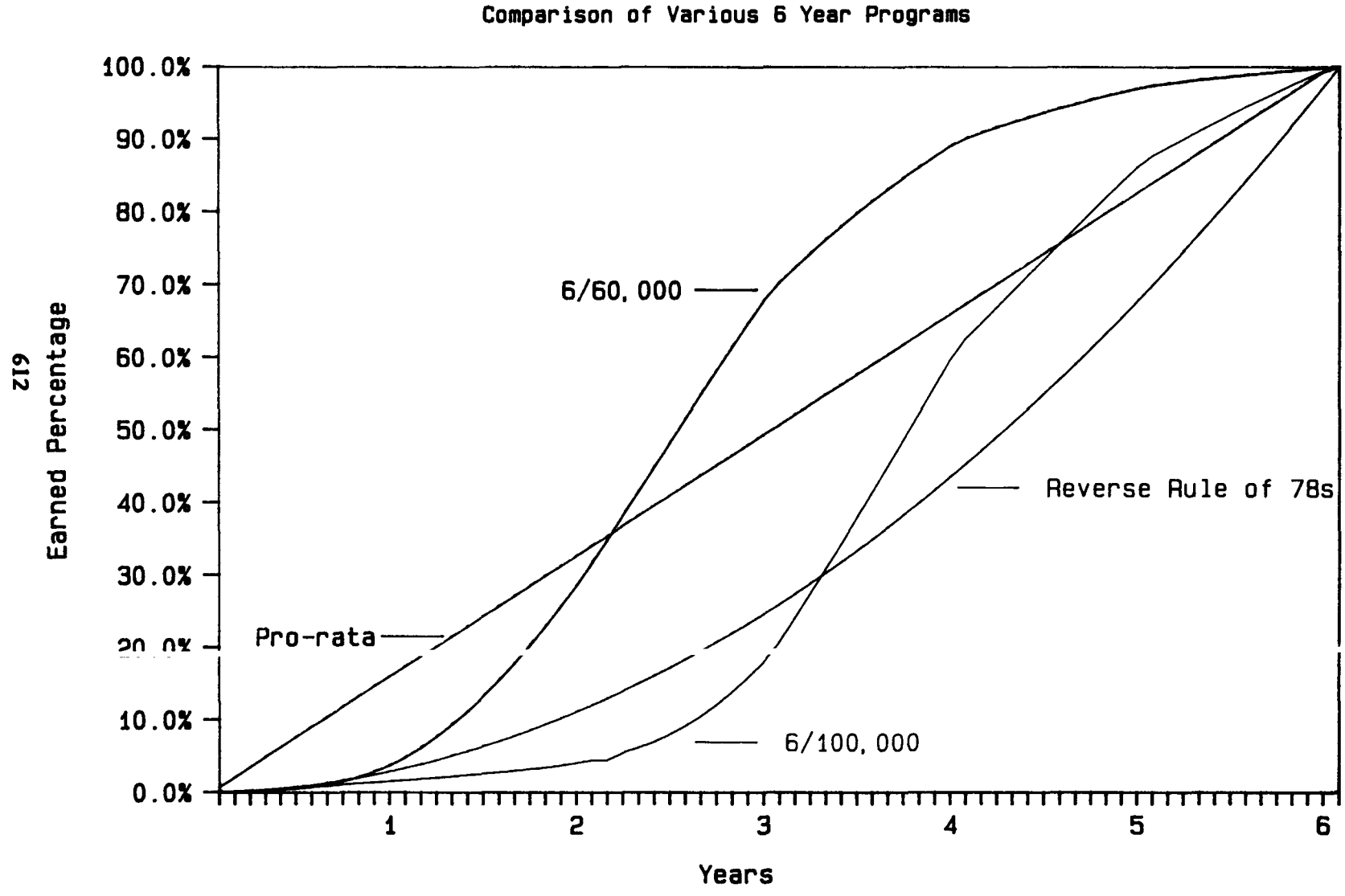
SESSION 4B-2-RESERVING FOR AUTO WARRANTY PROGRAMS

6 Year/60,000 Mile Service Contract
with 3 Year/50,000 Mile Manufacturer's Warranty



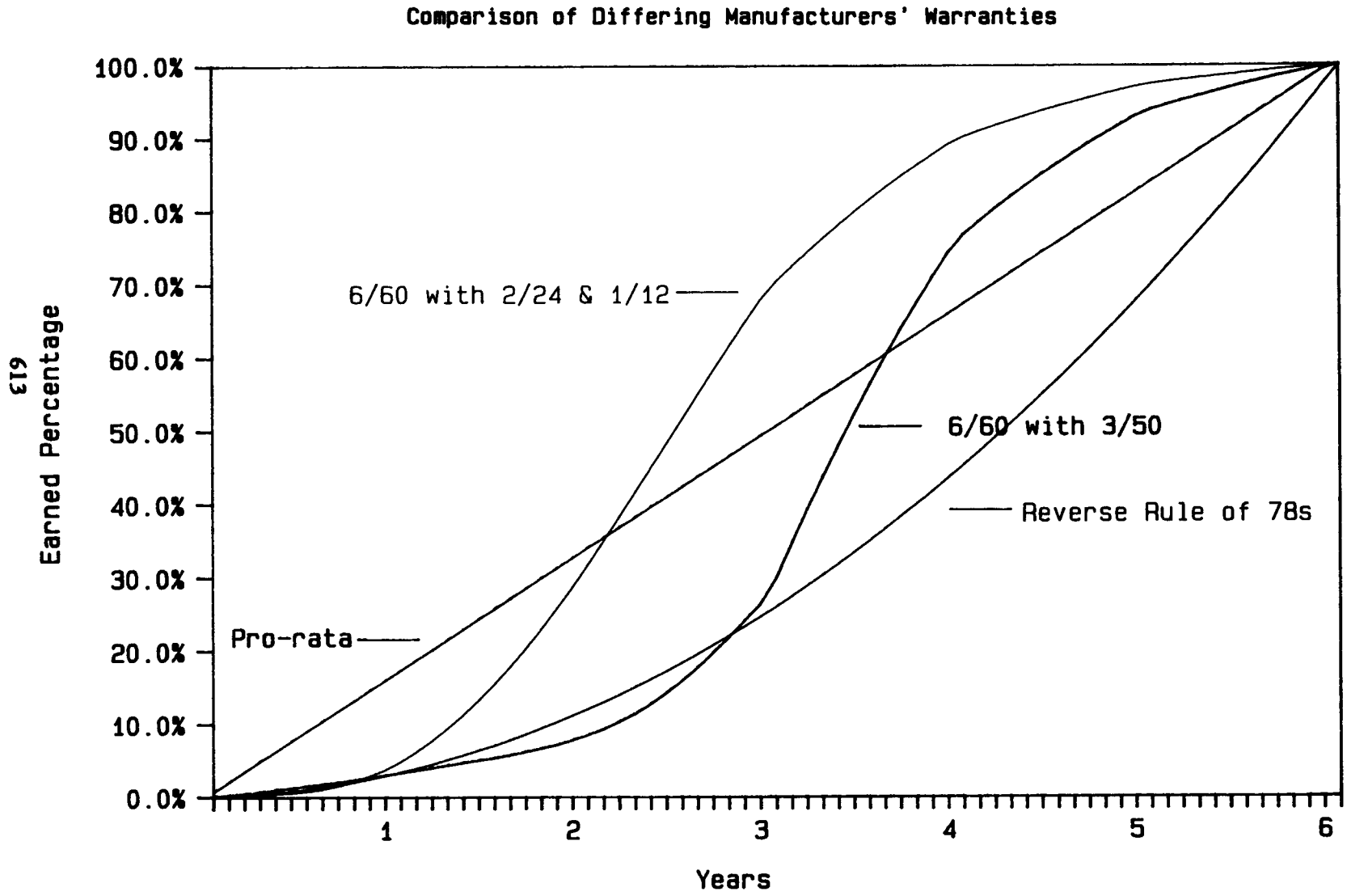
CASUALTY LOSS RESERVE SEMINAR

SESSION 4B-2-RESERVING FOR AUTO WARRANTY PROGRAMS



CASUALTY LOSS RESERVE SEMINAR

SESSION 4B-2-RESERVING FOR AUTO WARRANTY PROGRAMS



1989 CASUALTY LOSS RESERVE SEMINAR

4C-1: QUALIFICATION STANDARDS & STANDARDS OF PRACTICE

Panel

James A. Faber
Peat Marwick Main & Company

James F. Reiskytl
Northwestern Mutual Life

MR. FABER: This is session 4C-1, which is Qualification Standards and Standards of Practice. There are two separate topics that we are going to discuss briefly this afternoon.

The first will be by Jim Reiskytl, who is Vice President of Northwestern Mutual Life Insurance, and he is Chairman of the American Academy Committee on Qualifications. Recently that committee has released its final standard on qualifications.

After that, I will give some remarks with regard to the Actuarial Standards Board and talk to you about my role as subcommittee chairman, that is chairman of the Subcommittee on Reserving of the Casualty Operating Committee of the Actuarial Standards Board. My name is Jim Faber and I am with Peat Marwick Main and Company. As I indicated this afternoon, I am serving in the capacity as chairman of that subcommittee.

There are some announcements that I should make at the beginning of the session. With regard to questions, for the record, identify yourself -- that was for me, I just did that. I announce that the entire session will be recorded, which it is. I should stress to the audience the importance of speaking directly into the microphone when asking questions. When questions are asked, we will try to repeat them so everyone in the room knows just what those questions are and what is being responded to. To the extent that we have slides, we will -- or, of course, overheads in this particular case -- we will identify those as we are using them.

There are evaluation forms for the session, and we would ask that you fill those out at the end of the session and return them to the registration desk.

With that brief introduction, Jim, would you like to begin your talk?

MR. REISKYTL: How many of you have read the recently released American Academy newly restructured Qualifications Standards? One person.

QUESTION: When was that released?

MR. REISKYTL: Oh, about four to six weeks ago. Two final reports came out in that mailing from the board -- one on qualifications and the other on continuing education. I realize that you get many white booklets from the Academy, so it may just have joined the others on your book shelf unread. Since only one person is aware of the new structure, there seems to be little point in giving you the quiz that I was going to start off with.

Let me back up for a moment. If you are like me, you knew that there was something called a qualification committee, but until I was asked to serve on it, frankly, I had little idea exactly what they did or how they went about their business.

If you were to look up the Qualifications Committee in the yearbook, you would find that the purpose of this committee is to identify and recommend to the Board of Directors the minimum qualification standards for members who perform publicly required actuarial functions.

The committee investigates questions relating to qualification problems and counsels members on questions involving individual qualification. The key verbs are: investigates, identifies, recommends and counsels. Our committee members come from each of the major disciplines such as life, pension and health. Unfortunately, for two to three years we haven't had a member from the property/casualty area. That's been corrected recently since Mike Walters has agreed to serve. You probably know Mike a lot better than I do. I understand that he was a former president of the Casualty Actuarial Society. I am extremely pleased that he is joining our committee and look forward to working with him.

The committee members don't pretend to have all the expertise needed to determine in each instance who is qualified to express a public opinion. Whenever a particular standard is promulgated, the committee will review it and if appropriate will form a subcommittee of knowledgeable people in that area to assist us in determining what the minimum qualifications ought to be.

Since most of you have not read this, you probably aren't among the group who wrote to me complaining about the exposure draft version of new qualification standards for expressing an opinion about loss reserves.

Actually we did not think we had done anything new here. Yet a number of members wrote asking, "Why are you making these new requirements so stiff?" "Did we realize many won't qualify?" Our response to them was "Have you ever read the current Academy qualification criteria?" Unless we are inept with the English language, I don't think we introduced any new criteria. We changed the structure but not the substance.

Since the final report came out, I haven't heard from anyone, so either they now agree with us or they, like others, got it in the summer and haven't read it yet.

The key to qualification standards, from my perspective, is to provide assurances to the public that when an actuary expresses an opinion that he or she is qualified to do so, that the profession has minimum standards that must be met and that there is a disciplinary process to enforce them.

The Standards are limited to public expressions since if you are doing private work, or doing work for your employer, presumably they know your abilities and any limitations on the advice provided. The public is likely to have little or no knowledge of your actuarial expertise in a particular area -- clearly in this case qualification standards are needed so they can rely on the advice or opinion.

By the way, if you don't know if you are qualified to express on opinion -- for example, on loss reserves -- ask another qualified actuary or ask us. Only you, of course, can ultimately decide and ultimately defend whether you are qualified to express a particular opinion -- but we will be happy to counsel you on individual situations whenever others aren't available.

To determine whether you are qualified to express a public opinion one begins with the Guides to Professional Conduct. The Guides to Professional Conduct, of course, have their own set of rules. They state that "the member will bear in mind that the actuary acts as an expert when giving actuarial advice and will give such advice only when qualified to do so." Meeting this criteria is the first step in the process of meeting qualifications standards.

There may also be technical guidelines. As you are going to hear more about in the second part of this session, from time to time the Standards board will adopt standards. Once this is done the Qualification Committee must decide the appropriate minimum qualification standards and after having done so the member must determine if he or she is qualified.

The Qualification Committee tries to never get ahead of the Standards Board. They are doing an awful lot of work and that in turn increases our work.

There has been some strong interest in creating an exception to the general rule in the health area -- so as to avoid, if possible, what happened with pensions and the enrolled actuary. We have been giving this some thought and have experts in the health field looking into it. We may have qualifications before the Standard is complete.

So, first you must be qualified in an area to give public opinion. The other two requirements are education and experience. Meeting these requirements offers evidence that you are qualified. They don't necessarily prove that you are, but if you meet them, the presumption is that you are qualified.

Of course, if you do not satisfy these requirements and believe through experience or through working under another qualified actuary that you are otherwise qualified, you are encouraged to seek committee counsel as to whether we think that you have met the criteria. As I mentioned earlier, this counsel is only advisory.

As time goes on, I believe that the requirements for actuaries will continue to expand.

Frankly, if we had our choice we would limit qualification to members of the American Academy of Actuaries. Why? Because the Academy has an effective disciplinary process.

Standards without discipline arguably are of limited value. This carefully undertaken disciplinary process is likely to become increasingly important as more actuarial opinions are required.

As a result, the committee decided to require American Academy of Actuaries membership, realizing that the states are likely to permit others to express opinions. Academy members, of course, are subject to the disciplinary process if they fail to fulfill the qualification requirements. The States will have to set up a comparable process if they choose to let others express opinions.

Qualification Standards for signing statements of opinion on "loss reserves" and other functions have existed for some time. The current standards are simply the current standards reformatted. Others are likely in the future including ones for the valuation actuary area, continuing care retirement communities and, as previously mentioned, the health area.

As to the new structure, we found that we were repeating certain basic requirements each time we prepared a qualification standard for an opinion. For example, you ought to have basic actuarial knowledge, actuarial mathematics, economics and some others."

We also surveyed all the state laws and found that there were areas where there were required actuarial opinions, for example, for approval of something, yet we had no qualification standards for these opinions.

The committee decided to develop a two-tiered structure. One tier is a general qualification standard that as the name implies must always be satisfied. This general standard would cover the basics.

(Slide)

The general qualification standards include as minimum education requirements: general actuarial mathematics, economic, regulatory and legal requirements, identification and evaluation and management of risk.

We believe these are appropriate both for existing opinions covered in the yearbook and any others where currently required. Effectively implemented this should give the public appropriate assurances that they may have confidence in our opinions.

The second tier is called the supplemental qualification standard. Here we identify any additional requirements such as specific examination topics, alternative educational requirements or programs, and necessary years of relevant experience.

When the board approved this new qualification standard format, it also separately approved required continuing education. So continuing education requirements became part of the new qualification standards. When you do have time to take a look at our final report you will find that we simply adopted the recommended continuing education requirements. If you would like to, we can comment further on those later also.

Given that description of the structure perhaps I should back up a bit to fill you in on a few other important details. What does the committee really do? When we say "public opinion" or "public statement" what exactly do we mean? Our definition is that the opinion must be called for by law, regulation or Standard of Practice promulgated by the A.S.B. In these cases clearly the actuary is speaking to the public. Obviously there will always be cases where judgment is involved as to whether you are expressing a public opinion or not. In case of doubt, assume that it is and assume that you ought to meet the qualifications standards.

The reason we say "public" is because we assume that in other cases the user is aware of the actuary's qualifications whereas the public user is relying on the Academy to assure that the information provided is being performed by an actuary qualified to do so.

As to the committee process -- we begin by reviewing and analyzing the requirements of the new A.S.B. standard. We try to identify the actuary's duties and then decide what education requirements are needed and what experience requirements are needed.

A number of questions often come up regarding requirements: what do you do if you are moving into a new position and have not had any prior experience? What do you do if you are on the cutting edge of new product development? Or you are asked to give an opinion in a new area where there isn't a body of information?

Another question that often arises is, suppose you took the actuarial exams twenty or thirty years ago, and you are not quite sure if you would pass the examinations today, do you have to go back and retake the necessary tests to demonstrate that you are qualified to express an opinion?

The good news is that you don't have to take the tests again -- you can if you wish. It is your option. The continuing education requirements state that you can maintain your knowledge in a number of ways. One, of course, is by attending meetings such as this one, seminars, or other professional presentations where the topic you are going to express an opinion on is being presented and discussed and you have an opportunity to get up-to-date knowledge on that area.

As to new areas of responsibility, you can demonstrate that you are qualified if you can show that you have successfully applied similar knowledge to analogous actuarial functions. In other words that there is a similarity or carryover from your prior experience where you have demonstrated actuarial expertise, to this new area or function. As previously mentioned, you can also take the exams again if you so choose, but I doubt if many people will do so.

I should also point out that whenever you make a public statement, that your statement must include the following or something similar: "I, [name], am [whatever your position is] for [whoever you are working for either your company or consulting firm]. I am a member of the Academy of Actuaries and meet its qualification standards for [whatever the assignment is.]" That is you must clearly state somewhere in the report or in the public statement that you are a member of the Academy and that you have, in fact, met its qualification standards for this type of assignment.

That covers the essentials - any questions? Maybe we should let Jim speak and then we could answer questions at the end. What's your pleasure?

QUESTION: In terms of loss reserve opinions, suppose I am supervising somebody that is doing the first-hand work on a loss reserve opinion. Can that be signed in my name or in both names? Does it have to be signed with the name of the person that did the primary work?

ANSWER: It can be signed in your name, assuming you have met the qualification standards. As to the individual actually doing the work, if he did not meet the presumptive test (education and so on) then it would be up to you to decide if he or she is qualified to do so also.

If you are uncertain, you could write to our committee identifying the circumstances and why you felt you were qualified. In this case, we would refer it to our property/casualty member who would review it, discuss it within the committee, and give you our advice.

So the key to satisfying the educational requirements is to have either successfully completed the exams or have worked for a number of years and demonstrated that you have had responsibility for doing the work satisfactorily and have done so.

QUESTION: Can the opinion be signed with the name of the firm?

ANSWER: No.

MR. FABER: I would answer that no. It is contrary to an accounting opinion, which, of course, is signed with the name of the firm. I believe that all actuarial statements of opinion would be signed by the individual actuary taking responsibility for that opinion.

QUESTION: How does that differ from the accounting approach? I am wondering what the basis is for that distinction. An accounting opinion is signed with the name of the accounting firm as opposed to being signed by any of the individual accountants.

ANSWER: Take an opinion on loss reserves -- the states have said, "We want a qualified actuary to do this." They did not say they wanted a qualified actuarial firm. They realize, of course, that that individual, just as an accountant, may have to rely on others -- but its their opinion.

We are really putting the onus on you as an actuary to give an opinion only if you are qualified to do so and have satisfied yourself and can demonstrate to others that you are. Jim may wish to add something since I am not a member of an accounting firm.

QUESTION: I work as a consulting actuary for an accounting firm.

ANSWER: I am sorry -- I don't want to limit Jim's time any further. Jim, why don't you start and we'll answer additional questions at the end.

MR. FABER: From a legal standpoint, you know, I cannot really respond to that other than the fact that the requirements, of course, of the AICPA are that any opinions issued by the public accounting firm are signed in the name of the firm by a partner who is taking responsibility for that financial statement, but it is the responsibility of the firm and not the individual, whereas the way it has grown up through the actuarial profession is that the individual actuary is taking responsibility for his actions and his judgments, and so therefore our requirements are that the individual actuary sign the statement of actuarial opinions the individual taking responsibility.

QUESTION: Isn't that the same, though? Can the firm --

ANSWER: I think clearly the actuary that is a member of the firm -- I mean, he is going to have an individual liability, but the firm is also going to have a liability for what he does. Yes, that is true.

Conversely, of course, the public accounting firm has a liability for the financial statements that they are attesting to and I am sure the partner that signs the name of the accounting firm to that opinion also has some individual responsibility, of course, for it.

QUESTION: I am frequently asked that same question by the accountants who wonder why the actuaries need to sign these things. I was curious to see what the answer was.

MR. FABER: The second part of our program today speaks to the Actuarial Standards Board and specifically then to a standard practice on discounting loss reserves that is currently under development.

I thought I might start the same way Jim did and ask how many in the room have read the Actuarial Standards Board fact book? Members of the Academy should have received it about a month ago or so, and I think I see at least two or three hands in the room. Also, it is across the hallway in the display for the Actuarial Standards Board. It is there, and I urge any of you that don't have a copy of this or who are not members of the Academy and have not received it in the mail to pick up a copy of it so that you are familar with what the Actuarial Standards Board is all about.

Briefly, I thought I would take just a couple of minutes to read some excerpts from this, because I think it will give you a little bit of a flavor of the Actuarial Standards Board and what it is all about.

The quality of actuaries' work is prescribed in actuarial standards of practice and actuarial compliance guidelines. Standards of practice, built upon foundations and principles of actuarial science, guide actuaries in performing work defined as within the actuarial domain.

As of July 1, 1988 the task of promulgating standard practice and compliance guidelines for the actuarial profession in the United States was assumed by a newly established entity, the Actuarial Standards Board. This board is a separate entity affiliated with the academy, drawing upon Academy staff and financial support to accomplish its work. The ASB has sole responsibility to initiate the development of and to adopt new standards. This, I think is important. The nature of actuarial work dictates that standards of practice set forth a range of generally accepted methodologies to guide actuaries in their day-to-day work.

On the other hand, standards of practice must be conceptualized and worked in such a way that they do not unnecessarily circumscribe the creativity of the actuary in approaching new problems.

Standards of practice serve to insure the public that actuaries are professionally accountable. At the same time, standards provide practicing actuaries with the basis for assuring that their work will conform to generally accepted actuarial principles and practices.

The work of drafting the individual standards is accomplished by six operating committees of the ASB which correspond to broad areas of actuarial practice: the Casualty Committee, Health Committee, Life Committee, Pension Committee, Retiree Health Care Committee, and the Specialty Committee for practice areas that do not readily fall in those above.

In terms of how standards are developed, when a majority of members of an operating committee conclude that the initial drafting process has been satisfactorily completed, they make a formal request to the ASB to initiate an exposure process.

The ASB may approve a standard as submitted for exposure or return it to the operating committee with comments, suggested changes in wording or other instructions.

Once the board has approved the draft standard for exposure, it is published and distributed to all the members of the Academy as well as to individuals who have expressed an interest in the professional standard, such as state insurance commissioners. The comment period on exposure draft in most instances is a minimum of sixty days.

Some exposure drafts may be so complex or controversial or portend a sufficiently major impact on the actuarial profession as to require a public hearing.

When all of the steps that comprise the exposure process have been completed and two-thirds of the operating committee members approve, the committee submits the final proposed standard to the ASB. If six ASB members approve, the standard is formally adopted. There are nine members of the ASB.

Once standards are approved by the ASB they are published and distributed by the Academy to the entire membership as well as to other interested parties. Each new standard follows identical format throughout and includes only the following headings: title, preamble (which encompasses several sections including purpose, scope, effective date, definitions, background and historical issues, current practices and alternatives), and then the standard of practice which encompasses two sections (analysis of issues and recommended practices, and communications and disclosures).

I think with that brief introduction I would like to talk a little bit about the standard of practice that the Subcommittee on Reserving is currently developing.

I had hoped at this particular point in time that this standard would have been exposed to the membership. We actually had submitted it to the Actuarial Standards Board in July and they sent it back to the committee with some recommendations in terms of making some changes.

That is what is being done at the current time and it will be resubmitted to the Actuarial Standards Board in October. Assuming approval then, it will be submitted to the full Academy membership for exposure and comment.

The purpose of the standard of practice on discounting of property and casualty loss and lost adjustment expense reserves is do define the issues and considerations that an actuary must take into account in determining discounted property or casualty loss and/or loss adjustment expense reserves.

(Slide)

This particular slide indications, as I had said, the general section topics, and in particular in Section 5 you can see some of the subtopics then that are covered for this particular standard. We are going to spend just a little bit of time this afternoon on Sections 5.3 and 5.4 with regard to rates of investment return for discounting and risk margins.

(Slide)

There are about twelve definitions that are included within the standard. I just am going to put two of them up for you to look at.

The first is on investment risk, which is defined in the standard as uncertainty surrounding the realization of a specified investment income stream. Elements include default risk, reinvestment risk and uncertain investment liquidity.

Default risk and reinvestment risk are also separately defined, but originally they were considered as separate items and we have combined them under the broader category of investment risk. Risk margin is defined as an amount by which a selected estimate differs from a central estimate to compensate for the uncertainty in the estimation process.

Now, in Section 5, which is the analysis of issues and recommended practices, Section 5.3, the issue basically is rates of investment return for discounting. A discounted reserve may be used in a variety of contexts and the appropriate rate of investment return is a function of the context.

Section 5.3.1, investment risk, the investment income rates should be consistent with assets having low investment risk to minimize the uncertainty inherent in the investment process. The selected rates may be based on hypothetical assets or may be related to the insurer's investment portfolio. Now, this goes on to say a little bit more, but I think it is the salient part of the section.

Then, in Section 5.3.2, asset valuation basis, if the discounted reserve is used in a context which includes the reporting of assets, the rates used in discounting should be consistent with the basis used in valuing the assets. If assets are not valued or assets are included in market value, a market interest rate or rates is or are appropriate.

This section also goes on to say that if the overall value of assets is significantly different from market, the actuary should consider relationships between book and market values and between portfolio interest rates and market interest rates and also between the maturities of assets and the estimated timing of loss payments.

Then, included also in the investment return section, Section 5.3.5, is risk adjustment to the investment income rates. The actuary may use an investment income rate or rates lower than previously discussed as a means of introducing an explicit risk margin.

Section 5.4 deals with the issue of risk margins. A reserve estimate should take into account the degree of uncertainty inherent in the projection. More risk margin is needed in a discounted reserve than in a full value reserve. There is another comment that is also proved in that introduction but, again, I think these are the salient remarks.

Then Section 5.4.1 talks about a provision for uncertainty. The actuary should include an appropriate provision for uncertainty in the determination of the discounted reserve, giving consideration to the increase in uncertainty associated with the discounting calculation.

Then, finally, Section 5.4.2, implicit and explicit margins -- implicit margins may be introduced at one or more steps in the discounting process including the estimation of the full value reserve and the selection of the payment pattern from a range of reasonable estimates. For example, one could make conservative selections with regard to development factors and ratios, that kind of thing, in the development of the reserve itself or in the manner in which you select the payment pattern from a range of possible payment estimates.

Explicit margins may be added as an absolute amount and/or through an explicit adjustment to the investment income rate.

I think those are some of the key areas that are included in the standard. As I indicated in reading the fact book, what the standards of practice try to do is give guidance to the actuary in terms of his operation in a particular area, but not to be so limiting as to say, you know, one must do it in this way and this way only. There may be a situation where that is true, but I think this is a particular example where I don't think that is, and the standard is trying to speak to a means of guidance to the actuary without unnecessary limitation.

Are there any questions? Warren?

QUESTION: (Inaudible)

ANSWER: In terms of an explicit risk margin, that might very well be true. I can see that scenario. There are also other considerations. I know we have questions that arise with regard to, well, if you put an explicit risk margin there maybe the Internal Revenue Service is going to see it and say, "That really doesn't need to be there." So therefore you have that discussion in terms of -- from an actuarial standpoint you might very well feel that that is an appropriate margin, but clearly it does have some implications where it might be difficult to explain or justify from that standpoint.

Implicit risk margins may be a little easier to deal with in terms of the selection, as I said, of link ratios or something of that nature, in terms of tail factors as far as developing your full value reserve, how you select the payment pattern, whether you speed up the payment pattern slightly and therefore have less of a discount in the reserve and also, of course, in the selection of your overall interest rate or rate of investment return where either one is going to use a risk-free market rate or you could make some adjustment to the portfolio rate, certainly, because of the investment risk.

So probably justification might be easier in many regards in an implicit way, but I don't think that necessarily precludes in all situations the inclusion of an explicit margin.

QUESTION: I think either in the Academy standards for life actuaries or perhaps in the accounting literature there is reference to the risk margin. If you have an explicit margin as a contingency reserve, how is it treated for tax purposes? Is this margin removed?

MR. REISKYTL: Is your question regarding life reserves?

(Inaudible)

MR. REISKYTL: For tax purposes the Federal Income Tax Code defines the mortality table or the morbidity table as that mandated by at least twenty-six states. The table, of course, does include some margins.

If you are talking about the MSVR -- the mandatory securities valuation reserve -- it is not a tax deductible reserve.

QUESTION: Does that go on the financial statement? What about the valuation actuary requirements?

MR. REISKYTL: Yes, there has been a lot of work on valuation actuary concepts. The actuary may conclude that the company must hold larger reserves than minimum reserves for statutory purposes but these additional reserves at the current time are not recognized for Federal Income Tax purposes.

MR. FABER: Time is really, up, but I will take one more question.

QUESTION: Has there been any communication with the NAIC in regard to rules regarding loss risk stopping?

ANSWER: You mean in terms of the development of the standard?

QUESTION: Right.

ANSWER: No, not to this point, but when it is actually released as an exposure draft there will be some members of the NAIC, the insurance commissioners' departments, that will, of course, review it and offer comment -- I hope offer comment -- during exposure for consideration before it is actually finalized.

We felt we need to get the exposure draft, be comfortable with an exposure draft approved by the Actuarial Standards Board, released at this point in time and then have the public comment come in.

MR. REISKYTL: If I might make one last plug. I realize you haven't read this. I don't read all the booklets that come out of the Academy either, but as you may be doing something that is required by law, by regulation or now by the standards board, just keep in mind that there is such a thing as qualification standards. No one is going to come to check up on you now. You don't have to have anything in your file, but after you have given a public opinion you may be called upon to demonstrate that you were qualified to do so. Be prepared! Read it now so you'll be ready.

MR. FABER: I think we need to stop there. We are about five or six minutes over our time. Thank you all for attending.

ACTUARIAL STANDARD OF PRACTICE

DISCOUNTING OF PROPERTY AND CASUALTY LOSS AND LOSS ADJUSTMENT EXPENSE RESERVES

PREAMBLE

STANDARD OF PRACTICE

2.6 INVESTMENT RISK - UNCERTAINTY SURROUNDING THE REALIZATION OF A SPECIFIED INVESTMENT INCOME STREAM. ELEMENTS INCLUDE DEFAULT RISK, REINVESTMENT RISK, AND UNCERTAIN INVESTMENT LIQUIDITY.

2.11 RISK MARGIN - AN AMOUNT BY WHICH A SELECTED ESTIMATE DIFFERS FROM A CENTRAL ESTIMATE TO COMPENSATE FOR THE UNCERTAINTY IN THE ESTIMATION PROCESS.

5.3 RATES OF INVESTMENT RETURN FOR DISCOUNTING - A DISCOUNTED RESERVE MAY BE USED IN A VARIETY OF CONTEXTS, AND THE APPROPRIATE RATE OF INVESTMENT RETURN IS A FUNCTION OF THE CONTEXT.

5.3.1 INVESTMENT RISK - THE INVESTMENT INCOME RATE(S) SHOULD BE CONSISTENT WITH ASSETS HAVING LOW INVESTMENT RISK TO MINIMIZE THE UNCERTAINTY INHERENT IN THE INVESTMENT PROCESS. THE SELECTED RATE(S) MAY BE BASED ON HYPOTHETICAL ASSETS, OR MAY BE RELATED TO THE INSURER'S INVESTMENT PORTFOLIO.....

5.3.2 ASSET VALUATION BASIS - IF THE DISCOUNTED RESERVE IS USED IN A CONTEXT WHICH INCLUDES THE REPORTING OF ASSETS, THE RATE(S) USED IN DISCOUNTING SHOULD BE CONSISTENT WITH THE BASIS USED IN VALUING THE ASSETS. IF ASSETS ARE NOT VALUED, OR ASSETS ARE INCLUDED AT MARKET VALUE, A MARKET INTEREST RATE(S) IS(ARE) APPROPRIATE.

5.3.5 RISK ADJUSTMENT TO THE INVESTMENT INCOME RATE(S) - THE ACTUARY MAY USE AN INVESTMENT INCOME RATE OR RATES LOWER THAN PREVIOUSLY DISCUSSED, AS A MEANS OF INTRODUCING AN EXPLICIT RISK MARGIN.

5.4 RISK MARGINS - A RESERVE ESTIMATE SHOULD TAKE INTO ACCOUNT THE DEGREE OF UNCERTAINTY INHERENT IN THE PROJECTION..... MORE RISK MARGIN IS NEEDED IN A DISCOUNTED RESERVE THAN IN A FULL-VALUE RESERVE.

5.4.1 PROVISION FOR UNCERTAINTY - THE ACTUARY SHOULD

INCLUDE AN APPROPRIATE PROVISION FOR UNCERTAINTY

IN THE DETERMINATION OF THE DISCOUNTED RESERVE,

GIVING CONSIDERATION TO THE INCREASE IN UNCERTAINTY

ASSOCIATED WITH THE DISCOUNTING CALCULATION.....

5.4.2 IMPLICT AND EXPLICIT MARGINS - IMPLICIT MARGINS MAY BE INTRODUCED AT ONE OR MORE STEPS IN THE DISCOUNTING PROCESS, INCLUDING THE ESTIMATION OF THE FULL-VALUE RESERVE AND THE SELECTION OF THE PAYMENT PATTERN FROM A RANGE OF REASONABLE ESTIMATES. EXPLICIT MARGINS MAY BE ADDED AS AN ABSOLUTE AMOUNT, AND/OR THROUGH AN EXPLICIT ADJUSTMENT TO THE INVESTMENT INCOME RATE(S).

1989 CASUALTY LOSS RESERVE SEMINAR

4C-2: WORDING LOSS RESERVE OPINIONS

Moderator & Panelist

Michael A. McMurray
Milliman & Robertson

Panel

Neil A. Bethel
Tillinghast/Towers Perrin

MR. McMURRAY: Welcome to session 4C-2, Wording of Loss Reserve Opinions. Your panelists for today are Neil Bethel from Tillinghast and myself, Mike McMurray, from Milliman and Robertson. Our ever-faithful recorder is Julie Perrine from Milliman and Robertson.

The session today is, as you guessed, on wording of loss reserve opinions. The primary reason that Neil and I are your panelists today is our membership on the Reserve Committee of the CAS.

What we are going to try to do today is give you an update of the status of loss reserve opinions as they now stand and also give you an idea of the direction that the loss reserve opinions may go in the future.

Neil will start out by giving you an overview of how we got to where we are and the key issues surrounding the current reserve opinions. I will follow Neil with an example of one direction we may go on changing the reserve opinions.

A couple of things -- logistics. If you have any questions at any time go ahead, try to interrupt us with them. Don't wait until the end of the session. We may not take them, but go ahead and try it.

Also, please keep in mind that all of the opinions expressed here are personal in nature and do not necessarily reflect the opinions or philosophies of the American Academy of Actuaries or the Casualty Actuarial Society.

With that, I would like to hand it over to Neil.

MR. BETHEL: Thanks, Mike. The discussion within the NAIC regarding property/casualty loss reserve opinions began back in 1978 and some guidelines were adopted in about 1980.

There were two precedents that they were looking at at the time. ERISA required that an enrolled actuary sign off on pension valuations -- that was in 1974. The NAIC had adopted a statement of opinion on the life and A&H blank in 1975.

In preparation for this panel I looked through some old American Academy journals to try to get a flavor for what the debate was like when loss reserve opinions were being considered.

It is interesting that it appears that the proposed wording was set very early in the game. Most of the debate was about who could sign, but very little about what it would say.

There was a long debate over whether accountants could sign, whether actuaries could sign, whether you needed to be independent, how much it was going to cost, whether there were enough actuaries to go around.

The decision was finally to allow members of the American Academy and qualified loss reserve specialists. In California, interestingly, I think, more than half the statements are signed by non-actuaries.

While the wording was generally set early, there was at one point a proposal on the table that loss reserves in order to be certified had to be set at the ninety percent confidence interval. Even the actuaries asked that that be taken out, basically because they said

they didn't know how to do it, and that might be relevant to something -- some of the areas that Mike is going to talk about later.

So let's briefly review the current requirements. We have got a list (Exhibit 1) here of the states that are currently requiring some kind of actuarial statement. Each state is free to choose whether to have a requirement or not. This list shows about nineteen states. I have got another list that shows about twenty-four. I am not sure which one is actually accurate. The years are the year of the latest regulation requiring a statement.

Now, in most cases these states are requiring statements for domestic companies only, but there are several with just special situations. Sometimes they don't even want a copy if somebody else files, some other state requires it. Sometimes they want a statement only if there is discounting.

Seven states specifically require a member of the American Academy or another actuarial designation, and the rest just say "qualified loss reserve specialist." The due dates range from March 1 to June 30. I don't know how that happened.

Let's take a real quick look at the standard language and then we can talk about some variations from that.

(Exhibit 2, Page 1)

The first paragraph identifies the signer and indicates his relationship to the company. I think this is there essentially as a substitute for requirement for independence. You at least know if he works there, works for that company or is a consultant. Naturally Mike and I decided to use the consultant wording on our example.

You notice that you are signing as an individual. Dick Roth from the California Insurance Department is on the committee with Mike and I. He really brought home to me in a way that you really are signing as an individual.

Dick keeps a chart that shows each company and who signed for it and then he pulls best data to show what has happened to their reserves since them. You can look back and see that statement you signed back in 1984 and what has happened on what you signed off on.

He finds it very interesting. In fact, he says that certain actuaries act as his informal early warning test. He knows the company is in trouble when a certain individual is asked to sign.

The second paragraph is the scope section, which reserves are being reviewed. The next section is going to show what amounts are being signed off on. Most of these areas of the statement are not particularly controversial and aren't changed all that often, either.

(Exhibit 2, Page 2)

These next two are alternatives in the wording of who basically prepared the data that you relied on. I think the intent of the first version is that you somehow have looked closer at the information than if you relied more on the company to prepare -perhaps even to prepare some projections.

I don't really see the difference. I mean, none of us are really looking at transaction level data. You are always looking at a summary prepared by somebody, but both of these versions are suggested in the instructions.

We almost always use the second one. In fact, we like to name the guy that gave us the data so that somebody else is on the hook.

(Exhibit 2, Page 3)

We finally get to the nitty gritty here, the four basic parts to the opinion statement. The first part is computed in accordance with accepted loss reserving standards and so on; part two, factors relevant to policy provisions; part three, meet the requirements of the insurance law; and part four, make good and sufficient provision.

The first two are generally not too controversial and are not changed all that often. The third one is kind of interesting. I mean, the requirements in the insurance law are not all that stringent with regard to reserves and not all that specific, but Mike and I were talking about this and saying, well, what do you do about the Schedule F penalty? Is that part of the reserve you are looking at or not? What do you do if the company does not handle salvage and subrogation quite in the technical way that the statement requires it? I know that there are several companies I have looked at that just credit sal/sub in the payments and you never see it separately. So there is some question in item three.

Then item four is frequently changed if there is going to be a qualification of some sort. We will talk about that a little bit later.

QUESTION: Could you comment a little bit on (inaudible) How can you be sure that this statement really makes a whole lot of sense? It doesn't really mean anything in the first place.

ANSWER: Well, I think you could see that you would obviously make a distinction between claims -- made and occurrence, for example, very big differences, and differences that are normally tracked, but I would say people don't very often dig very deep.

QUESTION: You're talking about factors relevant to policy provisions?

(Inaudible -- simultaneous discussion)

ANSWER: I think we hope that somewhere in the discussion with the underwriters and the claims people and everything else that somebody says, "Oh, by the way, that coverage isn't in there anymore." In terms of real detailed examination, no, we probably don't.

QUESTION: I would like to go back to the non-controversial item 1.

ANSWER: Cut the audience Mike.
(Laughter)

QUESTION:

I guess I wonder what fairly stated means. That if it means what I think it means, then why have item four or item three, or item two for that matter?

ANSWER: I don't know, I don't know. I have never seen anybody leave it out.

QUESTION: (Inaudible-- simultaneous discussion)

ANSWER: I guess I have always taken "fairly stated" to mean that if I went too high in the other direction I would feel bad about that. There is some cap at the top end.

QUESTION: Well, as an example, does it mean if you are looking -- signing off on the total loss reserves, does it mean "fairly stated" by accident year if you look at Schedule P?

Mr. McMURRAY: First of all, the opinion is on lines.

In a way I think one and four are circular in that number one kind of brings into play principles, and then number four is, well, if you have done number one right then theoretically you have got something that is somewhat close to what is adequate, but when you look at item one it really does not address adequacy so much as whether you have done it in a reasonable way.

If you look at the American Academy interpretation, you see "good and sufficient" is really not well defined at all.

Mr. BETHEL: Well, we didn't anticipate that one. Okay, let me put up now some items that through Mike and I putting our heads together we came up with a list of either things we do or things we have seen that we don't consider to be qualifications but caveats. (Exhibit 4)

The first one just says that we haven't looked at the assets and haven't looked at the maturity matching. In fact, there are at least a couple of states where because of discounting they want you to look at the assets and look at the maturity matching, so we put this in the normal case, but there are times when you have to look at that.

Secondly, that there is no special provision or special review of the reinsurance and the collectibility of that reinsurance.

Third, that the booked reserves are not precisely your best estimate, but are still close enough to be reasonable. As Mike put on this slide, defining what is reasonable is an open issue and it may be a firm-specific standard that you set up, but I doubt very much it is a profession specific standard and certainly all of the practitioners in this wouldn't agree.

Nonreviewed lines that you deem are not material based primarily -- probably looking at what they have booked for them, and hopefully some feel for whether that thing can be off by a factor of five, but there would be a disclosure probably of things that you had not looked at.

Finally, if discounting is involved, to give them a discount rate and give them the effect of the discounting and the amount of the discount.

QUESTION: (inaudible)

ANSWER: Well, I think what we are saying is that -- I mean, the first two, for example, I can tell you that Tillinghast as a rule almost always puts those in where they apply, where people have assets.

I don't know. It's like a caveat is really what that is, but it is considered just part of our standard language at this point.

QUESTION: It's full disclosure.

ANSWER: Full disclosure -- I think there is -- and Mike will get into this in a little bit, perhaps -- there is a concern that there is a broader audience for these things than just the regulators and the feeling that you need to let the users of this know what it does and does not involve and what you have and haven't done, because they are not looking at your report -hopefully there is a report back there somewhere -- they are just looking at this two-page document. The feeling is that these points are important enough where they apply that they should be in there to warn the user. Yes?

QUESTION: On a discussion of this, on Exhibit 4, as to why we have those four items specifically listed. Isn't it part of the answer now that the states require that just those particular points be addressed? Doesn't the New Jersey statute say that you have to certify that one, two, three, four meet policy provisions and if you are going to not include that wording then don't you in fact have to say it doesn't include the following?

ANSWER: Yes, there are certain states who are going to specify the wording, as well, that is right, but there are a lot of states where you have a fair degree of freedom to interpret those instructions to the annual statement just as they read, but I think people tend to stick to those statements in general.

QUESTION: One caveat I have seen is the caveat that refers to the fact that a statement is only intended for regulatory use and not for any other use.

ANSWER: Yes. We have tended to put that in transmittal letters, saying "Here is your opinion and here is what we think you are going to do with it. We wish that you would only do that with it and not anything else." We have not put that directly in the statement, but it will probably migrate there.

We have got another list of things that we consider to really be qualifications where we are less certain about what we are signing off on, and I think this is in the instructions, as well. (Exhibits 5)

A disclosure where you have to rely heavily on outside data sources -- you have got a new company, you have got a twentyyear tail on something and only ten years of data, and so you would make some reference to the outside data that you are using and the uncertainty that that brings, a discussion of significant data limitations, and there is some judgment here.

If you could only get workers' comp in a lump instead of indemnity and medical, would you feel the need to disclose it? If you couldn't get C&P split between liability and property, would you disclose that? I think there, you know, if all I gave you was paid data you would probably say something, but there are definitely some considerations.

O.K., You have some lines that you did not review, but you are less certain that they are truly not material, so you would disclose that you were not able to look at them the way you wanted to look at them.

The booked reserves vary materially from the reserve specialist's best estimate -- the ultimate qualification. Now, here the range of responses really depends on how big the difference is and what is that standard. Clearly, if a twenty percent difference between your point estimate and the company's carried is too much and one percent difference is probably not material, but you might be looking at the percent difference in the reserve

or you might be looking at that difference expressed as a percent of surplus, as well. You may have a series of standards that you apply.

I think Mike's discussion will carry us a little bit further, because this is one of the limitations of the process under which we are operating now with these statements.

Finally, one that we haven't used but I like it, and that is that essentially the potential fluctuations in the reserve are quite large relative to surplus. In other words, you are explicitly making a statement about the fact that you are not making a statement about how adequate the surplus is under the situation. I like that.

Now, this is not an exhaustive list of special situations, obviously. You may have some to add. We would be glad to hear those.

I think, in summary, based on some limited discussions with regulators I have the feeling that right now the statements of opinion are not really used as leading indicators of some problem. I think they receive them, they file them away, they make sure that they have got one for each, and then they kind of go back to them when something else points them at that company.

I think Mike's discussion will touch on whether there might be a different way to word these such that they would become more informational rather than a black-and-white or the colors of your choice.

MR. McMURRAY: Thank you, Neil. What I want to go over with you first is the current survey being undertaken by the American Academy of Actuaries regarding the use of statements of opinion for companies that have gone under.

In early August of this year the Committee on Property and Casualty Insurance Company Financial Reporting -- I think I got it right -- anyway, sent out a survey to all of the states and most chief examiners essentially asking how they used or interpreted the statements of opinion that had been issued for companies that had gone bankrupt, the idea being, was the statement of opinion of any help or not, and if it was not of any help, how might the statement of opinion have been changed.

The focus is obviously just on the insolvent companies in which they were looking in kind of a negative way at what the reserve opinions might have done or not done, but in any event it gives us some idea of how the regulators are using the reserve opinions.

That survey, which should be completed roughly September 30, has two phases. The first phase is to compile historical information on statements of opinion issued for insolvent companies. The questionnaire, (Exhibit 6, Page 2) which is very simple to fill out, has questions like, was a statement issued, was the NAIC standard language used, did the statement indicate a reserve deficiency -- in other words, did the statement give you or could it have given you some early warning -- and was the signer a member of the American Academy or CAS. There was also a question regarding the examiner's familiarity with the disciplinary process of the American Academy.

There was a question on was the signer an employee of the company or an outside consultant. The key question is, what was in the examiner's mind the principal cause of the insolvency. Again, given that under-reserving was viewed to be the principal cause, could the statement of opinion have been used as an early warning system or did it give you a misreading on the company's reserve situation.

(Exhibit 6, Page 3)

The second part of the survey asked for narrative comments from the examiners, essentially getting their thoughts on how much they used or relied on the statements of opinion, whether they thought there was any significance as to the employer of the signer. It also asked them for suggestions for better differentiation between clean, qualified, and no-opinion statements. I will get into this a little bit more.

Finally, there is a question asking, do you think that the oneor two-page statement is adequate or do you need a full actuarial report to properly evaluate or understand the company's reserve position.

Now, there is a subcommittee of the Financial Reporting Committee that is already giving some thought to where they think the direction should go in terms of making these statements of opinion more usable. (Exhibit 7)

They have come up with a couple very preliminary ideas. We will have the opportunity to give you an early warning of what they might be, and we encourage you to write and, in fact, Alan Kaufman is a good guy to write to if you have any questions or comments regarding this initial thinking.

Again, this does not represent the thinking of the entire Committee on Financial Reporting, nor does it reflect some of the technical issues that the CAS Loss Reserve Committee are going to have to get into, but it gives you an idea of what is being thought about.

Currently you have either a yes or no statement, is it qualified or not qualified. If you know the statements well enough you might be able to figure out that there are degrees of difference, but it is not clear to a lot of regulators how to interpret an opinion.

There is no real standard manner for reserve specialists to point out that a company may need some sort of additional monitoring or maybe some other action short of conservation.

So what the subcommittee of the Financial Reporting Committee has done is to come up with some ideas on how yellow light situations could be identified.

Warren, did you have a question?

QUESTION: No. I am reserving my question for the end of the session.

ANSWER: Okay. Possible yellow light criteria for reserve evaluations.

(Exhibit 8, Page 1)

ABC is a new insurance company. More than X percent of the reserve estimate is based on data from outside data sources. This adds to the uncertainty. Again, these would be statements that you would add to an otherwise -- if you didn't exceed X in any of these cases you would not throw this in, but if your statement did exceed X or if in your estimate the reserve situation did exceed X, then you would add these statements, therefore making it a clear identifier to the regulator that additional monitoring may be necessary.

The first one, if you can measure X, doesn't look all that bad. The next item, loss reserve data base is limited. This gets into where maybe you are working with aggregate data. Maybe you are working with annual statement data, but you don't think it is enough but the company hasn't compiled it. Here is where you would state your concerns about the level of data available.

Number three, reasonable range of reserve estimates is X percent of the reserves. This item is near and dear to the hearts of Neil and myself, since the Reserve Committee of the CAS is charged with providing technical input to something like this.

At this point I think most of you will agree that there is no consensus as to how to determine what a reasonable range is.

By the way, this recommendation came about from somebody else, as well, a recommendation coming from the accounting community. It was unknown to the Subcommittee on Financial Reporting, the same sort of recommendation coming up.

Finally, "The company reserve or payment systems have changed so that more than X percent of the reserve estimate is based on methods involving adjusted paid or adjusted incurred reserve techniques." Here is essentially where you are doing things like adjusting for claim disposal rate changes over time. In any event, you would have to give your best shot in terms of determining how much your reserve estimate is due to this. Yes?

QUESTION: Suddenly I am confused. All four of these wordings appear to imply that it is somehow the actuary's best estimate that is on the balance sheet and that is hardly, if ever, the case. Do you see what I am saying?

ANSWER: Yes, I understand. Here is where we get into where your best -- I think this is getting into the process itself, where you are opining on whether the reserve was consistent with loss reserving principles.

If you don't believe that the process -- well, here you are opining on the process rather than the number itself.

QUESTION: Theirs or mine?

ANSWER: It would be theirs if you didn't do your own evaluation.

QUESTION: If I did my own evaluation?

ANSWER: If you did your own evaluation and you came up with essentially the same number, then I think these numbers would still apply as long as you were fairly close. I mean, if you were not close then you have got a different caveat to worry about.

QUESTION: (inaudible) You don't necessarily disagree with that, but given that the number on the page is okay. Do you spell out what they have done?

ANSWER: Yes, I think that is essentially it. Now, if you don't agree with what they have done then you have got a different caveat to worry about. If you just don't believe it.

QUESTION: What if its possible you are absolutely (inaudible)

ANSWER: Then you have got two caveats to worry about, the reasonable range and the fourth one. Actually, I can't imagine the fourth one without the third, or the third without the fourth.

(Exhibit 8, Page 2)

There are a couple of other things that -- I will just throw them out there and not really get into them.

They involve greater disclosure of involuntary pulled reserves, disclosure of the level of per-claim retention as a percent of reserves of surplus, how much of a hit you can take under your retention on a single incident, and further disclosure of the ceded liability with appropriate commentary on the amounts. Again, this kind of ties in to the recoverability issue.

Anyway, this is the direction that one part of our profession appears to be going. Again, the impetus for the setting up numeric amounts as a benchmark is coming from more than just our profession. Whether or not we will have the technical tools to allow us to fill in those benchmarks we don't know, but in any event it is something we are probably going to have to deal with in the near future.

Any questions? Yes?

QUESTION: Should the Academy (inaudible) be lobbying for something like that? If regulators require financial statements to the facts and if the GAAP statements have notes that this is in fact, how come we are submitting two pages that say we agree when we don't? Wouldn't we be better off lobbying for certain things that should go in the report with the opinion. I am not sure what those things are, like if the company has environmental reserve problems or they are in court (asbestosis) or the company's growth has grown this much is a standard piece of information that must go in to a statement of opinion.

ANSWER: I can tell you, the Committee on Reserves has discussed that at great length. I can give you a personal opinion. I think you are absolutely right. I feel very uncomfortable issuing a two-page opinion on something that is so complex and so easily misused or misinterpreted as an evaluation of reserves.

MR. BETHEL: Are you talking about something other than an actuarial report.

QUESTION: I don't mind submitting an actuarial report meant for use as a statement but I have a couple of problems with that. One, if it is not mandatory not everybody will do it and then you are going to be (inaudible) The other problem is that actuarial reports are all different and we might be able to score some points with certain regulators better if we developed some new standards that were maybe not quite as comprehensive in the actuarial work, but there is still some of that for every company or for every kind of company. You can have the actuarial report, too but I don't think the regulators have time to read every report.

ANSWER: Well, Dick Roth specifically mentioned in our committee that he wants a report there, he wants to be able to dig into it later and find, in fact, that there was a report prepared at the time.

QUESTION: (inaudible)

ANSWER: I think he finds it probably with most consulting assignments, that there probably is a report, and then the question is would the company put together a package that was basically put together at the time that would serve the same function.

QUESTION: I wonder if part of that might be addressed by the new documentation standards?

ANSWER: That is really a good point. It is going to be difficult to sign a statement of opinion and still -- in my view it is going to be difficult to sign a statement of opinion and still fully comply with the disclosure document, disclosure standards, unless somehow you reference a report. You might be able to get your way out of that, but in any event it seems that it is going to be very difficult for somebody who is a member of the American Academy to sign a statement of opinion without having a report that you can show that you have disclosed what you are supposed to disclose.

QUESTION: The requirement is that another actuary practicing in the same field will be able to understand what that reserve estimate is based upon.

ANSWER: But if somebody has given you regulatory language, I mean, you have a certain framework that you are operating in, I think you can reference the existence of the report if you decide as an individual or whatever that that is something you have to do to comply, but I don't think -- you can't force a hundred pages on somebody. I have tried.

QUESTION: That was my point before. I'm not sure what a hundred pages means to a regulator or to anybody else. It is not a very accurate report if it is a hundred pages. Some people may do in three pages what others need a hundred pages for.

ANSWER: You could almost say, if you give a person two pages they are going to say certain things and if you give them ten pages they are going to say certain things and if you give them a hundred pages they are going to say more.

QUESTION: The SEC has got a pretty reasonably thing on that when you talk about loss reserves it's not a step beyond that?

ANSWER: Except for the obvious exposure that goes into an SEC document, I otherwise feel more comfortable with the level of information I am passing on.

If you have to sign a two-page document on a reinsurance company that has been in and out of the market and all different types of markets, what can you really say in two pages?

It isn't necessarily that you have to give them a qualified opinion, but there is so much you have got to say to disclose accurately the situation.

Anything else? Thank you very much.

States Requiring Reserve Statements of Opinion for the 1988 Fire & Casualty Blank Reserve

California	(1981)	New Jersey	(1985)
Delaware	(1987)	New York	(1980)
Florida	(1985)	North Carolina	
Hawaii		Ohio	
Illinois	(1980)	Oklahoma	
Kansas	(1981)	Pennsylvania	
Maryland		Texas	(1987)
Massachusetts	(1988)	Washington	(1985)
Minnesota	(1988)	Wisconsin	
Nebraska	(1985)		

Key Excerpts From the NAIC Opinion Prototype

* *"I, (name and title of consultant), am associated with the firm of (name of firm). I am a member of the American Academy of Actuaries and have been retained by the (name of insurer) with regard to loss and loss adjustment expense reserves."*

* *"I have examined the assumptions and methods used in determining reserves listed below, as shown in the Annual Statement of the company as prepared for filing with state regulatory officials, as of December 31, 19__."*

  The paragraph should list those items and amounts with respect to which the specialist is expressing an opinion. The list should include but not necessarily be limited to:

  (i) Reserve for unpaid losses (Page 3, Item 1)

  (ii) Reserve for unpaid loss adjustment expenses (Page 3, Item 2).

Key Excerpts From the NAIC Opinion Prototype

* *"My examination included such review of the assumptions and methods used and of the underlying basic records and/or summaries and such tests and calculations as I considered necessary."*

* *"I relied upon underlying records and/or summaries prepared by the responsible officers or employees of the company or group to which it belongs. In other respects, my examination included such review of the assumptions and methods used and such tests of the calculations as I considered necessary."*

Key Excerpts From the NAIC Opinion Prototype

* *"In my opinion, the amounts carried in the balance sheet on account of the items identified above*
  (i) are computed in accordance with accepted loss reserving standards and are fairly stated in accordance with sound loss reserving principles.
  (ii) are based on factors relevant to policy provisions.
  (iii) meet the requirements of the insurance laws of (state of domicile).
  (iv) make good and sufficient provision for all unpaid loss and loss expense obligations of the Company under the terms of its policies and agreements."

* *"A material change in assumptions (and/or methods) was made during the past year, but such change accords with accepted loss reserving standards."*

  A brief description of the change should follow.

Frequently Used "Clean" Opinion Caveats

* Assets have not been evaluated as to:
  (1) Existence
  (2) Liquidity

* Contingent liability may exist to the extent that reinsurance is not recoverable

* Company's booked reserves vary from the reserve specialist's best estimate, but are still reasonable
  Unanswered question:
  "What is the standard for a reasonable difference?"

* Non-reviewed lines that have no material impact

* Disclosure of discount rate and amount where discounting is permitted

Special Situation Opinion Caveats

* Heavy reliance on outside data sources
  (1) New company problem
  (2) Long-tail lines problem

* Data limitations discussion
  (1) Incomplete historical records
  (2) Line or sub-line of business experience not available

* Non-reviewed lines with potential material impact
  (1) Reinsurance pools
  (2) Long-tail involuntary business

* Company's booked reserves vary materially from the reserve specialist's best estimate

* Adequacy of policyholders' surplus to support reserve fluctuations has not been reviewed

Academy Survey of Casualty Loss Reserve Opinions

OBJECTIVE: Evaluate effectiveness in the solvency regulation process of current casualty loss reserve opinions as adopted by NAIC

PARTICIPANTS: Insurance department financial examiners

Academy Survey of Casualty Loss Reserve Opinions

SCOPE OF SURVEY:

Phase 1- Compile historical information on statements of opinion issued for insolvent companies.

Examples:

(1) Was a statement issued?
(2) Was NAIC statement language used?
(3) Did the statement(s) indicate a reserve deficiency?
(4) Was the signer a member of AAA or CAS?
(5) Was the signer an employee of the company?
(6) What was the principal cause of the insolvency?

Academy Survey of Casualty Loss Reserve Opinions

Phase 2- Receive narrative comments from the examiners regarding the loss reserve opinions.

Topics for comment:

(1) Degree of reliance on opinions

(2) Significance of signer's employer; e.g., company employee vs. consultant

(3) Suggestions for differentiations between clean, qualified, and no opinions

(4) Need for an actuarial report vs. a one- or two-page opinion

Preliminary Thinking On How the AAA Survey Results Could Be Used

Current Situation:

NAIC prototype language results in either favorable or unfavorable reserve opinions; i.e., "green-light" or "red-light" opinions. There is no standard manner in which a reserve specialist can issue an intermediate ("yellow-light") opinion.

Possible Action:

Develop "yellow-light" wording that would be a signal for regulatory monitoring or other action short of conservation.

Possible "Yellow-Light" Criteria For Reserve Opinions

* *"ABC is a new insurance company. More than X% of the reserve estimate is based on data from ... [some external data source]. In my opinion, this data is relevant to the operations of the Company, but the uncertainty of the projections is increased by the use of this external data."*

* *"The loss reserve data base of the Company is limited. More than X% of the reserve is developed from a data base which is limited in the ways described below."*

* *"The reasonable range of reserve estimates is X% of the reserve."*

* *"Company reserve or payment systems have changed so that more than X% of the reserve estimate is based on methods involving adjusted paid or adjusted incurred reserve techniques."*

Possible "Yellow-Light" Criteria For Reserve Opinions

* Disclosure of involuntary pool reserves

* Disclosure of the level of per claim retentions as a percent of reserves or surplus

* Disclosure of ceded liability amounts with appropriate commentary

1989 CASUALTY LOSS RESERVE SEMINAR

4D: CLAIMS MANAGEMENT PERSPECTIVES

Moderator

Michael L. Toothman
Tillinghast/Towers Perrin

Panel

Margaret Wilkinson Tiller
Tiller Consulting Group, Inc.

Michael G. Zipkin
Tillinghast/Towers Perrin

MR. TOOTHMAN: This is Session 4D, Claims Management Perspectives. So, if some of you meant to go somewhere else, now is the right time. My name is Mike Toothman. I'll be moderating and participating in this session.

A couple of housekeeping items first. The entire session will be recorded. So, if you have questions at the end, please use the microphone. We'll ask you to identify yourself and your company affiliation at that time.

Also, we would appreciate it if you'd fill out the evaluation forms at the end of the session and leave them with the representative of the committee as you leave. This is the last session of the day.

Is. Mary Hennesy here? Mary told me that this was the toughest time to have a panel because by 3:30 in the afternoon only half the people are paying attention to you and the other half are having sexual fantasies.

(Laughter.)

MR. TOOTHMAN: So, I'd like to start with a show of hands. How many people are really going to be paying attention during this session? Okay. Now I know what the rest of you will be doing.

We're going to use a different presentation style than what you've had for most sessions. The staging is a little bit different. We're going to present a skit. We don't really have any staging or choreography but we're going to role-play some. In doing that, we'd like to present some concepts regarding the interaction of the claims department with the actuarial function.

The scene of our skit is a company by the name of Professional Reliable. Now, Professional Reliable is a fictitious company. The people are fictitious and the numbers are fictitious, but the types of problems and situations that we're going to talk about are definitely not fictitious.

Now, the background is that Professional Reliable is a company that writes only one line of business, physicians' and surgeons' malpractice. It was formed as a result of the medical malpractice crisis a little over six years ago.

Things apparently have been going very well. The company has been making a lot of money, or at least it thinks so. The president feels very good about the way things have happened. He has the respect of all his colleagues, who are now convinced he knows more about the insurance business than all the people in the insurance industry.

But now we've got a bit of a problem. For the first time, our auditors have expressed some concern about the loss reserves. In fact, they think that we're deficient by $25.5 million, and they've issued a qualified opinion.

We didn't have an opportunity to get a second opinion before they issued their opinion but we've now hired a firm of outside consultants to take a second look at our reserves. We're rather stunned by this situation and we're really hoping that these consultants will be able to prove the auditors wrong.

So let me introduce my cast. I will play the role of the Chief Executive Officer of Professional Reliable. I am a consulting actuary with Tillinghast, a Vice President and Principal in the St. Louis office, Fellow of the Casualty Actuarial Society, and a member

of the American Academy of Actuaries and I have been Vice President of the CAS for the last three years.

Margaret Tiller will play the role of our consulting actuary. Margaret is President of the Tiller Consulting Group, Inc. Margaret is also a Fellow of the CAS and a member of the American Academy of Actuaries. She is also an Associate of the Society of Actuaries. She has her CPCU, her ARM, and she's a Member of the Conference of Actuaries in Public Practice. I don't think there's room for anything else on her business card. Margaret has also co-authored a textbook, The Essentials of Risk Financing.

You'll see we've done a little bit of typecasting with Margaret and also with our third player. That's Michael Zipkin. He'll play the role of a claims consultant. He's a Vice President and Principal with Tilinghast in our Washington, D.C. office, and he is the national head of our claims consulting practice.

With that, let us raise the curtain. I have sent Margaret and Mike some information and some data. They also have the auditor's report. We've not met before, but we've talked on the telephone.

As the first scene opens, Margaret and Mike are arriving in my office to present me with the results of their analysis and we're meeting for the first time.

Good afternoon, Mike and Margaret. I'm really glad you could come this afternoon and I'm very much looking forward to the results of your analysis. As we discussed on the telephone, I'm still in a state of shock about the numbers the auditors have given us and I'm really glad you're here. I'm looking forward to reducing these numbers quite a bit.

MS. TILLER: We will take a second look, Mike. I can't guarantee that we will reduce them, however.

Let's start by reviewing the auditor's analysis. As you know, you're holding no IBNR reserve.

(Laughter.)

MR. TOOTHMAN: In fact, Margaret, you know we only write physicians' and surgeons' insurance and it's on a claims-made basis, and we've got a really tight policy form with a quick reporting provision that's been reviewed by some of the best attorneys in the country. By definition, there's no IBNR for claims-made insurance.

MS. TILLER: There are two components to IBNR. There's the reserve for reported claims and there's case reserve development. We'll get into that in more detail later.

The immediate point is that you're holding nothing and the auditors think you should hold $25.5 million. (Slide 1)

MR. TOOTHMAN: I'm sure you'll come to a different conclusion.

MS. TILLER: This is your data (Slide 2). We have report years going down the left-hand side of the page, your earned premium next, and then the losses that have been reported at various points in time. Now, reported losses equal payments plus case reserves. So, for example, for the first report year at 12 months, there was $5 million of reported losses; at 24 months, $7 million; 36 months, $8.4 million; et cetera.

Now, the first step in the auditor's analysis was to look at the report-to-report ratios. (Slide 3) You'll notice, if you look at the last two diagonals, there's been a change in the pattern. The auditors didn't seem to think that was particularly significant, so they selected development factors based on the arithmetic averages of the numbers in each column. They also made the assumption that after 72 months there would be no additional development, based on industry data.

MR. TOOTHMAN: Margaret, I don't want to interrupt you very much, but before we go very much further, you mentioned industry data. As we discussed on the telephone, the reason we started this company is because we don't think the insurance industry really is doing things very well and we think we can do things a lot better. We've hired some of the best claims people. As we get on in the discussion, I think that you'll see that using industry data may not be a real good idea. We think we've got reserve redundancy.

MS. TILLER: Let's continue. What we want to try to do is to square the triangle. (Slide 4) In the example that we're showing you, which is the auditor's analysis, the auditors have assumed that there is no development after 72 months. Normally, in fact, what you want to do is fill in the bottom part of the triangle and go as far into the future as you need to go for the numbers to reach their ultimate level.

Well, how do we get the ultimate level? (Slide 5) What the auditors did was to multiply the reported losses at the last evaluation date, the ones on the last diagonal, by the cumulative loss development factors to get the estimated ultimate value. The auditors then subtracted the reported losses from the estimated ultimate values to come up with an IBNR of $25.5 million.

MR. TOOTHMAN: It doesn't make much sense, does it?

(Laughter.)

MR. TOOTHMAN: Crazy.

MS. TILLER: Well, there are other approaches.

MR. TOOTHMAN: Good.

MS. TILLER: The auditor's analysis does not reflect the pertinent fact that you changed your retention from $100,000 to $250,000 in policy year five.

MR. TOOTHMAN: I'm glad you picked up on that Margaret. You know, we were just convinced that this business was so profitable that we decided to keep more of it for ourselves.

(Laughter.)

MR. TOOTHMAN: So that's why we did that.

MS. TILLER: Well, we're not going to argue right now about whether or not you're making money. Let's continue to reflect some of these additional items.

Normally a higher retention means that it takes longer for reported losses to reach their ultimate value. So, we increased the loss development factors for policy years five and six to reflect the change in retention. (Slide 6) By going through the same process of

multiplication and subtracting reported losses from the ultimate value, we come up with a $30.9 million IBNR estimate.

MR. TOOTHMAN: That's going in the wrong direction, Margaret. I hired you to come in and reduce this number. That's why I called you and sent you this information.

MS. TILLER: You hired us to give you a second opinion and we're trying to give you our best opinion, even if you don't like it.

MR. TOOTHMAN: You're giving me the wrong opinion, Margaret.

MS. TILLER: One problem with the loss development analysis is the impact of large development factors on unusually large claims. Because you changed your retention in policy years 5 and 6, it's possible that there are some large claims that are being overly developed using this method.

MR. TOOTHMAN: I hope so.

MS. TILLER: So, we're going to look at a different method. It is called the Bornhuetter-Ferguson method. (Slide 7) In this method we developed the IBNR reserve based on expected losses and the percent of those losses that we think is unreported. To get the expected losses, we looked at earned premium. We multiplied that by an expected loss ratio of 1.05. Now, your rates are discounted for anticipated investment income.

MR. TOOTHMAN: Explain something to me because I want to make sure I understand what you're doing. It looks to me like you're starting with an assumption that already presumes that we're going to lose money.

MS. TILLER: No. Because your rates are discounted you are earning money on those reserves and you are anticipating that in your rates. This, in fact, is your break-even loss ratio on an undiscounted basis.

MR. TOOTHMAN: You're saying this makes sense even given the way we are pricing our business?

MS. TILLER: Yes.

MR. TOOTHMAN: Even on the presumption that our pricing is adequate?

MS. TILLER: Yes.

MR. TOOTHMAN: Okay.

MS. TILLER: So, we multiply by the 1.05 loss ratio to get our expected losses. We developed the reporting pattern from the development triangle that we saw earlier. We multiplied the expected losses and unreported percentages together to get IBNR. So now we're down from $30.9 million to $22.3 million.

MR. TOOTHMAN: That's better, Margaret. We need to find a few more things to do, but at least we're going in the right direction now. What did you call this technique again?

MS. TILLER: Bornhuetter-Ferguson technique. The estimated ultimate loss ratios for policy years 1 through 4 are a little bit worse than when the development factor method

was used, but the estimated ultimate loss ratios for policy years 5 and 6 definitely are looking better, although they do not look very good.

There is also a problem with using earned premium. We'd prefer to use an exposure base such as number of physicians and surgeons.

MR. TOOTHMAN: We've got that. Will that help you reduce the answer?

MS. TILLER: Well, it will give us a better answer, but I can't promise that it will be lower.

MR. TOOTHMAN: I'll make sure you get it right away, if that will help get us a lower number.

MS. TILLER: We also see some indications that there have been some changes in your claim handling practices, so we asked Mike Zipkin to get involved to determine what happened and the ultimate impact of any changes.

MR. TOOTHMAN: Well, good, Margaret. I follow what you've done and arithmetically I followed what the auditors did too. It seems to me like other than this Bornhuetter-Ferguson thing -- I like that --

(Laughter.)

MR. TOOTHMAN: Other than that, it seems like you've done pretty much the same thing. You've made a few adjustments. but this just seems crazy to me. We've got the best claims people in the business. We've hired the best attorneys. We've got a claims-made form. Well, I did my own study and I want to show you what I came up with. (Slide 8)

We only had 100 cases open at the end of last year and, as of the end of July when I pulled this information, we had closed 50 of those cases already. Those 50 cases had total reserves at the end of last year of $750,000. We closed those cases for $625,000. So we closed half those open cases and we closed them for a 20 percent reserve redundancy. Clearly, the rest of our cases must have that same reserve redundancy. We ought to be getting credit on our financial statements for the higher reserves that we've got, not adding another $25 million. That's crazy.

MR. ZIPKIN: Excuse me a minute. Let me ask a question here. Has this guy paid his fee yet?

MS. TILLER: Yes.

(Laughter.)

MR. TOOTHMAN: I'm going to stop payment on the check.

MR. ZIPKIN: What appears to be a discrepancy between this study that you conducted and what Margaret is saying to you may appear to be a discrepancy that needs to be reconciled, but I would like to say that it probably has more to do with the substantial differences between case-basis reserving, which is what you're talking about, and actuarial reserving, which is what Margaret is talking about.

Let me point out the differences.

MR. TOOTHMAN: I guess I understand case-basis reserving better than I do the actuarial.

MR. ZIPKIN: Yes. But we're talking about an actuarial reserving process here, not a case-basis reserving process. Let me describe it differently. We're talking about the total loss reserving process, of which case-basis reserving is an important component, but it is not the whole thing.

MR. TOOTHMAN: Okay.

MR. ZIPKIN: Let me show you a slide. (Slide 9)

This is an example of one of your cases. It represents the loss reserving process in connection with, or in conjunction with, the investigative process that most cases go through. The left-hand axis or the vertical axis is the dollar value of the cases, whereas the horizontal axis is the passage of time over the approximate three-year life of this case.

The steps that these cases go through are represented by this particular diagram, which shows the accident, the report, the investigation, and the various other steps a case goes through during its life from the time it occurs until the time it is closed.

What you see here is a case with reserves of approximately $115,000. It settles for approximately $105,000.

MR. TOOTHMAN: Just like the ones I showed you.

MR. ZIPKIN: Yes.

MR. TOOTHMAN: We had redundancy in that case, didn't we?

MR. ZIPKIN: Right. Now, this represents a redundancy between what the case is reserved for and what it settles for. But two questions are raised by this particular case.

MR. TOOTHMAN: Okay.

MR. ZIPKIN: The first question is: If the case is going to settle for around $105,000, why is it reserved for about $3,500 in the beginning? Why does it not require a $105,000 reserve in the beginning? Secondly, if the case is in fact worth $115,000, how does it settle for $105,00?

We looked at this file, which is one of your actual cases, and what we found was that, in the first place, it would have been terribly inappropriate for your claim department to put $105,000 or $115,000 on this case in the beginning.

This case involved -- I won't bore you with the details about the injury, and so on -- but it appeared to involve in the beginning some relatively modest injury as a result of very questionable circumstances. Subsequently, however, your claim department learned that this individual claimant or plaintiff was injured a lot more than they thought he was in the beginning. Secondly, your doctor altered the medical records.

(Laughter.)

MR. ZIPKIN: Now, you beg them not to do that, but this particular physician went through his medical records and attempted to straighten them out. He didn't lie or cheat, but it would appear to a jury that he did. Your counsel was very adamant about that particular event, saying that it would appear that your insured physician did in fact change the medical records and inserted comments in those medical records that were inappropriate and had not originally been there.

MR. TOOTHMAN: If we knew all that, why didn't we set a higher reserve initially?

MR. ZIPKIN: The problem is you didn't know that. That's why I say it would have been inappropriate for you to have done that because your case-basis reserving is predicated upon information which is available at the time the reserve is established and they didn't have that information.

MR. TOOTHMAN: I hear people talking about stair-stepping reserves. That's not a good thing, as I understand it. Is that what we're doing?

MR. ZIPKIN: No. Stair-stepping reserves is a much misunderstood activity. Stair-stepping is not when you increase reserves from 5 to 10 to 15 to 25 to 75 to 105 if it's in conjunction, as this case will show, with the investigative development of the case.

Reserve stair-stepping is when a case is clearly worth $115,000 and your claim department puts $5,000 or $10,000 and incrementally increases the reserve to a higher level.

MR. TOOTHMAN: My guys aren't doing that, are they?

MR. ZIPKIN: No, they're not doing that.

MR. TOOTHMAN: Okay. Good.

MR. ZIPKIN: They're not stair-stepping their reserves. They are increasing their reserves in conjunction with the investigative development of the case. We don't call that reserve strengthening. We call that adverse development, and that is what is occurring on your files.

With regard to the redundancy in the reserve, what this case shows as an example, is that a $115,000 reserved case settled for $105,000. What your claim department learned relatively late in the life of this case was, number one, the plaintiff did not want to attend a trial. He didn't show up for depositions and other pretrial discovery activity and they had to be rescheduled.

Secondly, the lawyer representing this particular plaintiff was having trouble locating him and in a couple of instances he couldn't locate him at all. The plaintiff in this case was difficult to contact.

What your claim department did was to reserve the case properly, we think, at $115,000. But because of these later developments it was possible to settle the case for $105,000, thereby showing a redundancy.

MR. TOOTHMAN: Maybe we should have just tried the case and won entirely.

MR. ZIPKIN: Well, you didn't know. It's possible you could have tried the case won it. But it's also possible that a Cook County jury might award $10 million on that file. You just don't know.

MR. TOOTHMAN: Okay.

MR. ZIPKIN: So we think your claim department did a pretty good of settling this particular case.

What this case points out, although my claim colleagues hate to hear me say this, is the real ineptitude of a claim department to establish accurate early reserves through subjective means. That doesn't mean that your claim department is not capable of doing that. It does mean, however, that it's a very difficult task. If you want accurate reserves, you must, in our opinion, establish those reserves actuarially, that is in a statistically valid and somewhat objective manner.

We don't mean that your actuarial reserves are going to be perfect. There is no such thing as perfection when you're projecting ultimate liabilities. But it does mean that the actuarial reserving process is a good deal more statistically valid and more objective than case-basis reserving which is based upon a subjective interpretation of events which haven't occurred yet.

MR. TOOTHMAN: Well, Mike, I appreciate what you're saying, and I think I understand what you're saying. But I guess the bottom line is that if our auditor's numbers are right -- or, if Margaret's numbers are right -- I need $22 million or $25.5 million. We can't handle that much. If that's right, we might as well close up shop.

MS. TILLER: Let's not be hasty. There is some additional information about the claim handling that we'd like to get. Remember, we saw that change in the development factors when we looked at the report-to-report ratios.

MR. TOOTHMAN: Yes, you went over that.

MS. TILLER: Well, why don't we let Mike tell you what he would do in a claim review.

MR. TOOTHMAN: Okay. Anything that can get us out of this pickle would be wonderful.

MR. ZIPKIN: Well, I'm not sure I can extract you from the pickle --

(Laughter.)

MR. ZIPKIN: -- but, at the same time, I can tell you how we would normally proceed in a situation of this kind. (Slide 10) We would conduct a claim review, which would involve interviews with you and your claim management personnel about the manner in which cases are handled and reserved.

We would also look at some of the rules and regulations under which that work is done, the methods and procedures and statistical evidence that you would present to us, all as evidence by claim manual bulletins, memoranda, procedural documentation, and other types of written and verbally stated materials. It's not necessary that you have it in writing, but it is necessary that your people whose judgment is going into these case reserving activities understand what it is you want them to do.

Third, we would conduct a statistical analysis because we are convinced that unless the review has some kind of actuarial significance you're not going to be too interested in anecdotal references to specific cases without some kind of an aggregate implication being involved there. So, we would conduct that kind of a review.

(Slide 11)

What we're looking for in conducting this kind of a review, is evidence of changes in claims handling practices. For example, changes in the law or legislation affecting liability, damages, and so on, are important. I can assure you, for example, that when this state legislatively moved from a contributory negligence to a comparative negligence, it changed your case reserving practices. Now cases that you thought would have no value have a value and need to be reserved for that value.

Jury verdict patterns also reflect higher awards. It is an absolute that your jury verdict awards are a result that is based on outside activity, not necessarily inside activity.

Changes in the procedures, practices and policies for reporting and reserving losses, of course, have to be taken into account. You need to change your case reserving practices to accommodate that kind of activity.

Lastly, changes in personnel workloads and your claims department organization are important because they have an influence on the underlying data that's being evaluated by actuaries such as Margaret. We have to evaluate those.

What needs to be understood is that your claims department may not be aware, because it handles its cases one at a time, of the aggregate influence that these kinds of changes are having on the underlying data that's being evaluated in the actuarial review. So, we have to look at them in order to project what is actually going on.

MR. TOOTHMAN: Mike, I'd be happy to have you look at this. You say you're looking for changes in the way that we've done things. I really can't hold out a lot of hope for you finding very much. We've had the same person running our claims department since we opened our door and he's a fine claims man. He tells me we're doing things the same way now as we have been from the beginning. So, I'm really not sure what you'll find, but I'll tell him that you'd like to do this study. He'll give you the utmost cooperation, I'm sure. It's worth doing if it will help us get a lower number.

MS. TILLER: There are some other items that we'd like to look at as well.

MR. TOOTHMAN: Okay.

MS. TILLER: For example, we think that your allocated expenses -- your attorney's fees, investigative fees, et cetera -- look a little high. We want to be sure that you're paying reasonable costs for reasonable services.

MR. TOOTHMAN: Okay. Anything else you need to look at?

MS. TILLER: No, not that I can think of.

MR. TOOTHMAN: Well, I will tell our claims people that you're going to be doing this study. How long will it take?

MR. ZIPKIN: I would estimate that the study itself would take a couple of weeks. I would very much appreciate it if you would introduce us to your claims department. We will be working with them in a highly interactive and cooperative manner.

MR. TOOTHMAN: Good.

MR. ZIPKIN: We're not going to be conducting an audit in the dark, so to speak, so there will be a lot of light of day to be shed on this kind of a review. We would appreciate it if you would kick it off and that they would know that we're working for you in this regard.

MR. TOOTHMAN: I'll take you down there and introduce you right now and I'll look forward to hearing back from you in a couple of weeks. Thank you.

PAUSE -- NARRATION:

While Mike and Margaret are off doing their analysis, let's just reflect a little bit on the sad state of affairs that this poor CEO finds himself in. He had a very successful medical career. It's time to retire. His colleagues told him how bad the medical malpractice situation was and he also knew that was the case. That may have been one of the reasons he was retiring. The timing was fortunate for his medical career.

They said they wanted to start an insurance company and he was the right guy to run it. He felt good about that. He came in as president of this new insurance company and tried to learn a little bit about the insurance business. Money came in the door and not very much went out the other side. Assets kept piling up. The investment bankers were always pleased to come and help him invest the money. Things seemed to be going really well. He was kind of a legend in his own time with his colleagues.

Now all this seems to be tumbling down around him, or at least, he fears that it might. If these reserves are really what the auditors and now the consultants are saying they might be, then we've got a problem. Where else are there problems? What else does he not understand about this business? So, he's pretty worried. He's clearly been looking for a lower answer, but, you know, there is a lot of emotion tied up here, and pride.

So, with that, two weeks have passed and Mike and Margaret are coming back. Hopefully they've got some good news and something that's going to make him feel a lot better now. So, with that, we have Scene 2.

MR. TOOTHMAN: Margaret, Mike, I'm glad to see you back and I hope you've got some good news for me. I've been looking forward to having you back here again.

MS. TILLER: Well, Mike, it's different news.

(Laughter.)

MR. TOOTHMAN: Margaret, I'm not sure you're making me feel any better.

MS. TILLER: Why don't we let Mike start with explaining what he found during his claim audit?

MR. TOOTHMAN: Okay.

MR. ZIPKIN: Mike, we have some good news and we have some claims news.

(Laughter.)

MR. ZIPKIN: The first one has to do with this redundancy that you were talking about. Let me just go through this slide fairly quickly because it does reflect on what I was talking about earlier, and that is that most of your cases will experience a redundancy, but that's an extremely biased way to look at your ultimate liabilities. (Slide 12)

MR. ZIPKIN: The first line on this chart shows the 20 percent redundancy you were talking about: $750,000 worth of reserves on 50 cases, closed for $625,000.

What we did was select at random a group of the remaining 50 cases that you were talking about, and we tracked the development that occurred on those cases at the same point in time that you were experiencing the redundancy on the claims closed.

Keeping in mine that you do under the law have to take both into account at the same time, what we did was look at the development on the still open, less closeable cases and we found, as we normally do in studies of this kind, that that development more than offset the redundancy on the closed claims and you have a net inadequacy in your case reserves when you add in the development on these still open cases. You will see that amounts to about 21 percent.

More importantly, with regard to the glitch in the data that Margaret identified, we did a claims study of various cases. We looked at a number of your cases; this is just six of them. (Slide 13) The first five columns are not remarkable. They show the file numbers and the initial reserves, the accident date, the date of report, the initial reserves, subsequent reserves and changes.

But take a look at the last two columns. What we found in these six cases, which are typical of most of the cases we looked at, is that you underwent substantial reserve changes in June, July, and August of the same year. Now, that had to be due to more than just a coincidence.

Furthermore, we were concerned about your claims department looking at these cases all at the same relative point in time because we know that when claim people look at cases, reserves go up. That's just the phenomenon that normally occurs.

We were told by your claims department the same thing that they told you, that they had not changed anything. But what we began to realize was that your claims department had in fact done some massive changing one case at a time, and they had failed to take into account the aggregate influence of all that changing on the bottom line data being evaluated by Margaret and your actuary.

In essence what had occurred immediately prior to this June, July and August date was that you got hit with some very serious verdicts. In fact, on one case that you thought was worth zero, a Cook County jury awarded $2 million to the plaintiff. You started screaming and yelling about that time.

MR. TOOTHMAN: Yes, I remember that case.

MR. ZIPKIN: Yes, you remember that case.

MR. TOOTHMAN: It was H.W. Watson.

MR. ZIPKIN: Yes.

MR. TOOTHMAN: Boy, did we get burned on that one.

MR. ZIPKIN: The fact is that your claim department was sufficiently chastised about that particular case that they began to worry. So, they began to look at all of their cases to see if they had any more shock verdict potential, bomb type cases, in that group. As a result of that random selection of files that they looked at, which included just about all your cases for review at this particular point in time, they increased the reserves on those cases.

Now, they call that reserve strengthening. We call it adverse development. In essence they reached forward into the future and they compressed the timeframe within which normal adverse development would have taken place.

MR. TOOTHMAN: But if they've increased reserves above where they were before, we're more adequate than before, right?

MR. ZIPKIN: Yes.

MR. TOOTHMAN: Are we over-reserved now then?

MR. ZIPKIN: No, you're not over-reserved. What you have is a higher reserve earlier and a more correct reserve earlier in the life of the cases. We think that the reserves are more correct now because they're more realistic.

These shock verdicts seem to have shocked your claims department into a realization that it was undervaluing its cases previously, and now it is more accurately reserving those cases. When we looked at those files, we saw reserves which are a more adequate reflection of what those cases are really worth.

The problem, however, is that in the aggregate they have produced a glitch that Margaret has found in the underlying data. That is the importance of this particular finding. They didn't realize they were doing that.

MR. TOOTHMAN: Well, what do we do about it then?

MS. TILLER: Mike discovered, after looking at the files, that this is a permanent change so that now tells me how to interpret what we see in the data.

Let's go back to our development triangle. The top two rows of selected average and cumulative factors are what the auditors had used. (Slide 14) The selected average factors are the arithmetic average of the numbers in the columns.
Based on the information from Mike that this change is permanent and that the development we're seeing on the last diagonal is representative of this new, more conservative, more realistic philosophy, and that the new development also takes into consideration the change in the per-occurrence limit, we now are selecting the averages that show up in the last diagonal as the period-to-period factors. We completed our analysis with that assumption.

We again want to square the triangle and go as far as we need to go. (Slide 15) It does, in fact, appear that 72 months is ultimate for your particular company. We actually went back to the loss development method because Mike discovered there were no unusually large claims in policy years five and six that would indicate that the method is not appropriate. So, we multiply the reported losses by our new development factors

and come up with new estimated ultimate losses. (Slide 16) This reduces the IBNR down about $11.5 million.

MR. TOOTHMAN: That's a lot better, Margaret. It makes me feel much better.

MS. TILLER: It's a little higher than you're holding. However, you'll notice that what we thought might have been a problem with increasing loss ratios, particularly problems in policy years five and six, is in fact not a problem and that you're very close to your expected undiscounted loss ratio of 105%.

MR. TOOTHMAN: So what you're saying is that we really have priced and underwritten the business pretty much the way we intended to?

MS. TILLER: Yes.

MR. TOOTHMAN: I don't have something I've got to correct in that department, do I?

MS. TILLER: No. But you do still need to hold this IBNR reserve for the case reserve development.

MR. TOOTHMAN: Okay. Okay.

MS. TILLER: So, the summary is that you're holding nothing. (Slide 17) The auditor thinks that you should be holding $25.5 million. Based on the additional information we got from the claim audit, we think you should be holding about $11.5 million.

MR. TOOTHMAN: Okay. I guess I've learned something, Margaret. I think I understand now what you were trying to tell me last time about having to have some reserves up even though this is claims-made business.

You said you were going to look at a couple of other things? Did you do that?

MS. TILLER: Yes.

MR. TOOTHMAN: Was there something else?

MS. TILLER: In particular, we had asked Mike to look at the allocated expenses.

MR. ZIPKIN: Because Margaret was concerned about your allocated expenses, and so were you, and because we were already in your claims department, we thought we would look at the way these allocated expenses -- that is, primarily legal fees and a small amount of independent adjuster expenses -- were being incurred and the way they were being expended to see if we found anything wrong with them.

The two questions that we asked were, why were they higher than normal, and what could be done about it if that was in fact the case.

MR. TOOTHMAN: Mike, when you say higher than normal, you really mean higher than other insurance companies?

MR. ZIPKIN: Yes, higher than other companies like yours.

MR. TOOTHMAN: Okay. Well, I guess you understand the reason for that, don't you? We took the attitude from the beginning that we were going to defend these claims. Frankly, we think that the insurance industry has created a bit of a problem for itself. We feel that some of the companies have become a soft touch and the claimant's attorneys know that.

We decided that we weren't going to let that happen. We were going to defend these cases and we'd be willing to spend a few bucks to save the loss dollars.

MR. ZIPKIN: There is no question, Mike, but that there are two attitudes in the insurance industry today. One is to defend cases to the ultimate limit that it's possible to do so. The other is to try to settle them before those expenses are incurred. You definitely fall into the former group. There is no question about that.

But what we are talking about is the expenses associated with that process, not the influence that that process has on your loss costs.

MR. TOOTHMAN: Okay.

MR. ZIPKIN: Although you didn't authorize a separate study of allocated loss adjustment expenses, we did make a review of that as we went along.

What we found was that your independent adjusters -- what little use you make of them -- and your lawyers in particular on your law suit cases, are doing a relatively good job of what you're asking them to do. The problem is you're asking them to do too much.

We saw in the cases an awful lot of work being expended by these particular types of resources, independent adjusters and outside attorneys, that didn't need to be expended.

For example, we saw an awful lot of paper in your files where you would order -- routinely order -- depositions and pretrial discovery documentation and then your lawyers who had done that ordering for you would cover or summarize that material with a letter. All you really needed was the letter. You were paying twice. That's very expensive documentation. Nobody ever reads it and so you might as well not obtain it. That's just an example.

(Slide 18)

The way to control these expenses is by limitations on independent adjuster assignments. That is to say, you don't just give an assignment to an independent adjuster. You tell them exactly what you want. They perform that kind of work and they close their file and send you a bill. You terminate the assignment with that independent adjuster.

You need limitations on legal expense. Now, we have a specialist in litigation management on our staff who can do this kind of a review and show you how it's done. She is a lawyer and she was formerly the head of litigation management for a major insurer. So, she knows how to do this kind of thing quite well. I would encourage you to use her services if you feel that it's necessary to do so.

Limitations on investigation expense and legal documentation I've already discussed. The direct involvement of staff claim personnel in the claim handling process is also quite important. That is to say that there is a good deal of work that your legal staff is

performing, we think, because they have been asked to do that work which is non-legal/non-courtroom work that your own claims department can easily do.

If you do these things, we are convinced that you can reduce your allocated loss adjustment expenses, legal expenses, and your independent adjuster expenses, quite substantially.

MS. TILLER: This is real money. Let's look at an example. (Slide 19) For these six years our current projection is that the total ultimate cost will be about $93.6 million. About a third of that will be for the allocated expenses and two-thirds for the indemnity amount.

If we look at the loss dollars currently in your case reserves, plus what we think will come in on case reserve development, the total is about $38.1 million. If your expenses run 50 percent of the indemnity portion, that's $19.1 million. But if you can reduce that ratio to 40 percent, you'll have saved $3.9 million.

MR. TOOTHMAN: Can we really save that much?

MR. ZIPKIN: Yes, you can save a good deal of money. We can sure show you how for $3.9 million. We could do it for a good deal less than that.

MR. TOOTHMAN: If we can save $4 million, that's wonderful. How do we go about doing this? How do you suggest we proceed?

MR. ZIPKIN: Well, first of all, I think what's needed is a study by specialists, and you need a proposal which outlines the kind of work we intend to do and who will do that work. I would emphasize the "who". It's all well and good for me to explain to you how we go about doing that and then have somebody show up who doesn't know how. So, you need biographies of the people who will do the work and you also need to know how much it's going to cost in advance.

So, why don't you let me give you a proposal for an allocate loss adjustment expense review, bring in some additional staff, give you some biographies and tell you how much it's going to cost.

MR. TOOTHMAN: Good. I'll look forward to your proposal, Mike. We could do a lot with $4 million so that would be wonderful. I'll look forward to that. It sounds like that's really worth doing.

Is there any anything else, Margaret?

MS. TILLER: There are some other items that Mike routinely looks at as he's going through the files, such as how reinsurance recoveries are being handled. I believe he has some suggestions in this area as well.

MR. ZIPKIN: One of the things that we look for in the reinsurance side is (a) who is responsible for identifying reinsurance recoverables, and (b) who is responsible for going after them.

If we find that the claims department is responsible for both functions, we get very nervous, and you should be also. We have found in our reviews that claims departments are notoriously inept in accomplishing both of those functions and a lot of money is left on the table.

On the contrary, where an accounting department or an accounting function is being maintained which will account for reinsurance recoverable activity and the claims department is limited in its functions or its role to obtaining the money from the reinsurer, we're more comfortable. We find that their control work is more accurate.

We found that your accounting department is notifying the claims department of reinsurance recoverables and the claims department is then going after the money because it's dealing with its own counterparts and it's more able to do that than your accounting department. Notification that the case is covered by reinsurance and the amount of money that is recoverable is provided to the claim department from outside the claims department, which is an ideal.

MR. TOOTHMAN: So, you're really talking about tracking the aggregates and you're suggesting that I have that done outside the claims department?

MR. ZIPKIN: Yes.

MR. TOOTHMAN: I think I can handle that internally but I appreciate that. I'll make sure to take a look at that.

Is there anything else?

MS. TILLER: No, that's it.

MR. TOOTHMAN: Well, Mike, I'll look forward to your proposal. Mike and Margaret, I thank you very much for your help. My eyes have really been opened. $11 million isn't really good news, I guess, Margaret, but it's a lot better than where we started, and I've learned something as well. So, for that, I thank you.

MR. TOOTHMAN: That's the end of our skit. Now, I should stress again that the company is fictitious, that we made up the numbers and everything else. But the types of problems that we've encountered here are things that we see every day. It really isn't much of an exaggeration.

I used to say in doing this that we'd never seen all of these in any one company. I'm not sure that's quite true.
I think Margaret and I probably each had a couple of examples that we could but won't cite where we've seen these. Rarely do you find all these things happening in one company, but there is not a single problem that we touched on here -- and several others that could have been thrown in -- that really are unusual.

What the skit illustrates, I think, is one aspect of the basic message of this loss reserve seminar. That message is that as an actuary or as a reserve specialist you can't do your job or do your calculations blindly. There is no such thing as a black box for actuarial reserving. You don't put the numbers in at one end and pull them out the other end and, bingo, you've got your reserve number. You need to understand what's going on in the company, and the claims department is one of those areas that you need to understand.

I think Margaret has a couple of comments in summary to wrap this up.

MS. TILLER: Yes.

MR. TOOTHMAN: Why don't you go ahead.

MS. TILLER: As Mike mentioned earlier, I am a consulting actuary, and I use claim auditors quite a bit to help me do my work.

Many insurance companies, risk retention groups, and individual entities which retain risk plan to do a claim audit and an actuarial study. (Slide 20) I advise them to do the claim audit first. A claim audit will tell you whether or not the data that you are using is accurate.

I know of a situation in which someone did an actuarial study. The data seemed to be in order and all the data requested was available in the format specified. The actuary even complimented the company on the ability to provide such good data.

Four months later there was a claim audit done. It turned out that one-third of the entries on the claim run were in error. The error's were inconsistent so it was not the kind of thing that an actuary or a loss reserve specialist would be able to see just by looking at the bulk data. Needless to say, those error's impacted the usefulness of that actuarial study.

Are the excess and reinsurance recoveries being handled properly? Mike explained to you earlier that sometimes claims departments are not the best place for that particular function to be handled. You may find out that there are recoveries available that are not being taken advantage of.

Are the case reserves reasonable, given the information to date? Upward case reserve development within certain bounds is normal. Too much or too little indicates that there may be a problem with the overall case reserving philosophy. As long as the case reserve development is consistent, the actuary is usually able to make a good estimate of the ultimate values. But if there is a change in the case reserving practices, it will cause problems with the analysis. So, you need to have an independent opinion as to whether or not the case reserves are reasonable.

The claim audit may discover some changes, such as the one we discussed, that even management didn't know had been made. Hopefully a claim audit will uncover any change that might impact the analysis of the numbers.

There is another reason to consider doing a claim audit first. (Slide 21) You may suspect there is a problem. For example, you know there's been a change in procedure because management tells you or you know that they've changed from a manual to a computer system for getting claim information from regional offices to the home office. This type of change will show up in the reporting pattern.

There may be a change in the philosophy of the claim department. For example, it used to be that the department tended to reserve on the low side and now, because of the $2 million adverse claim development on one claim, they are reserving more conservatively.

Even with a written claims manual and in-house claim seminars about how claims should be handled, you cannot change the fact that individuals setting case reserves will bring their own personal biases and experiences into play. So, simply changing your personnel can sometimes cause changes.

Of course, changes in the law or jury verdict patterns that might impact your analysis can be discovered.

Sometimes when you're in the middle of an actuarial study you run across a problem that needs attention, and the only way to decide how to interpret what you're seeing in the data is to get the information that you can get from a claim audit. (Slide 22)

For example, you may see a change in the claim reporting pattern, the way in which claims are being closed, the way claims are being reserved, or the payment patterns. You may find people in the company say no changes have been made -- just as in our skit. A claims auditor can help you interpret what actually has happened and whether or not any changes are going to result in a permanent change, or if it's a onetime correction.

The next one is worded a little bit oddly: change is expected based on conversation with the management that's not seen. It's not the management that's not seen; it's the change that's not seen. That has happened to me several times. Management comes in and says, "we've made dramatic changes in the way that our claims are being handled. We've speeded up closure. We're doing more investigation in-house. Our allocated expenses are going down." I take notes and I say, "Great, it sounds wonderful." I look at the data, and I see no change.

So, then the question becomes, has the change taken place and it's simply too early to be reflected in the numbers, or is it a change that upper management directed that the claim department is ignoring? You won't know unless someone goes in there and does some digging.

A claim audit is a good way to fight a closed claim study. We gave you a very good example where there is savings on closure, but the change for claims that are open at point A and point B more than offsets the savings at closure over that period of time.

There may be some changes in your loss adjustment expense ratios. We have to worry about pieces, the allocated expenses -- the attorney's fees and investigative fees that can be attributed to individual cases -- and the unallocated portion, which is the part that's not allocated to individual cases -- the third-party claim administration fees, the overall claim department budget.

I have one client whose Schedule P looks very strange. They used to treat their claims department overhead as an unallocated expense. Then they decided that they were going to account for everything on a time and expense basis and allocate all costs back to the individual claims. So, all of the sudden on their Schedule P the unallocated expense disappeared and the allocated expense, of course, increased dramatically.

So, if there is a change where a company is doing more or less claim handling in-house, you may start to see these changes and you need to make sure that the dollar exchange is reasonable. It may not be a dollar for a dollar exchange; it may be a dollar for two dollars, which is what you hope to reduce your overall costs. But to evaluate the impact, you need some additional information that you can only get from a claim audit.

It is not always necessary to do a claim audit. Sometimes when you see a problem in the data you can ask the client what's going on. I had one situation in which the number of claim closures was going down. They simply were not closing as many cases. I needed to know whether the nature of the cases had changed so that they were requiring more investigation, whether they were simply being more cautious and doing more investigation, or whether there was some other problem.

I anticipated that we would need to do a claim audit, but I called the client and asked what he knew that might be causing this problem. He said, I can tell you exactly what it is. We have budgeted seven positions to handle claims. That would give us a caseload of about 200, which is what we think is reasonable. Four of those slots have been empty for six months. So, I simply cannot have anybody doing the mechanics to close the files. We're trying desperately to handle the claims that need to stay open.

That answered my question, I knew how to interpret the data, and I could proceed. The point is that you need to look at the data and ask questions about what it is telling you. You need to evaluate not just the numbers that you see, but the information that you get from management. The key to any of this is are the changes permanent? And, if so, how do I judgmentally make corrections for those changes.?

MR. ZIPKIN: Mike, let me add a comment to what Margaret just said. I'd like to read you a quote from a publication which speaks to the issues Margaret was talking about.

It says here that "a review of company claim practices should always be made to assure that correct assumptions are being made by the actuary regarding the claims process. Perhaps even more importantly, the actuary should continually review and be made aware of claims procedures in the claims handling process. Whenever a change in claims procedures can be identified, experience should be adjusted to align it with more recent claims practice."

Now, that quotation that I gave you -- there are numerous quotations like that throughout this publication -- is found in the Statement of Principles of the Casualty Actuarial Society. This is not a claim bulletin. These are your rules, ladies and gentlemen, not mine.

What I would suggest you do is do what Margaret says because by doing so you will follow your own rules, your own regulations and your own guidelines. At least, what she's talking about is being careful.

What Mike is talking about is the need, although he comes across as a typical client would, as someone who is pushing and prodding us have a lower number. What he's really saying is within the bounds of efficacy and propriety, and so on, please be careful.

If the prior group of actuaries who gave him the wrong numbers, as they have proven to be upon examination, are guilty of any kind of a "crime," it's that they were not careful enough and deliberate enough. They used arithmetic averages and they didn't take into account these kinds of changes.

So, I would assure you that if you take those kinds of changes into account, you will automatically be coming up with a considered and reasonable approach to your findings as actuaries, as professional people.

MR. TOOTHMAN: That's the end of our presentation. Questions and comments? Yes. If you don't mind using the microphone, we'd appreciate it, since the session is being recorded.

JEFF SUBECK (Rollins Burdick Hunter): If you find out from a claims person, let's say, that they were making changes that are going to cause claims to close earlier or are going to reduce allocated expenses, something that would lower your projection, and they tell you that this happened recently and it hasn't shown up in the data, how do you know

to what extent that's true and to what extent you should lower your numbers? Or, how would you adjust for that?

MR. TOOTHMAN: How recently are you talking about? I mean, just occurred a few weeks ago where nothing --

MR. SUBECK: Oh, maybe six months ago.

MR. TOOTHMAN: Okay. Margaret, do you want to try that?

MS. TILLER: I would send down a claim auditor to find out if in fact it's really happened. By looking at individual claims he or she might be able to tell me if the average time from date of accident to date of closure changed from 42 to 35 months, for example that kind of information would then allow me to make an appropriate adjustment.

MR. TOOTHMAN: I guess I'd comment that it would depend a lot on the line of business as well. Six months might be enough time with some lines that you can actually get some statistical data.

The type of exhibit that Mike showed with the six cases -- remember where he had the six cases listed on the one slide -- part of what Mike does, or his staff when they do studies, is they will often do that kind of statistical study where they will go through and look at the reserve changes and patterns on particular groups of cases. Sometimes one group from 18 months ago maybe, and another group from the last six months, and we can try to see what's different on those files.

MR. ZIPKIN: One of our biggest problems is that we typically run into claims departments that simply do not understand that the rate of closing is a very important indication to the actuary. So what we do is make them aware of the importance of these kinds of activities and the importance of recording them.

In other words, let them show you the hit that you're going to take one way or the other before it actually hits the system and becomes a part of that company's results. Then you will know how to deal with it before you have to deal with it, so to speak.

MR. TOOTHMAN: I might make one final comment too on that particular question. I think there are times when you don't have any data yet to substantiate what management is telling you.

I think management is a very good source of information. I don't think there is anything wrong with listening to management, making a judgment and deciding that you will rely or you will not rely upon that and allowing that to affect your conclusions. But you need to do that very carefully.

There have been times that I can think of when we've made such reliances and I've felt very comfortable and it's turned out right. Other times we've made similar reliances and we felt comfortable at the time but it turned out that those reliances were not correct. So you make those reliances cautiously.

Sometimes I'll take the attitude that I understand a change has taken place but at the present time I'd rather not reflect it in my estimate until I see it come out in the numbers. That's part of the judgment that you have to make in each situation, I believe.

MS. TILLER: If you are reflecting it, you need to so state.

MR. TOOTHMAN: State it. Yes, very definitely. Other questions? Comments?

MS. TILLER: War stories?

(Laughter.)

MR. TOOTHMAN: How many people here have had interaction with your claims department or with claims people on reserve assignments? Is that becoming a routine thing now, a regular thing? A lot of you. Good. Good.

I know some companies have actuaries in their claims departments now. A few of them. I don't know of any companies here.

Karen (Balko -- Aetna Life and Casualty) are you in the claims department now? Very good. Do you want to add anything?

KAREN BALKO (Aetna Life and Casualty): I want to know how everybody else interacts with their claims department? Is anyone else an actuary in the claims department?

MR. TOOTHMAN: I know of some that have been. I don't know if any are here. I know there are others beside you.

Questions? Well, if not, thank you very much. We appreciate your attention. Please give a thank you to our cast.

(Applause.)

Claims Management Perspectives

A TWO-ACT SKIT

CAST
(in order of appearance)

Chief Executive Officer: Michael L. Toothman

Consulting Actuary: Margaret W. Tiller

Claims Consultant: Michael G. Zipkin

PROFESSIONAL RELIABLE

Summary of IBNR Indications

($Millions)

	Held	Audit	Indicated Inadequacy
Physician & Surgeons	0.0	25.5	25.5

PROFESSIONAL RELIABLE

Physicians and Surgeons

($Millions)

Report Year	Earned Premium	Reported Losses @: 12 Mos.	24 Mos.	36 Mos.	48 Mos.	60 Mos.	72 Mos.
1	10.0	5.0	7.0	8.4	9.6	10.3	10.3
2	12.0	6.0	8.4	10.1	12.9	12.5	
3	14.0	7.0	9.8	13.9	15.1		
4	16.0	8.0	13.7	15.8			
5	18.0	12.0	15.6				
6	20.0	13.0					

PROFESSIONAL RELIABLE

Physicians and Surgeons

Report-to-Report Ratios

Report Year	12/24	24/36	36/48	48/60	60/72	72/Ult.
1	1.40	1.20	1.14	1.07	1.00	
2	1.40	1.20	1.28	.97		
3	1.40	1.41	1.09			
4	1.72	1.15				
5	1.30					
Selected Average:	1.44	1.24	1.17	1.02	1.00	1.00
Cumulative:	2.13	1.48	1.19	1.02	1.00	1.00

PROFESSIONAL RELIABLE
Physicians and Surgeons
($Millions)

Report Year	Earned Premium	Reported Losses @ 12	24	36	48	60	72
1	10.0	5.0	7.0	8.4	9.6	10.3	10.3
2	12.0	6.0	8.4	10.1	12.9	12.5	12.5*
3	14.0	7.0	9.8	13.8	15.1	15.4*	15.4*
4	16.0	8.0	13.8	15.8	18.5*	18.9*	18.9*
5	18.0	12.0	15.6	19.3*	22.6*	23.1*	23.1*
6	20.0	13.0	18.7*	23.2*	27.2*	27.7*	27.7*

*Projected

PROFESSIONAL RELIABLE

Physicians and Surgeons

Projection Method (000's)

Report Year	Earned Premium	Reported Losses	Loss Development Factor	Estimated Ultimate Value	
				Losses	Loss Ratio
1	$10,000	$10,300	1.00	$ 10,300	103.0%
2	12,000	12,500	1.00	12,500	104.2
3	14,000	15,100	1.02	15,402	110.0
4	16,000	15,800	1.19	18,856	117.8
5	18,000	15,600	1.48	23,085	128.3
6	20,000	13,000	2.13	27,702	138.5
	$90,000	$82,300		$107,845	119.8%

IBNR = $107,845 - 82,300 = $25,545

PROFESSIONAL RELIABLE

Physicians and Surgeons

Projection Method (000's)

Report Year	Earned Premium	Reported Losses	Loss Development Factor	Estimated Ultimate Value	
				Losses	Loss Ratio
1	$10,000	$10,300	1.00	$ 10,300	103.0%
2	12,000	12,500	1.00	12,500	104.2
3	14,000	15,100	1.02	15,402	110.0
4	16,000	15,800	1.19	18,856	117.8
5	18,000	15,600	1.60	24,960	138.7
6	20,000	13,000	2.40	31,200	156.0
	$90,000	$82,300		$113,218	125.8%

IBNR = $113,218 - 82,300 = $30,918

PROFESSIONAL RELIABLE

Physicians and Surgeons

Bornhuetter-Ferguson Method (000's)

Report Year	Earned Premium	Initial Expected Loss Ratio	Initial Expected Losses	Unreported Percentage	IBNR	Reported Losses	Estimated Ultimate Value Losses	Estimated Ultimate Value Loss Ratio
1	$10,000	1.05	$10,500	0%	$ 0	$10,300	$ 10,300	103.0%
2	12,000	1.05	12,600	0	0	12,500	12,500	104.2
3	14,000	1.05	14,700	2	288	15,100	15,388	109.9
4	16,000	1.05	16,800	16	2,723	15,800	18,523	115.8
5	18,000	1.05	18,900	38	7,088	15,600	22,688	126.0
6	20,000	1.05	21,000	58	12,250	13,000	25,250	126.3
	$90,000				$22,348	$82,300	$104,648	116.3%

PROFESSIONAL RELIABLE

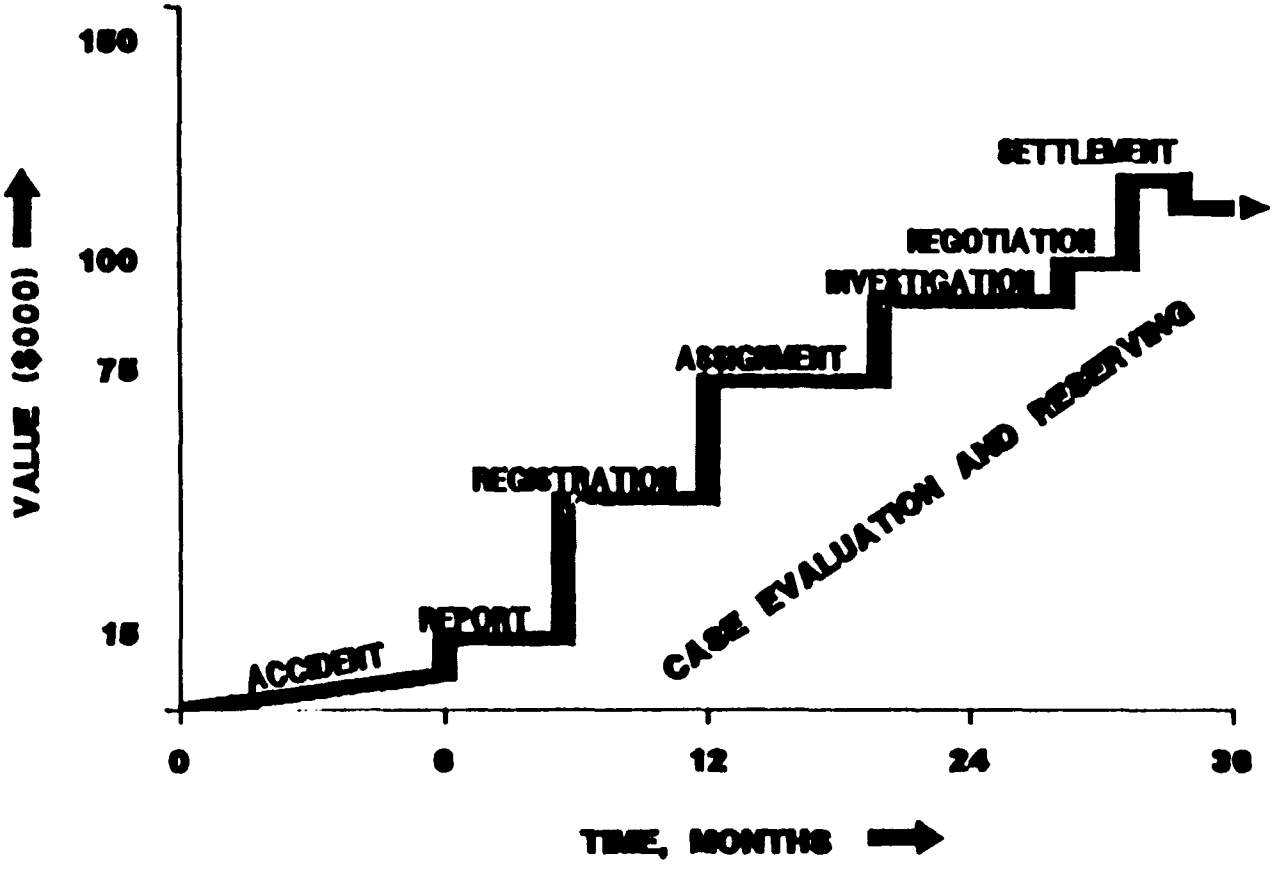
Physicians and Surgeons Liability

Study of Reserve Adequacy

692

50 Cases Closed In Last Seven Months

12/31 Estimated Value	750,000
Closed Value	625,000
Reserve Redundancy	20 %


150
100
75
15
VALUE ($000)
ACCIDENT
REPORT
REGISTRATION
ASSIGNMENT
INVESTIGATION
NEGOTIATION
SETTLEMENT
CASE EVALUATION AND RESERVING
0
6
12
24
36
TIME, MONTHS

Claim Review

- Interview Claim Management and Supervisory Personnel
- Review Claim Files
- Review Claim Procedures, Practices, Statistical Data

Claim Review

- Includes Review of Changes in:
  - Law or Legislation Affecting Liability, Legal Defenses, or Damages
  - Jury Verdict Patterns (Higher Awards, etc.)
  - Procedures/Practices for Reporting, Reserving, or Closing Claims
  - Personnel, Workloads, Claim Department Organization

PROFESSIONAL RELIABLE
Physicians and Surgeons Liability
Study of Reserve Adequacy
100 Cases Open @ 12/31 Year Six

	Value @ 12/31 Year Six		Value @ 7/31 Year Seven
50 Cases Closed	750,000		625,000
50 Cases Open	1,000,000		1,500,000
100 Cases	1,750,000		2,125,000
		+21%	

CLAIM FILE REVIEW

Professional Reliable

File	D/A M/Y	D/R M/Y	Initial Reserve	Subsequent Reserve Change to: Amt.	Date M/Y	Amt.	Date M/Y
043216	3/3	4/3	15,000	30,000	6/3	90,000	6/5
057392	2/3	6/3	20,000	–	–	60,000	8/5
068973	2/3	8/3	20,000	80,000	1/4	100,000	7/5
084010	2/3	10/3	15,000	50,000	12/3	72,000	6/5
099691	12/2	10/3	15,000	–	–	35,000	6/5
103201	1/3	10/3	15,000	25,000	6/4	32,500	6/5

PROFESSIONAL RELIABLE
Physicians and Surgeons
Report-to-Report Ratios

Report Year	12/24	24/36	36/48	48/60	60/72	72/Ult.
1	1.40	1.20	1.14	1.07	1.00	
2	1.40	1.20	1.28	.97		
3	1.40	1.41	1.09			
4	1.72	1.15				
5	1.30					
Selected Average:	1.44	1.24	1.17	1.02	1.00	1.00
Cumulative:	2.13	1.48	1.19	1.02	1.00	1.00
Selected Average:	1.30	1.15	1.09	.97	1.00	1.00
Cumulative:	1.58	1.22	1.06	.97	1.00	1.00

PROFESSIONAL RELIABLE
Physicians and Surgeons
($Millions)

Report Year	Earned Premium	Reported Losses @ 12	24	36	48	60	72
1	10.0	5.0	7.0	8.4	9.6	10.3	10.3
2	12.0	6.0	8.4	10.1	12.9	12.5	12.5*
3	14.0	7.0	9.8	13.8	15.1	14.6*	14.6*
4	16.0	8.0	13.8	15.8	17.2*	16.7*	16.7*
5	18.0	12.0	15.6	17.9*	19.6*	19.0*	19.0*
6	20.0	13.0	16.9*	19.4*	21.2*	20.5*	20.5*

*Projected

669

700

PROFESSIONAL RELIABLE

Physicians and Surgeons

Projection Method (000's)

Report Year	Earned Premium	Reported Losses	Loss Development Factor	Estimated Ultimate Value	
				Losses	Loss Ratio
1	$10,000	$10,300	1.00	$10,300	103.0%
2	12,000	12,500	1.00	12,500	104.2
3	14,000	15,100	0.97	14,647	104.6
4	16,000	15,800	1.06	16,748	104.7
5	18,000	15,600	1.22	19,032	105.7
6	20,000	13,000	1.58	20,540	102.7
	$90,000	$82,300		$93,767	104.2%

IBNR = $93,767 - 82,300 = $11,467

PROFESSIONAL RELIABLE

Summary of IBNR Indications

($Millions)

	Held	Audit	2nd. Opinion
Physicians & Surgeons	0.0	25.5	11.5
Indicated Inadequacy		25.5	11.5

Control of Claim Expense

- Limitations on Independent Adjuster Investigations
- Limitations on Legal Expense
- Limitations on Investigation and Legal Documentation
- Direct Involvement of Staff Claim Personnel

PROFESSIONAL RELIABLE
Physicians and Surgeons Liability
Analysis of Claim Expense

CURRENT PROJECTION				POTENTIAL SAVINGS		
Indemnity	=	$62.4		Indemnity Case Reserves	=	$30.4
Expense	=	31.2	(50%)	Indemnity IBNR	=	7.7
						$38.1
				Expense @ 50%		19.1
				Expense @ 40%		15.2
				Difference		$3.9

If Planning To Do Claim Audit and Actuarial Study, Do Claim Audit First.

Information Provided:

- **Accuracy of Claim Runs**
- **Excess/re-insurance recoveries properly handled**
- **Reasonability of Case Reserves**
- **Changes**

If Suspect "Problem" With Claim Handling, Do Claim Audit First

- Changes in Procedures
- Changes in Philosophy
- Changes in Personnel
- Changes in Law/Jury Verdict Patterns

Problems Discovered During Actuarial Study Requiring Claim Audit To Determine Interpretation

- Changes in Claim Reporting Pattern
- Change in Claim Closure Pattern
- Change in Case Reserving Pattern
- Change in Payment Pattern
- Change Expected Based on Conversation With Management Not Seen (need to be permanent)
- Discuss Inappropriateness of Closed Claim Studies
- Change in LAE Ratios

1989 CASUALTY LOSS RESERVE SEMINAR

4E: DISCOUNTING LOSS RESERVES

Moderator

Stephen P. Lowe
Tillinghast/Towers Perrin

Panel

Randall D. Holmberg
St. Paul Fire & Marine Insurance Company

Wayne Upton
Financial Accounting Standards Board

MR. LOWE: This session is on Discounting of Loss Reserves. Before we get started, a couple of administrative announcements.

I'm Steve Lowe and I'll be moderating this panel.

This session will be recorded and a transcript will be prepared. In the interest of making the recorder's life a little easier, I'd appreciate if you have questions, that you please come to the microphone, identify yourself, and speak into the microphone directly so that you do end up on the tape and the recorder can make some sense out of the questions and answers.

Those are often a very interesting part of a session, particularly on a topic such as this. The transcript is a lot less interesting when we have the answers but we don't have the questions. The panelists will try and repeat each question asked to ensure that the questions and answers are both recorded as well.

Finally, it's my understanding that you have evaluation forms so that you can grade the session and give the committee feedback on how we did.

We have two panelists today. Our first panelist is a non-actuary. On the far end is Wayne Upton. Wayne is a project manager at the Financial Accounting Standards Board since June of 1984. Prior to that, he was audit partner with a regional accounting firm called Clifton Gunderson and Company.

Wayne's assignments include project manager on Statement 97 for the FASB, that's the statement on universal life insurance. He's currently the project manager on the FASB project on interest methods, and I hope he's going to fill us in on the status of that project and give us some idea as to what the FASB sees as some of the issues. He's been a project consultant on the FASB's recently completed study of other post-employment retirement benefits. He's also staff coordinator of all projects concerning their impact on small businesses.

Wayne is obviously going to give us a perspective from the FASB and from the accounting profession.

We also have, to try and balance the panel, Randy Holmberg who is the senior financial actuary at the St. Paul Companies. Our hope is that he could give us a company perspective on some of the issues associated with discounting of loss reserves.

Randy is an FCAS and he's also an associate in the Society of Actuaries. He has a bachelor's in math from the University of California at Berkley. He graduated from there in '77. He has experience in most lines of insurance and in the financial aspect of insurance company operations.

Before I turn the podium over to Wayne, I would like to make just a couple of general comments on the subject of discounting. It's an area that I've been studying at some length for four or five years, after I did a study of the issue that was subsequently published in the Journal of Insurance Regulation.

Why is discounting an important issue, and, in particular, why is it an important issue for actuaries? In my view, it is more than an academic issue. It has public policy implications and also it is, I think, pretty central to our profession.

I think there are three reasons why discounting is important and I would just like to take a minute and share them with you.

First, as actuaries, we are responsible for valuing the liabilities on insurance company financial statements. The regulators and the statutory environment want us to express an opinion. Now, the opinion has a whole host of words in it that talk about that the reserves were prepared in accordance with commonly accepted methods and assumptions, are reasonable to policy provisions, et cetera, et cetera.

But, fundamentally what the regulators are looking for, in my mind at least, is a simple green light. They want to know that you think things are okay and you think that the reserves that are posted create a balance sheet under which the company can, with all likelihood discharge its existing policyholder liabilities. That's the central issue for the regulators.

They want to make sure the company is solvent and able to meet those liabilities and that there is no reason to intervene. I don't have any particular objection for the word, but I think we should just lay the cards on the table and say that what the regulators are looking for is just someone to say this is an okay situation, and alternatively this is not.

Well, why is that relevant? Well, once you start discounting the loss reserves, once you used a positive interest rate in the discounting, then the statements that you make become a little more difficult to make and make sense out of. In an environment where the reserves are undiscounted, we can make statements about that the estimated ultimate liabilities are reasonable, that the estimate of liabilities is reasonable, and equate that with a reserve and it's synonymous to saying that the reserves are okay.

We quite commonly, in discussing this, interchange the words liabilities and reserves. Well, in the discounted environment those two terms are not quite interchangeable. We had a conversation earlier this morning, in presentations to management, where one of the speakers was talking about the relative strength of the reserves and he said that he didn't want to get into talking about the reserves being adequate or redundant or deficient.

I think partially that was motivated by a concern that maybe we don't know those things as well as we would like to. I would submit that in a discounted environment it becomes a lot more problematical to make a statement about what constitutes and good and sufficient reserve.

You have to, for example, evaluate whether or not using an 11% interest rate and the results from that. Does that constitute a good and sufficient provision? Well, I think some might argue that it doesn't.

Also, from a public policy standpoint I think it's important to recognize that decisions about whether or not reserves should be discounted create the capital standards for the industry. Capital standards are more than just a requirement that surplus and premium ought to have a relationship of three to one.

Other things, like not anticipating subrogation and salvage requiring full value reserves, not being able to book future tax benefits as a deferred tax asset -- all of those things create additional implicit capital requirements for a property casualty insurer.

Why Is Discounting An Important Issue?

- The Need for Meaningful Measurement of Financial Performance
- The Need for Discipline on the Balance Sheet
- Valuation Standards Create Capital Requirements

A Subtle Distinction:

Discounting for Time Value ≠

Recognition of Future Investment Income

Why Is This Important To Actuaries?

- We are (or want to be) responsible for the valuation of the liabilities

- Once i=0, one cannot make meaningful statements of opinion without addressing these issues

Locked vs. Floating Rate

- Fluctuation in market value of assets not currently recognized in insurer income
  - presumption: management intends, and has ability, to hold to maturity
  - performance measurement not enhanced by inclusion
- Similar arguments could be made for liabilities:
  - lock the rate at issue
  - modify only in extreme circumstances
- Alternative is to mark both sides to market
  - mismatch would affect income

Tillinghast
a Towers Perrin company

Key Discounting Issues

- Portfolio vs. Market Rate
- Locked vs. Floating Rate
- Conservatism / Margins

Portfolio vs. Market Rate

Balance Sheet at 12/31/88	Balance Sheet at 1/10/89	
	Using Market Rate	Using Portfolio Rate
100 | 83 / 17	100 | 83 / 17	100 | 100 / 0
• Matched, Riskless Situation	• No Loss Recognized • Potential Loss Due to Mismatch	• $ 17 Loss Recognized • Potential Gain on Reinvestment

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Conservatism/Margins

The Present Value of Expected Liabilities
Using Market Interest Rates
Is Not The Right Answer

Why Not?

- Fails to provide for uncertainty
- Could not be exchanged for an equal amount of cash
- Not the way the liabilities were priced on their assumption
- Not representationally faithful
- Not good and sufficient

Insurance Business Is Liability Assumption

- Price includes expected costs, plus a return commensurate with uncertainty of liability
- At time of transaction, valuation of liability = price
- Subsequent valuation should include uncertainty element until uncertainty is eliminated

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Butsic Approach - Analogy to CAPM

$$r_A = i + b\,(r_m - i)$$

$$r_L = i - e\,(r_e - i)$$

(Note that r_L can be negative)

Tillinghast
a Towers Perrin company

Companies that are faced with large reserve strengthening and consider the discounting alternative I think understand this and I think it's important that we not simply say -- well, let's have the strongest possible balance sheet, let's be as conservative as possible. We have to understand that by doing that, we are creating capital requirements for the industry -- the extra dollars that get tied up in the reserves. Maybe that's appropriate and maybe that's prudent, but we ought to at least understand that fact and consider it in choosing whatever we feel is an appropriate standard for casualty loss reserves.

Well, what are the issues in discounting? It seems to me there are just three.

The first is they all relate to where you get the interest rate and how you implement the interest rate. Should you use a market rate or a portfolio rate.

The second issue is, once you've chosen a rate for a block of business, should that rate be locked in, or should it fluctuate with market rates or with other changes in circumstances.

The third is, should there be a margin -- somehow, should there be a margin for conservatism in the loss reserve. Bob Butsic several years ago wrote a paper where he argued that one should do that by using a risk adjusted rate to discount the liabilities. Others have suggested that you should just increase the expected losses and not use just straight expected losses.

These are issues that I'm sure will continue to be debated. I know there are people who will feel strongly on both sides of each of these issues -- some who argue that the portfolio rate is appropriate, for example, and that companies in choosing the discount rate, the actuary and other people ought to look to the company's portfolio to decide what discount rate they ought to use. Others feel quite strongly that the market rate should be used or that everyone ought to use the same rate for a given set of liabilities based on the market.

The problem with portfolio rates, of course, is that an identical set of liabilities on one company's books that has its bonds invested at 11% say you would discount those reserves. Another company with a different investment strategy would choose a different discount rate. So, we would have liabilities on the two companies books that were identical, but they would be valued differently. I think there are some technical problems with that.

Some people have argued that the rates should be locked in, as I said. Others say no.

I think I'll just stop at this point and turn the podium over to Wayne.

MR. UPTON: Thank you, Steve. If I may, let me begin with a disclaimer. The FASB encourages the expressions of views by members of the Board and members of the professional staff. The views expressed in this speech are those of Wayne Upton. Official positions of the FASB on accounting matters are determined only after extensive due process and deliberation.

That's the $5.00 disclaimer. The nickel disclaimer is that if anything that I should say insults someone, and experience has shown that particularly during question and answer period there is some probability that that might happen, please take it as a personal insult.

(Laughter.)

MR. UPTON: -- rather than one officially imposed by the FASB. Were the Board to insult you in an official capacity, we would have to issue a discussion memorandum and an exposure draft. We'd need a public hearing. It would take at least five or six years for the message to get through.

I'm going to focus my comments a little more broadly than just the question of loss reserves. In the process, I want to talk about both the FASB project and what I see as some of the tension points or the conflict points between the way accounting standards-setters and I hope accountants in general view this problem, and the way I perceive the actuarial profession looks at the problem. Note that that's a perception. It's someone looking from the outside in at what you folks do.

Just the other day I read an article in one of the corporate accounting magazines -- I forget which one -- by an accountant who was bemoaning the enormous complexity that a project that would require discounting all across the balance sheet would impose on the accounting profession. I would have to agree with him. Well it is that that is not the project that the Board is pursuing.

This project is designed to help the Board build a framework for discounting issues. Indeed, the current uses of discounting in accounting measurement can only be described as enormously complex. There are over 50 places in our professional literature in which we either:

(a) use present value techniques in some way--and we do it differently in every single place or

(b) don't use them--and a reasonable person has got to scratch his or her head and wonder why

I suggest to you that the only thing uncomplex about accounting's existing approach to present value is that, after all, its the devil we know rather than the devil we don't.

Accounting has a circadian rhythm when it comes to discounting. Every few years, whoever is doing the FASB's job -- and the FASB has done this a couple of times too -- runs up against the problem of discounting and present value, beats it to death, and then promises to add a long-term project to build a conceptual framework around the discounting problem. As you look back through history you'll find that just about every seven years, like the seven-year locus, accountants run into this problem and say there will be a better day coming when the conceptual project is done.

That doesn't say that the problem hasn't been addressed and people haven't tried to think it through from an accounting perspective before. Those attempts most of them by members of the academic community, have all failed, and most were probably doomed to failure from the very beginning. I suggest that they were doomed for two reasons.

All of them attempted to impose a new accounting model, a broad model that would apply present value methodologies from the top to the bottom of both sides of the balance sheet. That's likely to fail because accountants don't live in a world that's that tight. We measure different things differently. Always have and probably always will. Indeed, the whole notion of historical cost accounting that some of you may have studied when you took Debits and Credits Number 101, is probably a misnomer. The has never been a pure historical cost world in the financial statements of any company, insurance or otherwise.

The other reason these folks were doomed to fail, it seems to me, is because they started too far down the road. They started with the questions of "how to?" and "when?" without having first resolved to anybody's particular satisfaction the questions of "why?" and "what?".

Why use present value in the first place? Well, it must be because it communicates something that can't be obtained any other way. But none of the previous attempts to address this problem have effectively addressed this question.

As I note in the outline, in the last five years we really have reached a kind of discounting saturation level at the Board. I've given you four examples of different projects, one of them dealing with the insurance industry, in which the Board wrestled with discounting and present value.

You're probably not interested in the rate-regulated world and the whole problem of nuclear power plant abandonment, but in that situation there was considerable dispute over whether or not to discount and what interest rate to use.

In Statement 91, which dealt with loan fees -- and some of you who work on the investment side of the house may encounter this one from time to time -- the Board embraced a discounting and a constant yield sort of a notion, but then imposed a series of restrictions on its use.

In Statement 96 on income taxes, the Board looked very hard at the question of discounting. There were many suggestions from the academic community and from many in the professional accounting community that a deferred income tax liability, being something that was payable over a protracted period of time, ought to be expressed at a present value. The Board made one of those circadian points when it said, "No, not yet. There needs to be a broad project on discounting first."

Finally, in Statement 97 the Board started out with an exposure draft that prohibited an interest method of amortization. Ultimately, in response to well-reasoned arguments from the industry and change of mind by the members of the Board, the final statement went out with an interest method.

You'll note that I've used the words interest methods in describing this project. It's worth stopping for a minute asking, "Why not just call it discounted cash flow?"

From an accounting standpoint, at least, the term discounted cash flow refers to a point estimate that produces a number that is completely encompassed in the present value of one hundred percent of a series of cash flows. So, when accountants speak of a loan being recorded on the present value at its discounted cash flow amount, we can look at the contractual payments--all of them--and look at the interest rate and derive the number that ought to reside on the balance sheet. The problem is that there are a whole series of accounting measurements, including several I've found in the insurance world, that don't fit that tidy notion of discounted cash flow.

On page 2 of the outline I've given you three examples of measurements that incorporate interest, but do not satisfy the definition of discounting I just outlined.

Certainly, you cannot describe the amortization of deferred acquisition costs under Statement 97 in the terms that I've just used.

You can't describe the accounting model for traditional life insurance policies at all in terms of a model that encompasses 100 percent of the cash flows. The traditional long-duration model looks only at the net premium and leaves the profit margin to fall to the bottom line as it's realized.

Finally, the incorporation of anticipated investment income in computing loss provisions--provisions for a premium deficiency loss on short duration contracts--is an interest method but not a present value. Some in the accounting fraternity have described this last example as "left-handed discounting." Having three left-handed children, I'm not sure I'm willing to quite say that.

Since the Board's project will encompass all of these sorts of things, we've chosen to call it interest methods. By which we mean a method that uses this calculus of interest either prospectively, as would be the case in the valuation of loss reserves in the property casualty business, or retrospectively, as some would suggest is the case when we capitalize interest as part of the cost of constructing a building. As I say, we're trying to build a broad project.

The project was added to the agenda about a year ago in October. A task force was appointed and just a week ago today held its first task force meeting. The task force includes a broad representation of people taken from a number of professions in a number of industries. Some of you may know Steve Kellison who was formerly associated with the Academy. He is now at the University of Georgia serving as a nominee from the Academy of Actuaries. We also have two representatives from property casualty insurance companies and one from the reinsurance business.

What kinds of issues are we going to address? Steve identified three of them, certainly. I won't go through all of the shopping list. We see the issues essentially falling in three broad categories.

The first one is the why issue. It's very easy to look at a liability or an asset, and say, I think that that number is best communicated to people as a present value. It's a little bit like the late Justice Potter Stewart, when he said, "I can't tell you exactly what pornography is, but I guarantee I know it when I see it." That can't be good enough, though, if the project is going to build a conceptual toolbox for the Board and others to use in evaluating these kinds of problems. So we really do have to spend a fair amount of time analyzing the why; analyzing what we're going to try and communicate.

That's going to lead into some very basic definitions in this project, including a definition of a term that at least superficially ought to be easy--interest. Having read a series of economics texts on the subject, I can tell you it's not, or those fellows would all have agreed with one another. It's difficult enough, as a matter of fact, that some members of our task force suggested that we not even try.

Second the conditions for present value's use must be defined. Those conditions are governed, in part, by relevance and reliability--two buzzwords from the accounting parlance.

The relevance of the information. Once we've decided what the information is, when is that information relevant as opposed to some other set of information?

The reliability of the information. Reliability in our parlance refers to a combination of things that include:

> Verifiability, the ability of different people to look at a phenomenon and come up with similar answers or at least to agree on the tools by which those answers should be developed.
>
> Neutrality, which to us is an absolutely critical component of reliability -- and I'll talk about that again later on -- and
>
> Representational faithfulness. Does what the measurement comport well with what it represents?

I'll give you an example of how those factors interplay in the Board's notion of reliability. The interest rate on T-bonds is highly verifiable. I can open up the Wall Street Journal five days a week and turn to the page that has the interest on Treasury securities and find the security of the appropriate maturity, and I'll know what that amount is. It's highly verifiable. It may not be at all representationally faithful if in fact what I'm trying to measure is an asset of highly uncertain cash flows.

So, you see the problem. Reliability is not just the ability to identify and easily obtain a number. We have to also reach the conclusion that that number is the right one, the right value to be applying.

Once we've finished off those two main topics then we can get to the how-tos. On page 3 of the outline I've given you what I described as a litany. These are the problems as we see them right now.

I would like to use just one of those as an illustration of the problem of jumping ahead to the how-tos. That's the question of how the interest rate should be determined.

I found it interesting that Steve mentioned the Butsic article. That's one that's made the rounds at the Board quite a bit. I have to admit one that I had a hard time internalizing. Butsic's thesis is that increased uncertainty would, when it's on the liability side of the balance sheet, lead to a lower discount rate. It is one that we as accountants aren't used to dealing with probably because uncertain liabilities are not something that we've measured using present value. We are a lot more comfortable with the relationship on the assets side in which, of course, uncertainty tends to create a higher discount rate, not a lower one.

It's interesting, though, to see how people who are responding to our exposure draft on postretirement benefits wrestle with this notion. That exposure draft calls for the use of a settlement rate and, since those liabilities are not settlable in the market today, provides for a surrogate.

Many people have disagreed with the exposure draft and have said you should use x, y, or z interest rate as the right one to measure this liability. They may be absolutely right and absolutely consistent with their objective. But since in most of their letters they don't set that out -- and understandably so; we didn't ask them to -- it's very difficult to wrestle with the question of the interest rate.

Interestingly, if you'll pardon the pun, several of our task force members, including a couple from the insurance industry, suggested to us that discounted cash flow all by itself is probably the wrong answer for measuring postretirement benefit liabilities and establishing property casualty loss reserves. They favored option pricing models rather than simple discounted cash flow models. If you thought discounting made your life complicated, I guarantee option pricing will absolutely give you chills worse that this air conditioner that's blowing down right on my forehead here.

Steve was right when he identified the accounting for the change in estimate as a critical point. If you look at the accounting literature, you'll find that we've done it every way conceivable.

A couple of other issues that tag on; one that people almost think of as an afterthought. If you record an amount at a present value, the force of time, if my math is right, will force that number to change from one period to another if nothing else happens. When I went to debits and credits school, we called that amount interest. Many people, though are troubled by the fact that we would, for example, record claim liabilities on the balance sheet at a discounted amount and then characterize the annual additions that are going to follow as interest expense. Interest expense, to most folks, refers to contractual interest on a debt, on a borrowing, not the interest piece of a present value computation.

Even if we reach conclusions about what it is we're trying to do, when we're going to do it, and how we're going to do it, we may stub our toes on what to call it. Again, we've had a whole series of proposals. The AICPA suggested in their issues paper "accretion of the present value discount." That's a mouthful even for the FASB.

Let me turn, then, to what I perceive to be tension points or difficulties as actuaries and accountants try and talk about these problems. It's obvious that a series of issues near and dear to your hearts, like claim reserves, are going to come to the surface as we move ahead with this broad project. Being human, none of us can talk about the broad conceptual things for too long without wanting to get down and run our fingers through the details.

It seems to me that there are at least two points that bear observation. The first one is the role of conservatism that Steve referred to earlier. In life insurance accounting, it goes by the name, the provision for adverse deviation. This is a provision for some element of conservatism to reflect the chance that things will not ultimately turn out the way they were projected to.

(The only place in the accounting literature that an explicit provision for conservatism is directly addressed is in insurance accounting. In most other circumstances accountants

would consider that provision for conservatism to be inappropriate and a violation of generally accepted accounting principles.)

That's usually described as conservatism in the measurement. Now, it may seem surprising to most observers of the accounting world, but conservatism is not a characteristic of accounting. As a matter of fact, when the Board described the qualitative characteristics of accounting, it saw fit to explicitly exclude conservatism from the pantheon.

Why? Because conservatism, as it is usually practiced, indicates a preference for systematic understatement of what would otherwise be the preparer's informed best estimate of the world as he or she sees it. In other words, take a best estimate and then add something to it. Pad it. Introduce conservatism. The Board reached the conclusion that financial information is misleading if it is systematically understated. Stated simply, systematic conservatism fails the test of neutrality I mentioned earlier.

Another tension point is the objective. Again, getting back to the why issue. I'm not picking on Steve, but he set me such a perfect foil here in the introduction.

Most commentators don't talk about what the objective is, but if you look at the interest rate, you can at least speculate about what people thought they were trying to do when they applied discounting. On page 5 I've given you a quote from the CAS paper on methodologies regarding loss reserve discounting. It states that because the insurer's actual asset portfolio will involve various types of risk, the interest rate -- and in this case they're referring to the interest rate applied to the development of the liability -- should be based on a hypothetical asset which negates those risks.

What does that say to an accountant? It seems to suggest a couple of things.

First, at least in part the objective of the exercise was to produce a particular net income number. In the life insurance world of FASB Statement 60 that's exactly the objective of the exercise, to produce a particular net income number. Accountants, though, tend to think of net income as the ending point instead of the beginning.

It also suggests to me that the objective, at least in the view of the group that prepared this paper, is to attempt a matching of the asset and the liability side of the balance sheet. Company "x's" liabilities then ought to be measured and expressed as a function of company "x's" assets. As Steve mentioned company "y", having similar liabilities but perhaps different assets, would derive a somewhat different number.

Again, accounting literature rejects that view in most situations. We typically do not look at what I would call a funding rate, or an asset rate, to derive the amount that's appropriate for a liability. If you think back to some basic economic theory, a liability would have a discount rate if you took the money all out and blew it in Las Vegas. The liability still has a discount rate that's appropriate for that liability and has no relationship to either what you did with the money or what you might have done with the money. So, again, there is kind of a tension point here between the way I perceive the actuarial profession looks at this problem and the way accountants do.

It may be that tied up in the theory behind a paper like the Butsic paper is the answer to some of these problems. That a better understanding of the appropriate discount rate will accomplish explicitly what some have attempted to wrestle with under the implicit flag of conservatism.

Well, where does the project go from here? As I said, this is a broad general conceptual project. We're going to look at the broad scope of the project and develop what we call a discussion memorandum. That's a large relatively boring document that attempts to identify all of the critical issues. It attempts to frame the question and to outline in as neutral way as we are capable of doing -- and this is where our task force helps us a lot -- what the pros and cons and the opposing views are. That's the first step in any significant project like this.

This is the only project that I know of where the Board has only said they're going to go that far. We frankly don't know what happens next, but I'll give you a strictly personal speculation.

We could stop. The Board could issue the discussion memorandum, hear what people have to say, conclude all of our predecessors who decided not to take this thing up in the first place were right, and drop it. That's happened from time to time in a series of Board projects. The Board's gone as far as it can go and for one reason or another decided not to go any further.

The Board could, having issued the discussion memorandum, also decide that we've identified a series of areas that are so egregious that they have to be fixed. I suggest that that's almost as unlikely as quitting altogether. Certainly the current seven Board members are not inclined in that direction.

I think the most likely output from the project will be what we call an FASB statement of financial accounting concepts. I think that's consistent with the way I described the objective in the first place. What we want is a tool kit. Or, even better, we want an instruction manual. We've got a tool, it's called present value, and it's a hammer. What we don't have is a real good idea of when a hammer works better than a screw driver or a wrench.

So I think the output of this project, at least at this phase, will ultimately be a set of financial accounting concepts that we can then use going forward as issues come to the Board to try and work our way through them and deal with the problems.

That about concludes that my remarks. I think you wanted to hold the questions for the end, Steve.

1989 CASUALTY LOSS RESERVE SEMINAR
THE FASB PROJECT ON INTEREST METHODS

I. BACKGROUND ON THE FASB PROJECT

A. The project was undertaken in response to a long recognized need for a comprehensive look at the use of interest in accounting measurement--with an equally long history of failed attempts.

1. Accounting standard setters--the FASB and its predecessors--have referred to the need for a project like this on several occasions.

2. Previous attempts to address the issue, usually by academics, tried to develop a comprehensive accounting model based on present value. They were doomed almost from the outset. Accounting uses, and will continue to use, different measurement attributes for different assets and liabilities.

B. In the last five years, almost every measurement issue addressed in an FASB Statement, a staff Technical Bulletin, or a discussion of the FASB Emerging Issues Task Force has involved the question of present value. Those discussions usually cover common ground, but seem to result in very different decisions, for example:

1. FASB Statement No. 90, Regulated Enterprises--Accounting for Abandonments and Disallowances of Plant Costs

2. FASB Statement No. 91, Accounting for Nonrefundable Fees and Costs Associated with Originating or Acquiring Loans and Initial Direct Costs of Leases

3. FASB Statement No. 96, Accounting for Income Taxes

4. FASB Statement No. 97, Accounting and Reporting by Insurance Enterprises for Certain Long-Duration Contracts and for Realized Gains and Losses from the Sale of Investments

C. Why call the project **Interest Methods** instead of Discounting?

1. Discounting usually refers to a point measurement in which the carrying amount of an asset or liability is determined by direct reference to all of the cash flows involved in a transaction or event. Many accounting measurements that employ interest or present value techniques would not satisfy that notion. For example:

a. The amortization of deferred policy acquisition costs under Statement 97

b. The accounting for long-duration contracts under FASB Statement No. 60, Accounting and Reporting by Insurance Enterprises

c. The role of anticipated investment income in accounting for short-duration contracts under Statement 60.

2. As a point measurement, discounting tells us very little about measurements following initial recognition.

D. We use the term interest methods to refer to any accounting measurement that includes interest or present value in determining the carrying amount of an asset or liability.

E. Progress on the project to date:

1. Staff work began in early 1988

2. Added to the Board's technical agenda in October 1988

3. Task Force appointed in July 1989

4. First Task Force meeting on September 11, 1989

II. ISSUES THAT THE PROJECT WILL ADDRESS

The project is not designed to develop a new, comprehensive, basis of accounting. Instead, our objective is to study when interest methods should be used and how they should be applied. With that in mind, we see the issues developing along these lines:

A. Why use interest methods? Stated differently, what relevant information, if any, does an interest method provide that cannot be obtained from some other accounting measurement?

B. When should interest methods be used? What are the conditions of relevant information and reliable measurement that seem to call for use of an interest method? When should an interest method not be used?

1. A short digression about the Board's definition of reliability is in order here. The term is frequently used in ways not contemplated in the FASB concepts Statements.

C. How should an interest method be applied?

Previous attempts to address interest methods in accounting measurement have sometimes jumped to this issue without first examining the first two. As a result, they have fallen into a trap by describing how something should be done without first describing what it is they were trying to accomplish. There are a myriad of "how-to" questions, but we see them in three categories.

1. Estimating future cash flows and interest rates, including:

   a. The future events that should be included in or excluded from the estimate of future cash flows

   b. Whether estimates should be based on explicit or implicit assumptions

   c. Whether estimates should include a provision for risk or conservatism

   d. The extent to which similar items should be grouped together for measurement

   e. How the interest rate should be determined

   f. Whether the interest rate should be constant over the entire period of the measurement

   g. The extent to which measurements of assets should be associated with the measurement of related liabilities, or vice versa

   h. How interest methods should be applied to transactions that include both a financing and some other element, like pensions or long-duration insurance contracts.

2. Accounting for changes in estimate, including:

   a. When and how changes in estimated future cash flows should be reported

   b. How current experience different from estimated amounts should be reported

   c. When and how changes in estimated interest rates should be reported.

3. Other issues, including:

   a. How the interest element of a present value computation should be reported in the financial statements

      For example, if casualty liabilities are recorded at present values, is the change in amount from one year to the next interest expense, claims expense, or something else?

   b. When the use of an interest method should be discontinued

III. SOME THOUGHTS ON DIFFERENCES BETWEEN ACTUARIES AND ACCOUNTANTS IN THE USE OF INTEREST METHODS

There is no accounting **theory of interest**, ergo the need for this project. However, there are some points at which what I perceive to be the typical views of actuaries differ from the typical views of accountants. Two points may serve to illustrate the differences:

A. The role of conservatism in measurement

1. It seems to me that actuaries view conservatism as an element that should be explicitly included in estimates. The provision for adverse deviation in life insurance accounting is one example of this practice. The use of implicit, rather than explicit, assumptions may also serve to introduce an element of conservatism.

2. While some might find it surprising, conservatism is **not** one of the qualitative characteristics of accounting information. The Board made the following comment about conservatism in paragraph 92 of FASB Concepts Statement No. 2, Qualitative Characteristics of Accounting Information:

> There is a place for a convention such as conservatism--meaning prudence--in financial accounting and reporting, because business and economic activities are surrounded by uncertainty, but it needs to be applied with care. Since a preference "that possible errors in measurement be in the direction of understatement rather than overstatement of net income and net assets" introduces a bias into financial reporting, conservatism tends to conflict with significant qualitative characteristics, such as representational faithfulness, neutrality, and comparability (including consistency).

B. The objective of present value in measurement

As mentioned earlier, present value is often employed without a clear statement of the objective of the exercise. One can often discern an objective, however, from the choice of interest rate.

1. The CAS Committee on Reserves made the following statement about interest rates in the committee's Position Paper on the Methodologies and Considerations Regarding Loss Reserve Discounting:

> Because the insurer's actual asset portfolio will usually involve various types of risk . . ., the interest rate should be based upon a hypothetical asset which negates these risks.

This statement seems to suggest that the objective of present value is, at least in part, to determine a particular income statement result. Further, it seems to suggest that the interest rate appropriate to a liability is determined by reference to the earning rate on assets.

2. Most accounting pronouncements reject this approach. An entity's assets influence the interest rate of its liabilities only indirectly, in that the quality of assets affects general credit quality. Accounting tends to take the view that a liability has a unique interest rate that can be determined or estimated without reference to how the proceeds of the liability were spent.

IV. THE FUTURE OF THE FASB INTEREST METHODS PROJECT

A. We plan to issue a Discussion Memorandum in late 1990. A Discussion Memorandum is a neutral presentation of the issues and significant alternative views about those issues. We will solicit comment letters about the Discussion Memorandum and may follow with public hearings.

B. The Board has not determined what the next step in the project will be. The Discussion Memorandum will also solicit comments on how the Board should proceed. There are several possibilities:

1. Do nothing. While it seems unlikely, the Board might conclude that it has learned enough from the Discussion Memorandum to guide further deliberations of specific interest issues.

2. Proceed to amend one or more existing accounting pronouncements. This also seems unlikely, but the Board might conclude that specific areas need "fixing".

3. Proceed to develop a new FASB Statement of Financial Accounting Concepts or to amend existing concepts Statements. This seems the most likely outcome, since our objective was not to alter current practice but to build a framework for future deliberations.

MR. HOLMBERG: Well, I'm supposed to talk to you about the practical company perspective on reserve discounting, and it's going to be very practical. I don't think I could add too much to the theoretical side of this that Bob Butsic and others haven't already written. But I'm a real good worrier and I've thought about these issues a lot and what they would mean for the practical side of a company's operation. I'm going to share some of my worries with you now. These are not intended to be reasons not to discount. They are just intended to identify some concerns you have to deal with once you start discounting reserves.

Before I get onto that, I have to make it clear that these are my opinions only and not those of the St. Paul Companies. They told me several times to say that.

(Laughter.)

MR. HOLMBERG: Before I get into a lot of discussion of the particulars, I want to talk a little bit about why it is that reserve discounting might be considered with a little more interest now than at times in the past.

(Slide #1)

First of all, we've got discounting of reserves for income tax purposes. At the same time that discounting started for income tax purposes, we had FAS-96 which talks about how you account for income tax in GAAP financials. The interplay of those two items appeared to create some problems for insurance companies where they were going to pay taxes based on discounted reserves but they would state their GAAP income with undiscounted reserves.

In many cases this would result in a very high effective tax rate. In essence, you're paying taxes ahead of time, compared to your GAAP income, but you couldn't create a deferred tax asset that would fully offset that. So, that was a very bad thing for many companies that could result in tax rates higher than 100 percent. GAAP financials could be seriously distorted.

Well, the tax law has now changed and it has addressed this matter. Companies can ostensibly pay tax based on undiscounted reserves but then make a special estimated tax payment for the taxes on the discount. This apparently allows the deferred tax asset to be stated at a higher value and erases the problem the companies were originally concerned with.

Nonetheless, this income tax matching of the timing was part of the reason companies started looking more closely at discounting in recent years.

Total return pricing is another current hot topic. Proposition 103 in California required total return pricing on all lines of insurance in California. Companies are looking more at total return pricing anyway because in most ways it's the economically right way to price insurance.

If you're going to price your insurance on that basis, it seems like you should also monitor your results on that basis. Discounting reserves is a large first step toward monitoring your results on a total return basis.

A third reason that some companies might be looking at reserve discounting is the underwriting cycle. When results start to turn bad, it can be tempting to look for something you think might be a quick fix and make your results look better. Initially discounting would appear to do that. However, you have to keep in mind that if you make a change in accounting method of this sort, you have to disclose it in enough detail that in fact no analyst outside your company would be fooled by that. It would be ineffective for making results prettier, but, still, companies might be tempted for that reason.

(Slide #2)

As I said, tax rules changed and allowed for the special estimated tax payment which solves the insurance company's tax timing problems to a large extent. This is a better solution, in my view, than reserve discounting would have been for these reasons.

Reserve discounting decreases conservatism on the balance sheet. Conservatism may or may not be a dirty word, but for those of who value conservatism in the balance sheet, you would lower the amount of your liabilities and therefore have a less conservative balance sheet.

Reserve discounting for GAAP purposes would also not match the discounting that you use for tax purposes. The IRS tells you how to determine your payout pattern and interest rate for tax discounting, and it would be unlikely you would use the same choices for GAAP discounting So, you would end up with a discount that wouldn't match what you used for tax purposes. You'd still have some mismatch of GAAP income and your tax expense and there would still be a lot of complex calculations involved.

A third drawback to discounting compared to a deferred tax asset is that it does require a fair amount of calculation and reconciliation, which I'll get into later.

On the positive side, many people will tell you that reserve discounting gives you a more accurate income statement. I think that is true.

On the deferred tax side, hand, a deferred tax asset will precisely offset the effect of the IRS discount. It results in a smaller increase in your assets than the decrease in liabilities you would have with loss reserve discounting, so you have a more conservative balance sheet. By the same token, you end up with a more conservative income statement.

(Slide #3)

I also indicated that reserve discounting is related to total return on underwriting. There are a couple of big differences, reasons why reserve discounting doesn't capture total return as well as you'd like. One of the big reasons is that there are timing affects other than simply the payout of losses. Your premiums are not received all on day one on each policy. Your expenses may not be paid on day one either. Therefore, you need a model where you can also account for the timing effects on premiums and expenses.

The law for income tax is very complex. The amount and timing of tax payments you would have to make on a given book of business can't really be modeled just by discounting your loss reserves. So, you need a model that takes more into account in terms of income tax.

Then, finally, if you have some other kind of total return profit model, you can look at different alternatives as far as how you invest your assets. You can look at optimal scenarios of how you invest and determine the return under those scenarios.

So reserve discounting alone is not the ideal approach to any of the issues I listed as making reserve discounting a hot topic. If you're going to discount, it should be for long-term reasons.

Once you move to discount reserves, though, there are some practical aspects of this.

(Slide #4)

By discounting you remove implicit conservatism in undiscounted reserves. It may be you don't need that conservatism or you only need part of it, but you do have to recognize that you're removing one source of conservatism in the way that your balance sheet and income statement were stated previously. So, if you feel you need that conservatism, you now have to explicitly put it back in.

Beyond the simple fact that you're removing one margin of conservatism, the discounting calculation itself is based on uncertain parameters. The loss payout and to some extent the interest rate and the amounts that you'll eventually pay, all of those things are not determined when you do your discounting calculation. Therefore you may need a risk adjustment for that uncertainty.

(Slide #5)

If you start discounting your loss reserves, you have a more demanding task of reconciling your reserve changes during a calendar period. Under undiscounted reserves, lots of us are used to looking at runoff reports where you have the reserve that you started with, how much you paid during a calendar period, and how much you have in reserve at the end of the period.

You can't really look at that sort of an exhibit with a discounted reserve and make any sense of it. As Wayne mentioned, if you are dealing with a discounted item, it's going to change through time just because of the fact that you're earning interest in some sense. Therefore you have to have a more detailed type of reconciliation in order to understand what's happening to your reserves.

If you just look at whether paid plus the ending reserve is greater than the reserve you started with, you won't know anything. You have to break it down to different sources of the change in reserve through the period to determine whether you estimated it correctly or incorrectly, and to what extent different parts of your estimate influenced the error.

(Exhibit 1)

This is the purpose of Exhibit 1, which is on the handout.

Essentially this exhibit goes through and breaks down the change in reserve in a calendar period to several different sources. You begin with the discounted reserve at the beginning of the period, you look at how much you expected to pay during the period you're examining -- in this case, 1986. You compare that to what you actually paid in that period.

Column 6 of this exhibit shows amortization of discount, which is the interest earning under the assumptions that you used in your initial reserve discounting, with the payout and the interest rate that you assumed. It shoes what amount of interest you would have earned during that period on assets equal to the beginning reserve.

Column 7 only deals with the change in payout in the current year. This is the effect on discounting of the payments in the current year being different from what you would have projected at the beginning of the period.

You can change your estimate of ultimate undiscounted loss. If you change your estimate, that clearly changes your ending reserve. This effect is shown in Column 8.

Column 9 shows the effect of changing your estimate of the future payout pattern. In each period you get more information as to how these losses are being paid. You may change your estimate as to how the future payments are going to run. That will change your estimated discount at the end of the period.

So, this is the type of calculation you'd have to go through in order to understand where the changes in your reserve are coming from and to understand whether you estimated these different components of the discounted reserve correctly.

If you allowed the interest rate that you used for discounting to change during the course of the year, that would require further reconciliation, which is not shown in this exhibit.

(Slide #6)

What assumptions do you allow to vary after you've finished an accident year and you're going into the future and you're discounting the reserves? What things will you let change that affect your estimate of the discounted reserve?

One thing that you've got to let change is the required undiscounted reserve. You're going to know more as time goes on about the amount of loss that you're ultimately going to have to pay out. Therefore, that change will go through the discounted reserve, as well.

You can also change your estimate of what the payout pattern is going to look like. That will change the discounted reserve.

Finally, you can change the interest rate at every valuation point.

Each one of these factors, if you allow it to change, requires more thinking and analysis in determining how your reserve changes and what the source of that change is.

(Slide #7)

One very practical question that comes up when you start thinking about reserve discounting is that companies have a number of ways of breaking down their reserves. They break down reserves one way in order to do reserve analysis. They also need to break down reserves based on their internal organization so that each business unit is allocated its appropriate share of the company reserve.

You have annual statement line breakdown of reserves which may be used for other purposes by external analysts. You may have other breakdowns within your company beyond these.

Once you start discounting reserves, you have the additional problem of allocating the discount to all these bases. You may determine your discount amount based on the reserve analysis category because it's the best way to project payouts, but you also have to give the discount to the business units. If you're going to report company results on a discounted basis, each unit of your company has to have discounted results as well.

If you analyze reserves on the basis of your internal organizational responsibility, you're probably not going to get anything like the same undiscounted reserve need or the same payout pattern as you get looking at your reserve analysis categories.

Therefore, you're going to have to create some kind of mechanism to make these things come out equal, or else you're going to have to develop tolerance within your company for these things not reconciling. I think it's probably easier to come up with a mechanism for forcing the reconciliation.

(Slide #8)

How do you present your income statement when you've discounted your loss reserves? If you presented underwriting income in the way that it's traditionally been presented, premium minus the paid losses minus the change in reserve minus the underwriting expenses, you're going to have some problems.

You initially establish the reserves for an accident year on a discounted basis. If you simply follow through by showing paid plus the ending reserve, what you're doing is you're treating the change in reserve that happens through time because of the interest being earned as if it's loss development. In my opinion, you need to correct the way you present your income statements so that your insurance income has an offset for the release of the discount in the reserves.

It's also required for a consistent division of insurance income. If you only wrote one year's worth of business and ran it off, traditional underwriting income calculations would show anomalies where you'll have a profit in the first year and then underwriting losses in future years. Offsetting the release of discount would avoid these effects.

(Slide #9)

If you move to discount loss reserves, you have to also take some account of the resources that are going to be required in order to maintain your financial information. Basically payout patterns for losses become a lot more important than they are now. Currently your main concern is what the ultimate is going to be and what you've paid out to date.

Under the discount scenario, you have to worry about what's going to get paid out in each future period. That estimated pattern, to the extent it's in error, will throw off your discounting and your financial status will be stated incorrectly. Therefore, you're going to have devote a lot more effort to this.

Determining a payout pattern isn't a strictly mechanical sort of analysis. You can't just look at the historical shape of paid loss development and assume that's going to continue into the future. There are changes going on all the time, both internal to your organization in the way you settle claims, and in the external claims environment. Your payout pattern is not going to be what it was historically. You need to think about it as much as you can before you discount your loss reserves.

(Slide #10)

Once you state your reserves on a discounted basis, it brings up a logical consequence of doing strategic planning on a discounted basis.

Depending on the process that your company goes through in doing strategic planning, that may or may not be very burdensome, but it's another source of judgment that's going to be going into the plan. Besides the usual process of trying to project your underwriting results and project some investment income, you're going to have to project the payout of all those losses, the interest rate you're going to use to discount the reserves in future periods, and it just creates more opportunity for disagreements when you're setting up your plan.

If you do a lot of variance reporting, comparing your actual results to plan, you're really going to have some potential for headaches in that the payout patterns and the interest rates will be an item that can be discussed almost endlessly.

(Slide #11)

If you do strategic planning on a discounted basis, it seems logical you should also have your management compensation plans based on discounted results. Now that you've got money on the table for somebody, you're really going to have disagreements on all these items.

Setting goals will be just that much more complex, with more things to talk about, more things to disagree on. Once you've settled on those things going in, then you have the pleasure of trying to measure your accomplishments on a discounted basis. People who can see dollars slipping out of their grasp are going to be arguing about the parameters that you chose in discounting.

(Slide #12)

External financial analysts try to look at every company's reserves and determine whether they are short or redundant. They are now going to have a much harder job, if reserves are discounted. It's going to require a lot more disclosure from the companies to give those analysts the information they need to adequately assess what those reserves are, whether they're strong or not, and it's one more source for disagreement between the external analysts and the internal reserves experts in the company. So, you can anticipate more time in talking to financial analysts and the possiblity of more friction in some cases.

(Slide #13)

Finally, some miscellaneous issues.

How do you discount unallocated loss expense reserves properly? The actual payout of unallocated loss expense is probably not known by any company. You can come up with rules you decide to follow in terms of discounting your unallocated loss expense reserve, but those rules are largely going to be arbitrary.

Salvage and subrogation recoverables. If your payout patterns are determined on a basis which is net of salvage and subrogation and you're discounting reserves which are also net of anticipated salvage and subrogation, then I would say you're being consistent and

you're probably coming up with a reasonable answer. But if you tried to discount these things separately, you have another problem. You're going to have to determine your pattern of recovery in salvage and subrogation. Depending on what your company systems are like, this may be a relatively difficult task.

Reinsurance recoverables are another item that has to be considered. For a company where reinsurance has a fairly small effect, this may not be a major item. But on a line of insurance where you cede a lot of reinsurance, or for a company which cedes a lot of reinsurance, the discounted reinsurance recoverable may be discounted using a factor which is very much different from the direct business. The problem of uncollectable reinsurance also arises.

If you're using a net payout pattern to discount your loss reserves, and then it turns out you can't collect your reinsurance, that's going to affect the payout pattern for your net reserve and it could have a large effect on what you would state your liabilities to be. So, it's a further concern that some companies need to have.

That concludes my prepared remarks.

(Applause.)

SAMPLE LINE OF INSURANCE

EXHIBIT 1
Page 1
R. Holmberg

RECONCILING DISCOUNTED RESERVE

ACCIDENT YEAR (1)	DISCOUNTED LOSS RESERVE 1985 (2)	EXPECTED LOSS PAYMENTS 1986 (3)	ACTUAL LOSS PAYMENTS 1986 (4)	DIFFERENCE ACTUAL VS EXPECTED LOSS PAYMENTS (5)	AMORTIZATION OF DISCOUNT (6)	DISCOUNT EFFECT OF UNEXPECTED PAYOUT (7)	PRESENT VALUE OF CHANGE IN ULTIMATE (8)	EFFECT OF CHANGE IN PAYOUT PATTERN (9)	RECONCILED DISCOUNTED LOSS RESERVE 1986 (10)	ACTUAL DISCOUNTED LOSS RESERVE 1986 (11)
Prior to 1977	$27,600	$5,895	$4,500	($1,395)	$1,185	($150)	$1,241	$0	$25,375	$25,375
1977	7,223	675	800	125	331	17	(45)	(5)	6,721	6,721
1978	9,872	785	1,300	515	465	88	505	(11)	9,619	9,619
1979	13,240	1,825	1,200	(625)	679	(128)	(1,142)	(32)	11,417	11,417
1980	10,946	1,813	2,200	387	684	99	726	(54)	10,200	10,200
1981	13,729	3,170	6,600	3,430	1,108	1,146	2,745	(108)	12,020	12,020
1982	17,761	4,725	3,900	(825)	1,406	(277)	988	(177)	15,801	15,801
1983	37,957	13,719	9,900	(3,819)	2,216	(1,012)	(2,084)	(288)	26,889	26,889
1984	74,368	29,851	35,000	5,149	4,658	1,367	5,990	(669)	50,714	50,714
1985	92,960	40,391	47,000	6,609	5,191	1,489	9,742	(807)	61,575	61,575
1986			15,000						73,431	73,431
TOTAL	$305,655	$102,849	$127,400	$9,551	$17,922	$2,638	$18,666	($2,151)	$303,761	$303,761

EXPLANATION OF EXHIBIT

In the following, "initial payout assumptions" means the payout pattern assumed for each accident year in discounting the beginning (12/85) reserve. "New payout assumptions" means the payout patterns assumed in discounting the ending (12/86) reserve. Explanation is by column number.

(3): The loss and loss expense payments that would have been expected to be made in 1986, based on the initial payout assumptions and the outstanding reserve at 12/85.

(6): Theoretical accrual of interest on the reserve in Column (2), calculated as if the expected loss payment had been made, using the interest rate assumed in discounting the 12/85 reserve.

(7): Column (5) X (1.00 - (12/86 discount factor based on initial assumptions)).

This is the timing difference realized in 1986, comparing expected payments to actual. It can also be interpreted as an adjustment for the effect on future interest earnings of current payments being higher or lower than anticipated. The 12/86 reserve must be increased or decreased to offset this anticipated loss or gain of interest.

(8): (12/86 Undiscounted Reserve - (12/85 Undiscounted Reserve - Column (4))) X (12/86 discount factor based on initial payout assumptions).

(9): (12/86 Undiscounted Reserve) X (12/86 discount factor based on new payout assumptions - 12/86 discount factor based on initial payout assumptions).

This isolates the effect of the change in the projected shape of payout patterns beyond 12/86.

(10): (2) - (4) + (6) + (7) + (8) + (9).

(11): (12/86 Undiscounted Reserve) X (12/86 discount factor based on new payout assumptions). Should equal (10).

FORCES ENCOURAGING RESERVE DISCOUNTING

1. **Discounting for income tax creates a timing mismatch between income and tax expense.**
   a. **FAS 96**
   b. **Section 847**
2. **Total Return Pricing**
3. **Underwriting Cycle**

COMPARISON OF DEFERRED TAX ASSET VERSUS RESERVE DISCOUNTING

DISCOUNTING:

1. Decreases balance sheet conservatism.
2. Will not match IRS discounting, so some mismatch remains.
3. Calculation and reconciliation.
4. More accurate income statement

DEFERRED TAX:

1. More precise offset of IRS discount.
2. More conservative balance sheet.
3. More conservative income statement.

SLIDE 3

RESERVE DISCOUNT VERSUS TOTAL RETURN ON UNDERWRITING

1. **Timing Effects on Premium and Expenses**

2. **Income Tax Amounts and Timing**

3. **Investment Alternatives**

NEED FOR CONSERVATISM IN DISCOUNTED RESERVES

1. Discounting removes implicit conservatism.

2. Discounting parameters are uncertain.

SLIDE 5

RECONCILING CALENDAR-PERIOD RESERVE CHANGES IN A DISCOUNTED FORMAT

1. Analog to Runoff Report

2. Distinguishes Sources of Reserve Development

3. Exhibit I

RESERVE DISCOUNTING ASSUMPTIONS SUBJECT TO RETROSPECTIVE REVIEW AND REVISION

1. Required Undiscounted Reserve

2. Anticipated Payout Pattern

3. Interest Rate

DISCOUNT BASED ON DIFFERENT BREAKDOWNS OF COMPANY RESERVE SHOULD RECONCILE

1. Reserve Analysis Category
2. Internal Organization Responsibility
3. Annual Statement Line
4. Other

OFFSET OF RELEASE OF DISCOUNT IN INSURANCE RESULTS

1. Distinguish between adverse development and expected release of discount.

2. Consistent division of insurance versus non-insurance income.

PAYOUT PATTERN ANALYSIS - RESOURCES REQUIRED

1. Crucial to Financial Status

2. Not a Mechanical Process

3. Anticipate Changes

SLIDE 10

STRATEGIC PLANNING ON DISCOUNTED BASIS

1. More Judgment in Plan

2. Complex Variance Reporting

MANAGEMENT COMPENSATION PLANS

1. Setting Goals on a Discounted Basis

2. Measuring Accomplishments on a Discounted Basis

EXTERNAL FINANCIAL ANALYSTS

1. **Increased disclosure will be required to enable external analysis.**

2. **Opportunities for significant disagreement multiply.**

DISCOUNT OF OTHER RESERVE ITEMS

1. **Unallocated Loss Expense Reserves**

2. **Salvage and Subrogation Recoverables**

3. **Reinsurance Recoverables**
   - **Uncollectable Reinsurance**

1989 CASUALTY LOSS RESERVE SEMINAR

4F-1: TRENDS IN DATA COLLECTION AND MANAGEMENT INFORMATION SYSTEMS

Moderator

Mark Savory
Coopers & Lybrand

My name is Mark Savory and I am a Partner at Coopers & Lybrand in New York in the Insurance Industry Practice. I am here today to talk to you about Trends in Data Collection and Management Information Systems. Although I work for an accounting firm, I am not an accountant. I am a systems and operations person by background, actually out of the insurance industry. Personally, I spent a little over ten years with the Hartford Insurance Group. A good deal, if not all of that time, was in commercial casualty systems and operations. Since 1981 I have been in the consulting business, among other things, and have spent a fair amount of time on information systems in the property/casualty insurance company underwriting environment.

What I will be speaking about today is a little bit of futures, what is likely to be coming down the pike and what some of the implications of that are for you in the actuarial business. I want to touch base on some technology trends, generally four basic trends that are affecting the business of insurance. I will discuss how they might play into the operations of an insurance company and then focus on the implications for you and the kinds of data that you get to deal with, be it in loss reserving or in pricing and other kinds of projects and studies that you have to address.

Lastly, I will talk about the data base design process, focusing on something that I think you might be personally involved in at some point in your career, which is helping to determine what should go into an automated data base to support you in your needs for information to support the kind of analyses that you do.

The first trend I want to open up with is a trend in data base technology. Perhaps you have heard of these three terms to begin with: hierarchical, network and relational. Clearly the buzz word of today in most MIS circles is relational data bases. IBM has one (listed on the chart as DB-2) in the 1988 to 1990 timeframe. What that means, for those who are not familiar with IBM, is that they announced it in 1988 and they got it to work around 1990 or thereabouts. I will touch base later about some of the inherent problems in using some of these new technologies and what it may mean to you.

There are some others that pretty competitive in the industry right now. Oracle and Ingress are two other products that are beginning to get acceptance within the insurance industry as software packages that are repositories of information that actuaries among others may want to use.

Oracle is finding applications in the field of artificial intelligence, and I will talk about how it plays into the insurance industry a little later.

The forecast is something that we call data base machines. What is a data base machine? A data base machine is a computer that basically is devoted to nothing other than managing a data base. It doesn't really run application programs. It does all of the maintenance work that today is incorporated into application programs. This machine does all the maintenance work associated with keeping the data base up to date and allowing other computer systems that

you may use, such as your personal computer or some of the transaction processing systems that access data bases, to get at that information.

To throw a name against this particular concept, there is a firm called Tera Data that has been making some splash in the industry and is beginning to approach insurance companies about finding ways to off-load the data that is currently contained in the IBM mainframe environment. Tera Data does work with IBM mainframes into a Tera Data type machine to improve access, improve throughput and processing efficiency.

So this is kind of a trend. I think relationally it is important specifically to you in the actuarial function because one of the classic problems that actuaries have had over time is that the data is not organized right.

Historically, data in insurance companies tended to be organized for purposes of policy issue or policy maintenance and put in order of policy numbers, and that is not really the way most of you like to look at it. You like to group it by class and by subclass and get the premium records and put them together with loss records and see what the experience is.

So right from the beginning there are some trends that I think will affect you in a macro sense. The benefits fundamentally are that relational data bases are generally easier to understand. It is a more natural form of the way we are used to thinking of data, and in particular, it has kind of an array structure to it, so those of you who are used to using array-oriented mathematics will find it a little bit easier to deal with.

It has easier understood end user interfaces in that there are some facilities and languages that are being designed to work with relational data bases and those of you who can master things like Basic and APL should be able to master this as well.

It is not a one-for-one trade-off, however, and there still are some implications when we get into some of these issues, such as performance. If you were to go after the commercial casualty workers' compensation main transactional processing data base in your company with one of these languages, you might very well stop transaction processing for the day or thereabouts. There still are performance issues, but there clearly is a new capability and a new range of capabilities that we haven't had before in terms of things like query by example, English language-like queries that can allow you to scan and compile information out of a relational data base.

Performance is one issue. Some of the data bases in an insurance company obviously get very large. What I am referring to here with that term is that the queries can become very complex, and that is impacting on-line transaction processing. You can have a negative impact if you are not careful.

What a lot of companies are doing at this stage in the game is still extracting information from transaction processing files and putting it in a separate Oracle

data base, and in fact in most cases, loading that Oracle data base into a separate machine.

The second issue with relational data base is the maturity of the products themselves. They haven't all been around for very long, so security, integrity and in some cases actually correctness or accuracy of information is, still a bit of a problem--less and less as time goes on.

What do data bases do in practical application? Well, one of the things they do is take the processing load off of your main transaction processing computers and put it into a separate environment where it can be better controlled.

Secondly, the data base machines are beginning to utilize a form of hardware technology known as parallel processing. As a practical matter, what that means is that you open up multiple channels, multiple access paths to the data base that can be used concurrently, not exactly simultaneously, so that different people can be going at different parts of the data base and getting good response time and good access to it.

Lastly, data base machines fit in well with distributed data bases and processes. More and more we are finding departmental level computers--it has not been a completely new development in the actuarial function that you may have a separate computer, in some cases not even an IBM computer, digital or a Hewlett-Packard, in the actuarial department for doing some of your analysis. The data base machines seem to be able to support the distribution of data on a more timely basis and therefore provides some advantages there as well.

Before I used the term "distributed processing." It might be well to try and define that term and talk about what was and what is coming about now. Basically, distributed data processing in this context is where you do some of the processing someplace else other than where the central data center has historically done it. There may be some control functions, in and output functions and some analysis functions.

You might have had a minicomputer or minicomputers in different departments and terminals associated with those minicomputers. It was usually a fairly structured, standardized kind of network.

What we are now finding in a distributed data processing environment is a variety of types of networks, ring networks--we still have got many computers with terminals on them in some cases--and PC networks that tie into at various levels of the centralized data processing facility. I think we are going to see this more and more. What it means is that the technical environment becomes more complex, but also at the same time, brings with it more capability Exactly which capability winds up in which location gets to be a fairly significant planning issue for your MIS department in terms of getting the data out of the central mainframe into your environment.

Just to try and tie these concepts together in the not too distant future, I would say the 1990s as opposed to 1990 exactly, but a concept whereby in the data center itself you have got a parallel processor to support the data bases, providing access paths, multiple concurrent access paths again to you out in your department, where you have some distributed processors that access some of that information, update it, refresh it periodically as new transactions occur, and that allows you to rerun, update and refresh your analysis of loss development factors or trend factors or whatever particular type of information you are particularly interested in.

I say the 1990s because some of these boxes that support the data base machines are fairly expensive and your companies are going to have to work through what, is the cost/benefit analysis to having it done this way as opposed to having it done the historical way.

There is also a fair amount of internal technical systems programming that needs to take place to shift from one to the other, so that the migration may be a few applications at first and not just you walking in the door in December of 1990 and there it is sitting on your desk. In fact, you are going to be asked in all probability to participate in some of the design work associated with creating the types of data bases that will be used in this environment.

The second significant trend is expert systems. You see a lot in the literature, be it data processing literature, Best's Review, or National Underwriter about expert systems or artificial intelligence.

Just for today's discussion, let's talk about what is an expert system. Well the definition we find fairly useful operationally is that an expert system is something that handles relatively complex problems requiring an expert's interpretation and uses a computer model of the human reasoning that classically is used on that problem.

The thing that makes it an expert system, is that we can reach the same conclusions as the expert with a very high degree of probability or a very high degree of confidence, and, by the way, a good expert system will be verified before it is put into production as to the confidence level of its decision making.

By high degree I mean on the order of ninety to ninety-five percent correlation between the way the system would decide the issue as compared to the way a human being would decide the issue.

How do these work? What is it that distinguishes an expert system from the kind of a classic system that might be programmed in COBAL and process for commercial lines rating, for example?

Well, there are a couple of things. First of all, an expert system has with it something called a knowledge base. The knowledge base is distinct from the data base. In the knowledge base we incorporate rules and regulations.

Where do we get those rules and regulations from? Well let's use underwriting as an example because as we will see in a minute, underwriting in the property/casualty industry is the area where most of the work on expert systems is currently going on.

We will talk to a group of senior underwriters in the company and we will ask them in a fairly structured way called knowledge engineering, "How do you decide? How do you accept a risk or reject a risk?"

This is usually done in very great detail over a period of some number of months to build a knowledge base that says this is how company A views workers' compensation risk, or this is how company A views general liability. These are the ways in which we evaluate the exposures and determine whether or not we want to accept the risk.

These rules may include sometimes looking at the traditional factors such as pricing and loss experience from past history, but it will also include all the kind of things that underwriters have historically said "It's my gut, you know; I don't like things from that agent because I have a lot of problems with that agent."

We'll talk more about how to evaluate an agent whether it is a good agent or a bad agent and what is good business from that agent and what is not-so-good business from that agent?

These get incorporated into something we call a knowledge base. The expert system itself is really quite simple. It has elements within it that allow those rules to be interpreted in any given case. It looks at the data that is supplied. It looks at the knowledge base and it says, "Applying these rules in the knowledge base we get these levels of confidence," so that if you said to accept the risk it would be a good risk.

What is so magical about it? There isn't a lot of magic other than a programming capability called LISP. Most expert systems have that type of capability at their heart. LISP is basically a list processing kind of programming algorithm as distinct from a procedural kind of programming algorithm. Most of the programming that has been done in insurance to date, rating programs for example, are procedurally oriented. You lay out a series of procedures together with formulas and they calculate a rate for risk and a premium for risk.

In the case of expert systems, the programming is done using a technique that involves comparing lists of rules against conditions that exist. The LISP processors are machines and software that are designed to do that kind of comparison efficiently and relatively quickly, as well.

So if that is the fundamental difference in terms of programming systems or technology that underlines expert systems, the fundamental difference in actual practice is the areas that you apply them against, because you now have a programming capability, in essence, that you can use and apply against rules of

thumb, gut feels and things like that, which were pretty hard to write down and deal with in a procedural sense in the past.

Status today (today is really more like the end of last year, the last time we did a survey of the insurance industry) is that about sixty-five percent of the companies, the largest insurers ("largest" being defined as the top one hundred) are doing one of the following things: They are either using them, fewer using than developing, or actively researching expert system applications.

Underwriting is clearly the primary area of interest. Underwriting which came in in the survey we did place as high as claim adjudication or claim administration, and that was number two, and then they drop off rather rapidly down to marketing and some other areas.

What is the impact of these systems? The perceived impact in most cases where people haven't got them in production yet--the impact is first of all improved quality in the underwriting process and quality here is pretty well defined as consistency. Underwriter A begins to do things pretty much the same way as underwriter B, pretty much the same way as underwriter C. There is less variation.

Third, there is some increase in productivity, although that turns out not to be the primary motivation for using expert systems. I think the first two taken together, quality and consistency, in this home office underwriting management's minds, begin to go toward getting better loss ratio to the degree that you are right about your underwriting guidelines. If you can get everybody out in the field in the branches to do it "the right way" you should get better underwriting results.

There is some increase in productivity also because over time we get through the more routine kinds of evaluations quicker than we would otherwise get through, so we don't need quite as much of an effort from an underwriter's standpoint.

The last impact is probably the most significant one, I think from an actuary, which is that as a by-product of using an expert underwriting system we are beginning to capture in machine readable form types of data you never had available before.

We now begin to get information on the types of exposures. These are some of the types of data elements that an expert systems will typically include that you didn't really have before--types of exposures in more detail, more descriptive kinds of information; qualitative experience, in terms of what was an actual source of some of the prior losses, and evaluations of some other areas that you don't really get in today's system at all--the management of the risk, since management is not one of the factors in most people's rating plans; related coverages, since related coverages except in the case of active policies is not at all in anybody's rating plan; and agent information, where that agent information is used to influence the decision, yes or no, do we take this risk.

Agent information, we coincidentally find, in these systems is usually not a primary indicator or is not used as a primary indicator, but it is used to qualify some of the other primary indicators about a risk, and basically what we are saying is that we make a judgment about the quality of the information or reliability of the information that has been given to us as underwriters by its source, with some agents being better sources of primary information than others.

Another implication of expert systems is the use of relational data structures. The expert systems software are heavy users of relational data bases.

So it begins to structure this information in a way which ultimately is perhaps a little bit more useful to an actuary as the data moves through the system and comes out the back end and perhaps goes into the kind of data base that you would use for pricing analysis or loss reserve analysis.

The ultimate step we see is that you are going to begin, if you haven't already, to talk to your company about underwriting work stations. The early expert systems were generally stand-alone systems run in a PC or a specialized computer environment that didn't interface directly to your premium processing or your policy issue and policy maintenance systems.

More and more as the expert system moves from research and development and actually out into production implementation, people are saying "I don't want two computers out there. I want to create something called an automated underwriting worksheet, and once I talk about creating an automated underwriting worksheet, I basically begin to have an underwriting work station."

This underwriting work station can then pass information up to the policy processing or premium transaction processing systems and it can access information and pull it down for renewal underwriting purposes.

It can, for example, at renewal time access this year's loss experience plus any other changes that have occurred in risk characteristics and pull that information down. You don't have to input it all again.

So things are beginning to be tied together. As expert systems become more prevalent in the underwriting function, I think you will see people begin to move toward providing automated underwriting worksheets as a way to begin to move data into some of the other systems. That means that ultimately it becomes available to you.

So now we have the stuff in the machine, things you didn't have before. How do you get at it and what do you do with it?

Well, one of the things that should help is high-level programming languages. What is a high-level programming language?

I think a formal definition is a programming language that does not reflect physical data structures of any particular computer or operating system. In other words, something that you can learn that will operate across different types of data bases and perhaps across machines.

I think that is a little bit more the ideal at the moment, and not to push anybody's product, there is a product called Ideal that is a little bit more the ideal than a practical reality.

Let's try and get a little bit more practical definition. Basically, there are two types of languages, data dependent--and I would add to the top of this list, again for those of you who have some programming experience I would add APL and Basic to the top of the list. APL and Basic together with Assemble that you almost never hear of anymore, PL-1 which you sometimes hear of, and Fortran and COBAL, which you probably hear a lot of--are data dependent in the sense that you have kind of embedded within the program's definitions of data and files and where to access the data and how that data is structured in its relationships.

These are some examples of the higher level languages. We have listed data base products again like Oracle, because Oracle comes with some language to access it, or Focus is kind of approaching a higher level language, or Ramus. I use Focus as an example because there are different forms of Focus that will access different data bases.

Ramus, Ideal and SQL begin to become independent of the data. You can write a program and define the data separately from it and then move the program from one data base to another or use the facilities more correctly, use the facilities of something like DB2 or Oracle to find the data for you in the data structure and to put it together the way you want to view it and kind of ignore the things that you aren't interested in and keep them out of your way.

Nice as they may sound, high level languages come with some advantages and disadvantages, just like data bases and expert systems.

Advantages. Clearly, the second point up there is probably of most interest to you--end user reporting and data query. This gives you a facility to get at the data yourself so you don't have to go over to the programming systems from the programming department and wait six weeks for somebody to come back with a report or special run.

It provides some benefits also specifically to the people in a systems environment. These are good prototyping tools. They allow people to do some definitional work and some design work and kind of mock it up and get a mini-version of it running to show to the operating people how this might work. Lastly, it helps to reduce the application backlog.

Believe it or not, a good MIS organization will, in fact, welcome the use of these types of facilities because they have got more than enough work to keep them

busy probably for the next two or three years, so it is helpful ultimately in terms of the productivity of the organization.

There are some disadvantages, however. They are not the most efficient use of resources. They take a lot of computer time and disk space and actually they require some technical management, that you wouldn't otherwise have to try and keep it under control.

They are poor as transaction processors. One of my competitors who shall remain nameless tried to use one of these facilities to develop a transaction processing system for a state motor vehicle department and wound up having to spend an awful lot of time doing it, because they don't really do a good job at high volume transaction processing.

They are not effective with complex searches. Back to the issue of large data bases again, you probably don't want to try and run through your on-line commercial workers' compensation transaction processing data base because it will slow it down a lot, but they are good where you can extract information and set up an extract data base for purposes of analysis.

What does all this mean? What are the implications to you in your job in the years to come?

Well, first of all I think we have already highlighted that there is going to be more data available. There should be more types of data available. You can begin to think in terms of rating plans where you can begin to think in terms of types of correlations or analysis against underwriting factors that today aren't in your data bases.

There should be higher quality information, as well, as the data base technology improves in particular and as we move more the processing to distributed sense we should get accurate--we should improve the accuracy. By off-loading editing out to the field, for example, we should do a better job.

There will be more tools available to organize and store and to even compile the data and you should, as a byproduct of that, actually have more direct access with some security limitations, and as we have referred to, probably some performance limitations in terms that they are not going to want to get at the transaction processing files but more set up specific data bases for your own use.

Now, there are some other things that need to be taken into account. That is the technology. The technology doesn't get there by itself. You have to make a conscious decision. The company has to be willing and able to build the application systems to apply the technology and to use it. That is going to mean probably some sizeable projects to collect and organize the data.

Secondly, to enable the access tools, you can buy the software but you are in some cases personally going to have to learn how to use some of it and your

MIS organization is going to have to learn how to use some of it. That means some investment in training the staff as well.

The dollars, unfortunately, are going up not down. Everybody talks about how the prices of hardware are coming down. Per megabit, processor cost has dropped like crazy over the last few years or so.

Unfortunately, software costs are going up, however, as the hardware costs go down the software costs are going up and it is amazing. DB budgets kind of stay where they were or go up each year. I think those are still issues that are going to have to be wrestled with.

I would like to stop now just to see if there are any questions or comments that anybody would like to raise about what we have talked about so far.

QUESTION: Your point about the high level languages I know our company just got Ideal and we like it very much, but when the users started using Ideal I thought we had pretty good response time?

ANSWER: The question fundamentally is, how practical are the uses of some of these high-level languages such as Natural and Ideal, given eleven-hour run times to do some type of analysis.

I think it is practical in a sense that somebody is going to have to think through carefully the structure of the data base and how we are going to use it.

You are right. I have one client who is now devoting an entire machine to the use of their high-level language. They learned the hard way that early usage, the same kind of experience, is going to choke the computer. We can't afford that, it impacts our transaction processing. So they ultimately made the decision that they are going to have a time-sharing machine fundamentally for the use of people who want to use those high-level languages, and that is where this concept emerged that we are going to provide extracts of those data bases over on this separate machine and, yes, if we take too long to run there it is not going to be as adverse to the company.

I think that, as a practical matter, is what you are going to have to do for a while, until some of the data base machines come along, is speed up the process a bit.

Any other questions or comments on the trends?

QUESTION: Would you include COBAL as a high-level language?

ANSWER: No I would not.

QUESTION: It looked like you had two groupings. How would we classify COBAL in this environment and how does it relate to high-level languages?

ANSWER: Generally, the idea behind high-level languages is to be independent of hardware again. To fit with the existing data bases and teleprocessing systems to some degree, DB-2 in here, some of the newer languages are just designed for some of the newer data base types, and lastly, through COBAL generators and COBAL restructuring tools to keep COBAL alive and well.

I think COBAL is going to be around for quite a while for two reasons, especially in the insurance environment. One is just an unbelievable inventory of application code that has been written over now ten to fifteen years, that if you set about tomorrow and you went to replace it all, it would be in the millions and millions and millions of dollars. With the cost of programming going up and the cost of some of the software support facilities going up, I don't think very many companies are about to undertake a wholesale replacement of COBAL.

The second thing, it still is not bad. As a transaction processing language it has survived the longest of any of them. It has still got probably the widest pool of people out there who know how to program it. It is believe it or not, relatively efficient to program with some of these kinds of facilities.

There has been a noticeable improvement in how quickly code can be generated of a transaction processing nature, and we have improved productivity through things like case tools and structured programming techniques and COBAL generators.

A COBAL generator, by the way, for those of you who are not familiar is a program that looks like a high-level language except that the output is COBAL code. You have high-level statements and it in turn generates COBAL code, usually incomplete. Usually it is about eighty percent of a program that you get out of a COBAL generator and then a programmer has got to pick it up and refine it and work with it from that point on, but the process is probably--various results of studies indicate that it takes maybe from a half to a quarter the amount of time to develop a specific application system in COBAL using the COBAL generator as compared to historical, what I call the cottage industry approach to COBAL. So I think for that reason it is going to be around for a while.

QUESTION: You said that some companies are off-loading data base monitor computers for processing. What is the size of file that gets off-loaded from the company's main transaction processing system for purposes of analysis?

ANSWER: Actually, the company I am thinking of in particular devoted a Thirty-Ninety. That is a pretty good sized PC. Essentially, all that Thirty-Ninety does is two things. It manages and deals with the data bases--the analytical type data bases, not the transaction processing data bases--and it also provides the access software support, the time-sharing kind of support to get at those data bases.

What people are doing is using some of these language facilities to go in and do some primary searches, primary analysis and producing some summary

files, which then find their way into either a PC environment or into a minicomputer environment.

QUESTION: How would we envision expert systems potentially being used in loss reserving?

ANSWER: I can't tell you that as a matter of fact we have seen a lot of work in that area at all. Again, the primary uses of expert systems to date have been in underwriting and in some cases in very sophisticated and very complex underwriting. I am thinking of a couple of applications in particular that we have worked with clients on in the reinsurance business--treaty underwriting, for example, both property treaty underwriting and casualty treaty underwriting.

In the area of losses or claims I think most of the work so far has been done insofar as reserving is concerned in regard to case reserving, where there is a lot more fundamental data or information. I shouldn't say data. It is more qualitative information that we deal with in determining what the case reserve should be or when case reserves should be reviewed. I haven't seen very much done from an actuarial standpoint in terms of the use of expert systems yet.

I think that if I can kind of hypothesize about it, I suspect that is because the actuarial function is more quantitative model oriented as compared to the underwriters, who are a little bit more qualitatively oriented, or the claims supervisors out in the field, who are making judgments about severity of injury and things like that that influence their estimates of case reserves.

So I would say case reserving is the primary area in loss reserving where expert systems have been applied directly.

I think the implication for you as actuaries in loss reserving is more in the future, the kinds of information you should find in your systems to be able to do an analysis on.

I am going to stop here just to make sure we cover everything we said we were going to cover in the data base design process. Basically what I want to highlight here is that there are a number of steps to creating a data base. Actually, I am going to put up two slides. This one just kind of identifies what the basic steps are. Design is the first one, but there are five other steps you have got to go through before you actually get the data, and that is partially why it takes so long.

You have got to go through a physical creation, conversion, integration, some operations, and then you get kind of back into maintenance.

The design process itself typically also has a number of steps in it. I would like to just identify what these are, because I think this is where you would wind up participating most directly in this.

The first is identifying entities for the enterprise and the applications for the data base. Actuarial analysis is clearly one of them. Secondly, defining those entities and their relationships, and that is a fairly involved process sometimes referred to as normalizing the data base.

The output of that is a data dictionary, which you will have to become intimately familiar with even if you use high-level languages to understand what is in the data base. That is typically built through a modeling process: conceptual model, logical model and physical model, and then it is kind of an iteration that people go through to optimize the design.

I apologize for taking a little bit more time than we were allowed. If you have further questions, I will be glad to stay around for the next ten minutes or so before the meeting gets taken over.

Thank you.

TRENDS IN DATA COLLECTION AND MANAGEMENT INFORMATION SYSTEMS

Casualty Actuarial Society

September, 1989

Mark Savory
Coopers & Lybrand

AGENDA

- Technology Trends
  - — Data Base
  - — Distributed Processing
  - — Expert Systems
  - — High Level Languages
- Implications
- Data Base Design Proces

Trends in Data Base Technology

Three Types of Data Bases:

Hierarchy
Network
Relational

1970 ⟶	Hierarchy	(IMS, Total)
1980 ⟶	Network	(IDMS)
1988 - 1990 ⟶	Relational	(DB2, Oracle, Ingres)
1993 ⟶	Data Base Machines	

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Relational

Benefits

- Easy to Understand
- Easy to Use
- Easily Understood End User Interfaces (e.g.: Query by Example)

Issues

- Performance
  - Large Data Base
  - Complex Queries
  - On-Line Transaction Processing
- Maturity of Product
  - Security
  - Integrity
  - Correctness

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Data Base Machines

- Off Load Data Base Overhead to Separate Processor(s)
- Parallel Processors
- Distributed Data Bases and Processes

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Distributed Data Processing

Data Processing in which some or all of the processing, storage, and control functions, in addition to input/output functions, are dispersed among data processing stations.

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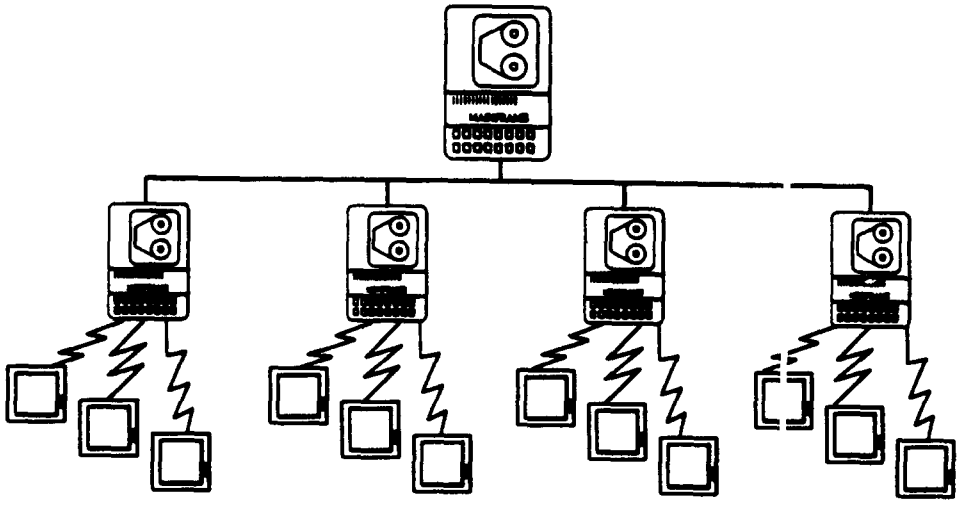

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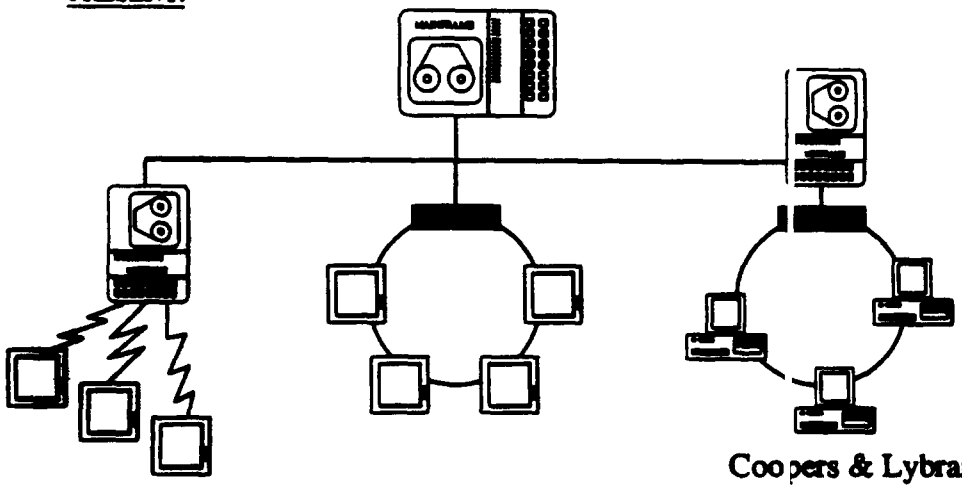

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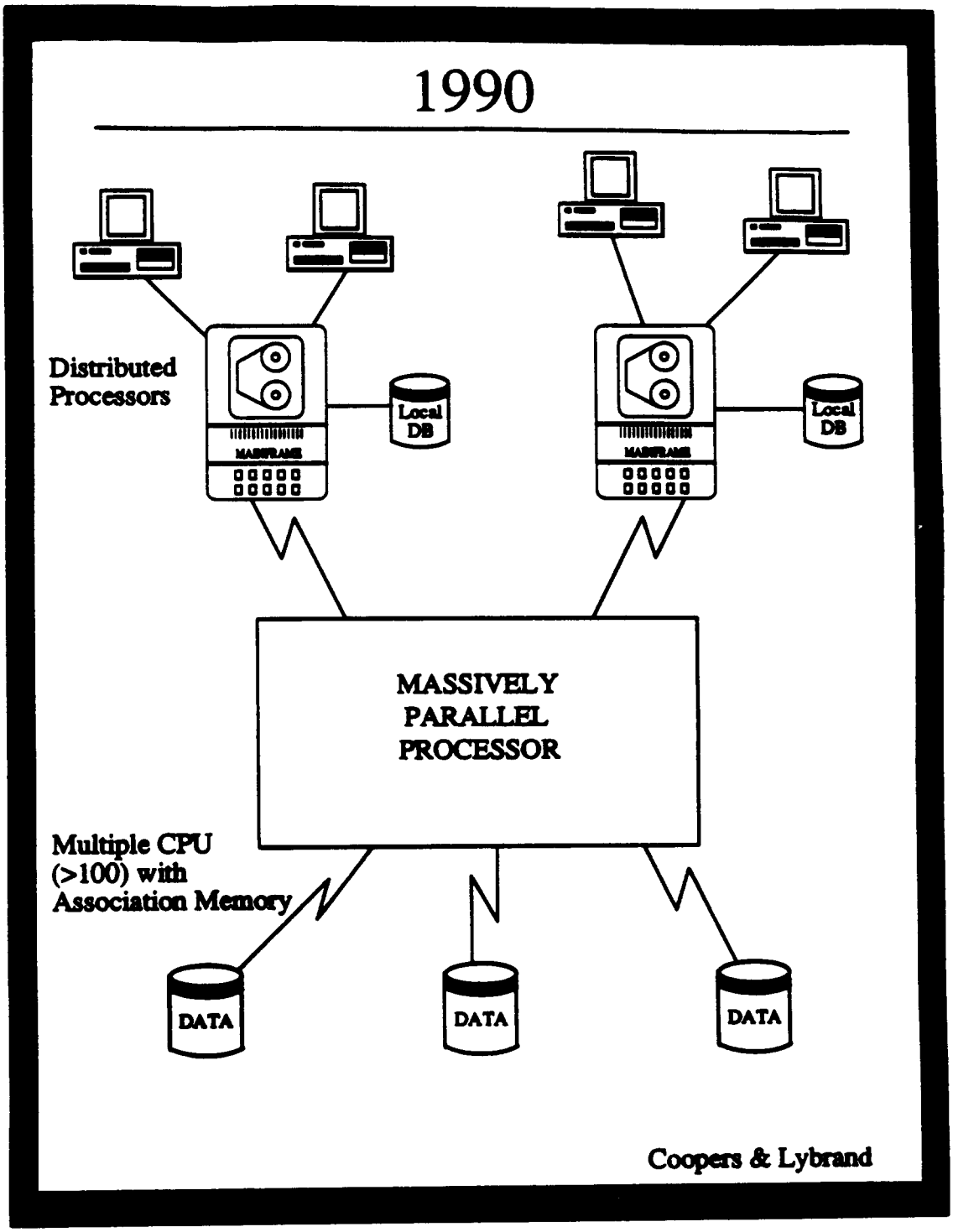
1990
Distributed Processors
Local DB
Local DB
MASSIVELY PARALLEL PROCESSOR
Multiple CPU (>100) with Association Memory
DATA
DATA
DATA
Coopers & Lybrand

Expert Systems

"An expert system handles real world, complex problems requiring an expert's interpretation, and solves these problems using a computer model of expert human reasoning reaching the same conclusions the expert(s) would reach if faced with a comparable problem."

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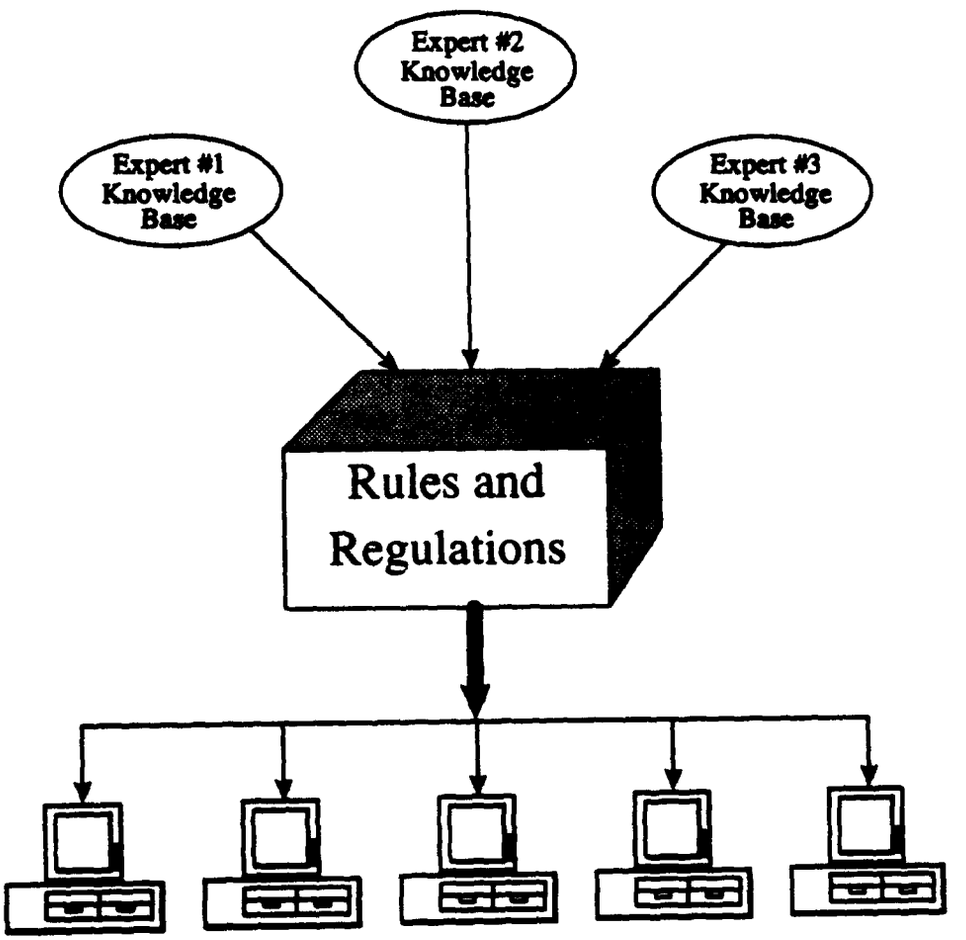
Expert Systems



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Status Today

65% of the Country's largest insurers are using, developing or actively researching expert system applications, with underwriting being the area of primary interest.

IMPACT

- Improved quality
- Improved consistency
- Increased productivity
- Additional data captured

Coopers & Lybrand

Expert Systems in Underwriting

- More Data Elements
  - Exposures
  - Experience
  - Management
  - Related Coverages
  - Agent Information
- Relational Data Structures
- Leading to Automated Underwriting Worksheet

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HIGH LEVEL LANGUAGES

A programming language that does not reflect the physical data structures of any particular computer or operating system.

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LANGUAGES

DATA DEPENDENT

Assembler

PL/I

FORTRAN

COBOL

HIGH LEVEL

Adabas

Natural

Oracle

Focus

Ramis

IDEAL

SQL

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HIGH LEVEL LANGUAGES

Advantages:

- Prototyping tool
- End user reporting and data query
- Reduces Application Backlog

Disadvantages:

- Inefficient use of resources
- Poor transaction processor
- Ineffective with complex searches -- large data bases

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HIGH LEVEL LANGUAGES

TRENDS

- Code transportable to any hardware platform
- Fits with existing database and teleprocessing systems (DB2, CICS)
- Cobol Generators and Cobol restructuring tools keep Cobol alive and well

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IMPLICATIONS

- More Data Available
  - More Types
  - Higher Quality
- More Tools Available
  - Organize and Store
  - Retrieve and Compile
- More Direct Access
  - By Staff and Management
  - With Security Limitations

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IMPLICATIONS . . .

Assuming a company is willing and able to build application systems and:

- Collect and organize the data
- Enable the access tools
- Train the staff

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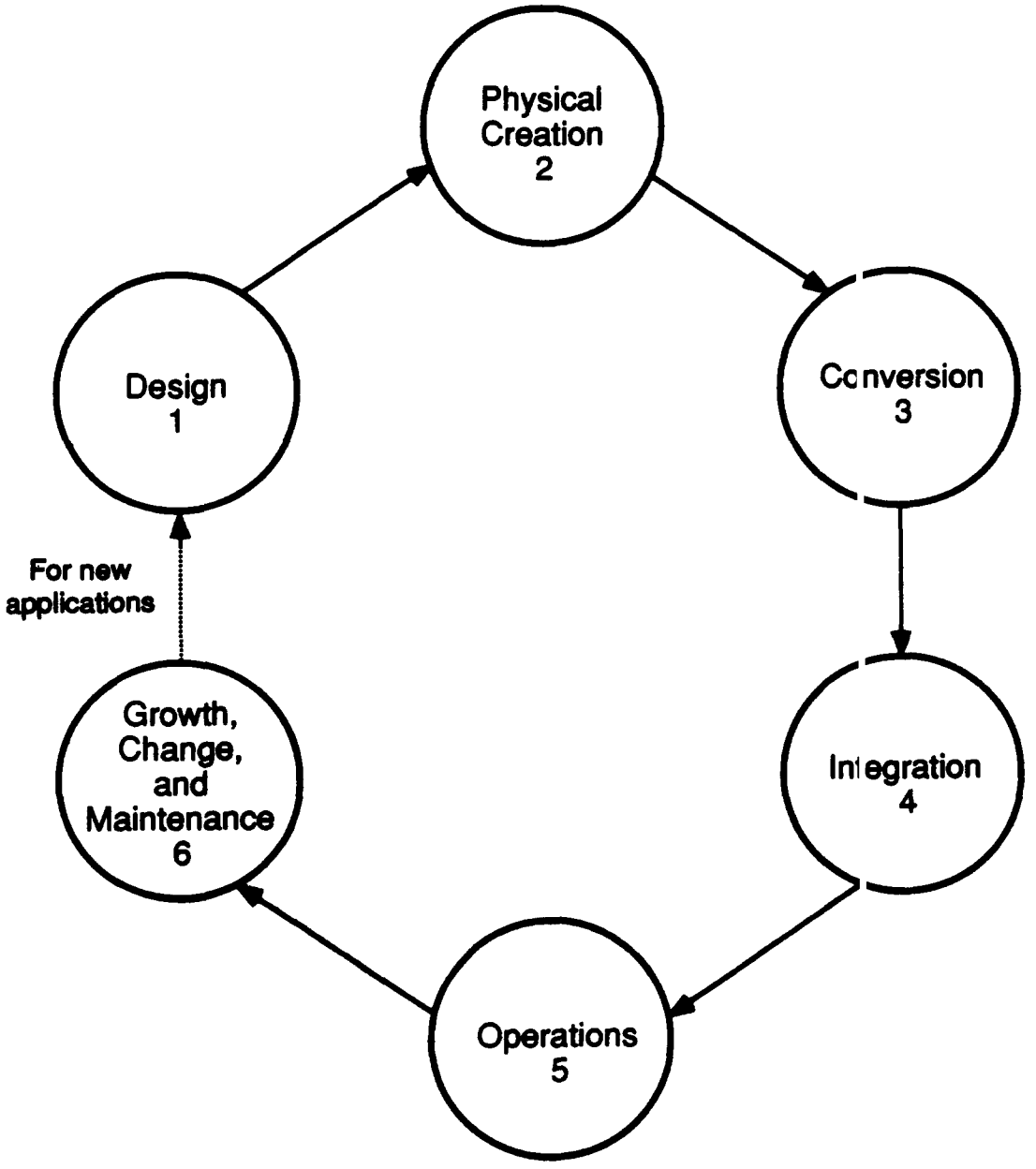
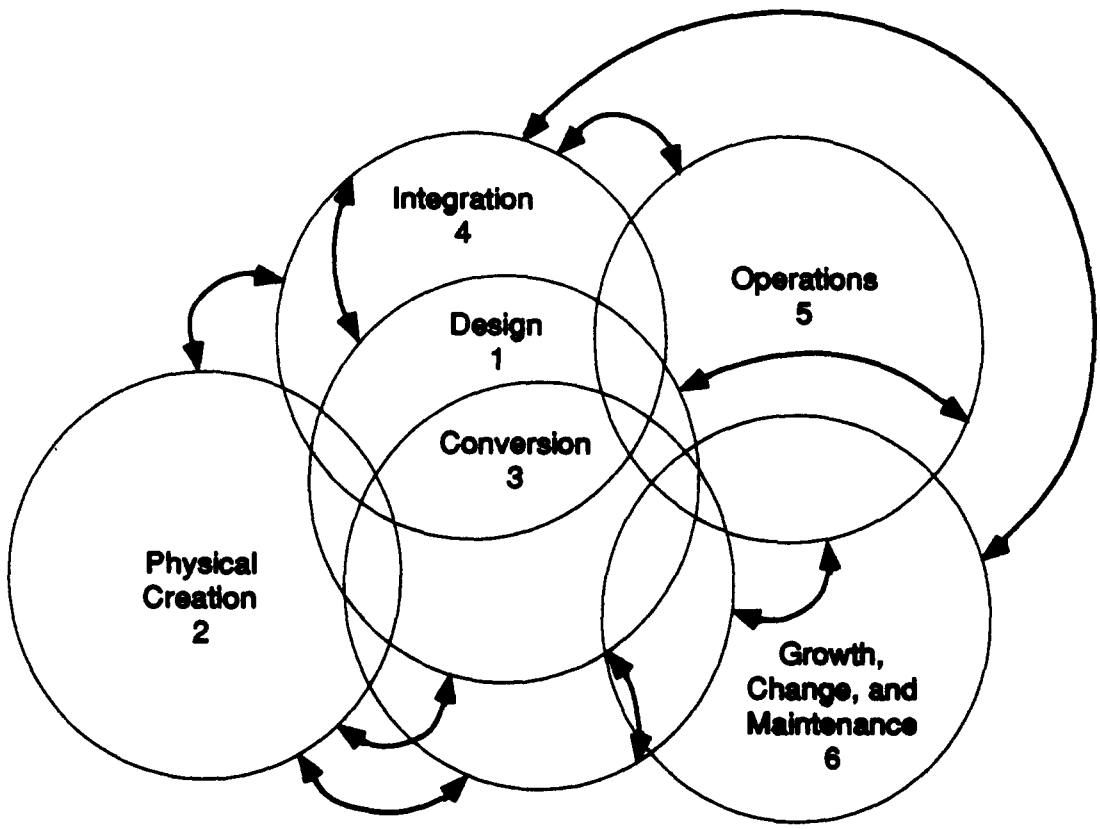
THE MAIN PHASES OF THE DATA BASE SYSTEM'S LIFE CYCLE WITHOUT OVERLAP



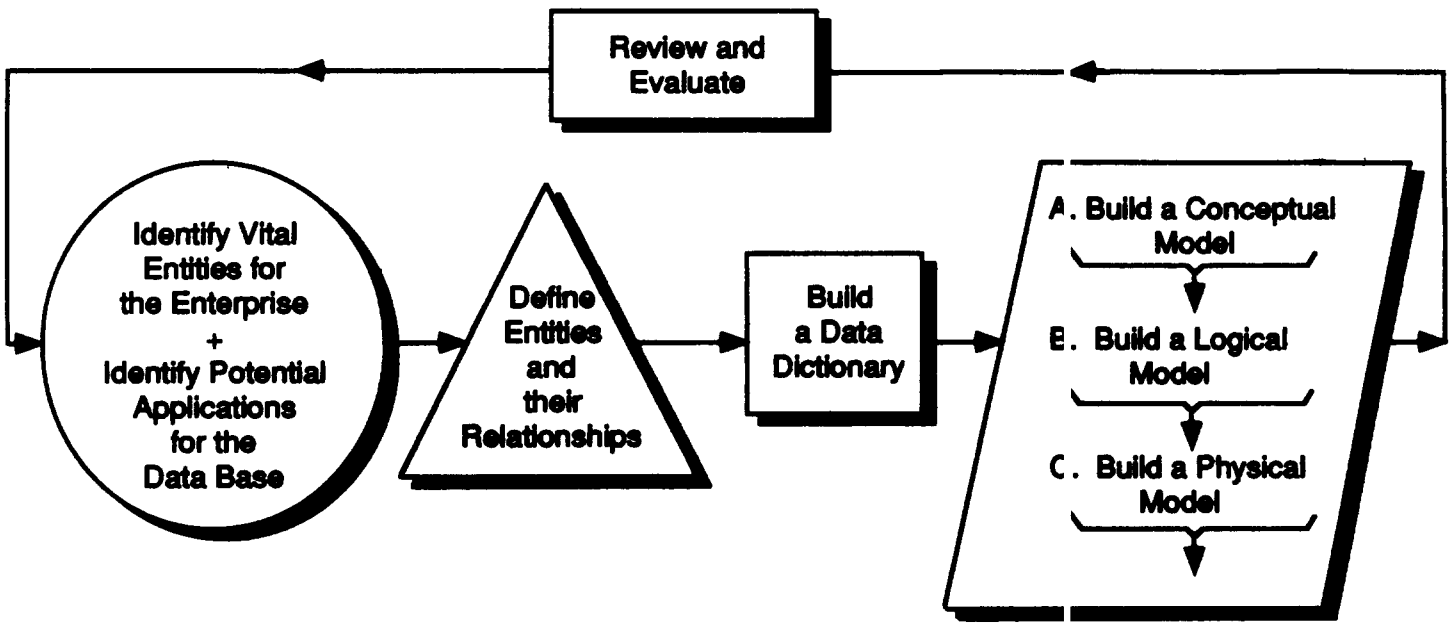
THE MAIN PHASES OF THE DATA BASE SYSTEM'S LIFE CYCLE WITH OVERLAP (REAL WORLD)



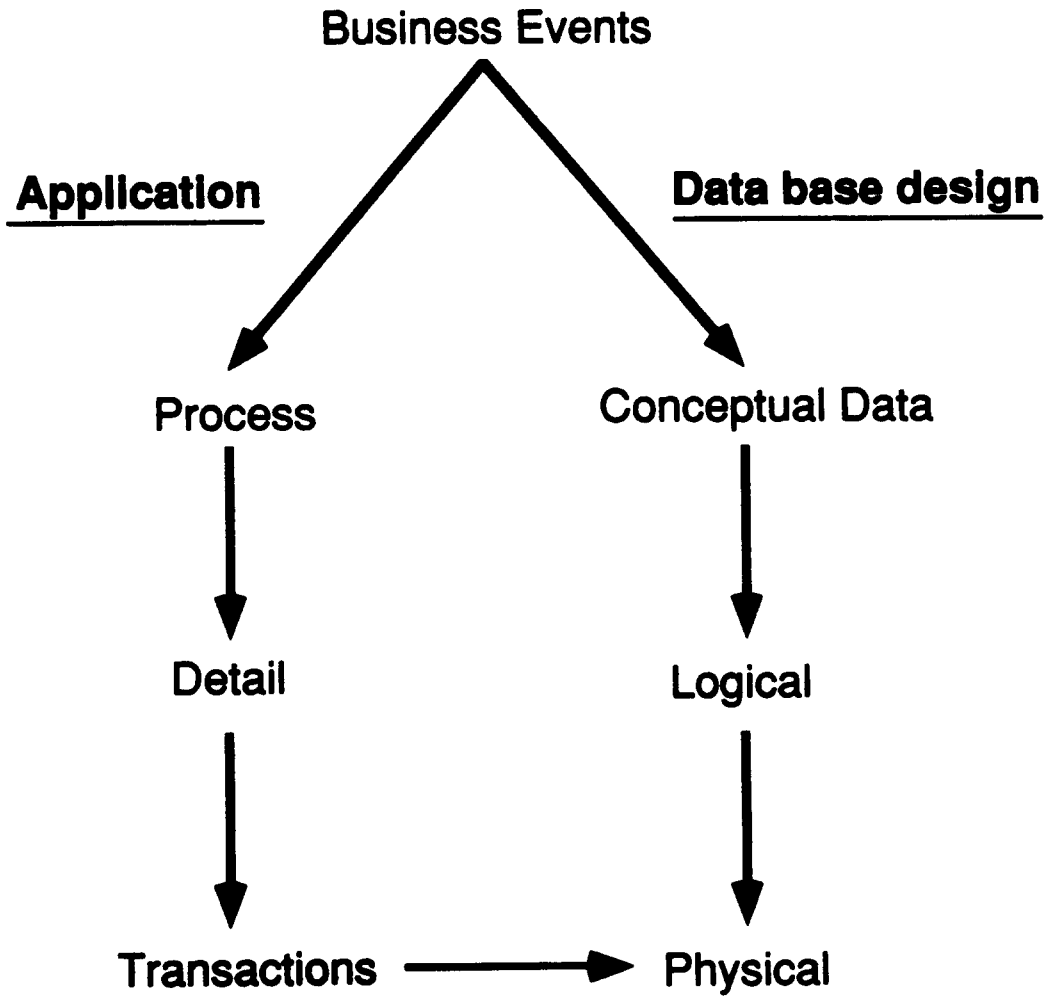
- Phase 1: Design
- Phase 2: Physical Creation
- Phase 3: Conversion
- Phase 4: Integration
- Phase 5: Operations
- Phase 6: Growth, Change, and Maintenance

RJ-4

DESIGN STEPS OF THE DATA BASE PROJECT



BUSINESS EVENT MODELER



Data Structures + Algorithms = Programs

1989 CASUALTY LOSS RESERVE SEMINAR

4F-2: GRAPHICAL METHODS FOR LOSS RESERVING

Moderator & Panelist

John Narvell
Coopers & Lybrand

MR. NARVELL: As you can see from the meager presence up on the stage, I am the moderator, the speaker, everything all wrapped into one.

I will give you the standard disclaimers to start. I am not speaking for the American Academy. I am not speaking for the CAS. I am not speaking for Coopers and Lybrand. I am only speaking for myself and my opinions.

I am John Narvell. I work for Coopers and Lybrand in Hamilton, Bermuda. It is a wonderful place to work and it has given me an opportunity to work with some very interesting data. I will be showing you some of that data today.

[As of November 6, 1989, John Narvell works for Ernst & Young in Philadelphia.]

What is an Actuary?

The question that I am going to answer is not particularly that one; it is a different one. A very good friend of mine once asked me, "What is it that you do at work?" I wasn't going to tell him an actuary is someone who predicts the future financial consequences of contingent events and all of that mumbo-jumbo. He would have disowned me and never have spoken to me again. The answer that I gave to my friend was that I look for patterns in numbers. I think that is a good answer for what I do as an actuary.

When I first learned loss reserving, I was in a production loss reserving environment. Every three months three feet of paper would get dumped onto my desk. I and a team of other people would have to sift through the numbers and come up with some insight that we could extract from the large volume of data.

The problem with that scenario is that it is very mind numbing It is very difficult, tedious work to look at pages and pages of numbers and to try to spot what is going on inside them. As any of you who have done a lot of quantitative analysis are certain, the trick is to manipulate the numbers and look at them all different ways until you finally cut the data in the fashion where the numbers jump off the sheet of paper.

What I am going to show you today is a better way to look at numbers. Graphs can show a much higher density of quantitative data than printed numbers can. You can have much faster, more efficient analysis of numbers if you use graphs. I will try to show you some of the statistics and the way to manipulate them in order to get the most utility out of the numbers.

(SLIDE) Now, to start with the data -- I am sure few of you in the audience can read these numbers, and the intent was not to read the numbers. The whole point is that when you are looking at this many numbers, it is difficult to make heads or tails out of the data. These are cumulative paid losses at six month intervals -- three, nine, fifteen, twenty-one -- for eight years of data, 1981 through 1988. The most recent valuation is as of March 31, 1989.

(Slide) The next slide shows the loss development factors. From just examining the data it is difficult to make sense out of what is going on, so I will start with some graphs.

Cumulative Paid Losses ($000s) - Marine
Months of Development

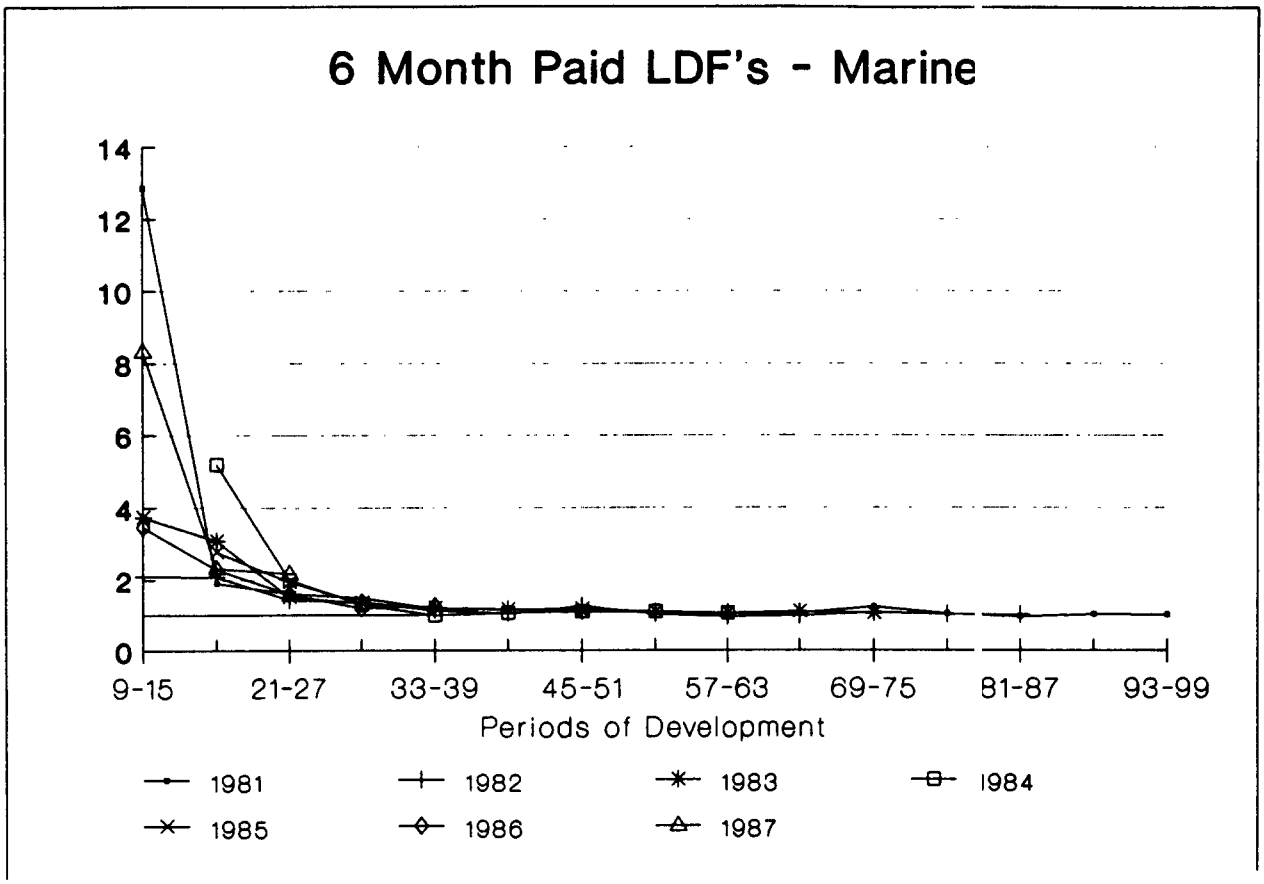
U/W Year	3	9	15	21	27	33	39	45	51	57	63
1981	0	3	37	70	112	166	194	222	257	280	287
1982	0	33	68	142	201	274	306	318	397	402	381
1983	0	42	160	496	745	986	1,174	1,363	1,467	1,573	1,655
1984	0	2	193	1,002	2,005	2,569	2,553	2,689	2,950	3,213	3,338
1985	0	0	648	1,807	3,489	4,682	5,538	6,430	7,488		
1986	0	126	439	1,009	1,593	1,870	2,320				
1987	0	53	439	1,016	2,209						
1988	0	189	441								

U/W Year	69	75	81	87	93	99
1981	302	369	381	362	367	368
1982	372	397	402	405		
1983	1,799	1,869				

Paid Loss Development Factors
Months of Development

U/W Year	9-15	15-21	21-27	27-33	33-39	39-45	45-51	51-57	57-63	63-69	69-75
1981	12.86	1.91	1.60	1.48	1.17	1.15	1.16	1.09	1.03	1.05	1.22
1982	2.09	2.08	1.41	1.37	1.12	1.04	1.25	1.01	0.95	0.98	1.07
1983	3.78	3.10	1.50	1.32	1.19	1.16	1.08	1.07	1.05	1.09	1.04
1984	78.82	5.19	2.00	1.28	0.99	1.05	1.10	1.09	1.04		
1985	6545.5	2.79	1.93	1.34	1.18	1.16	1.16				
1986	3.47	2.30	1.58	1.17	1.24						
1987	8.33	2.32	2.18								
1988	2.34										

U/W Year	75-81	81-87	87-93	93-99
1981	1.03	0.95	1.02	1.00
1982	1.01	1.01		



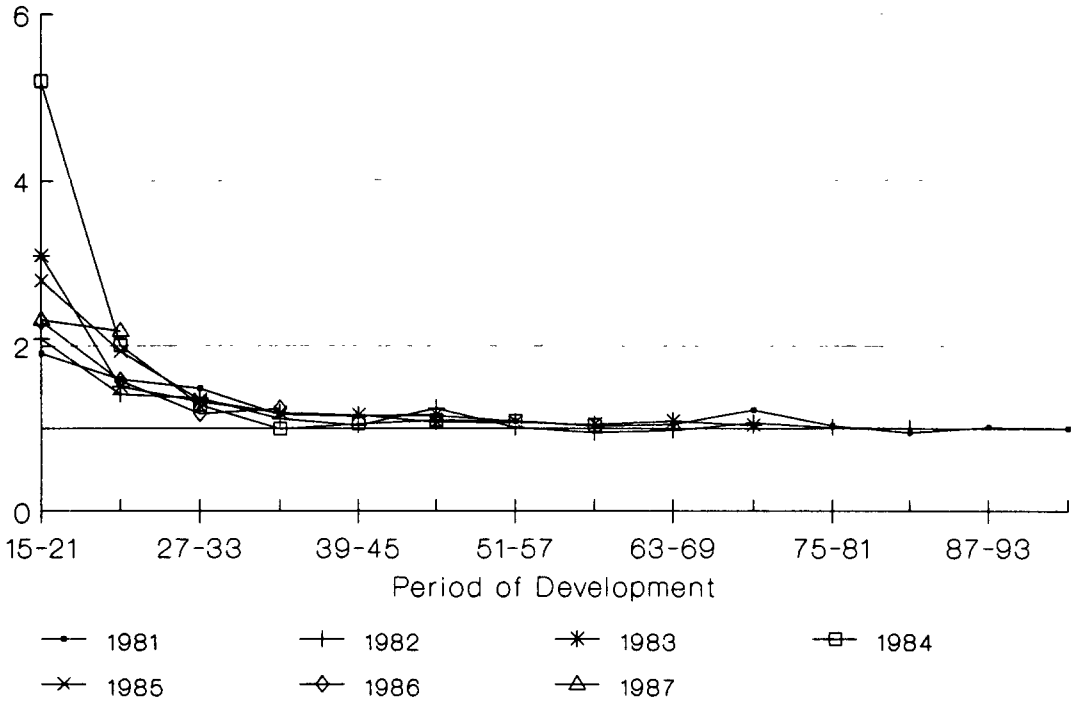
This is a graph of loss development factors. The first factor that is on the graph is nine to fifteen, and then running on out. One of the problems with graphing loss development factors is that the scale changes on you. At early stages of development you have very large numbers, in this particular case ranging as high as thirteen, but when you get out to later development stages, the numbers get relatively small. If you scale your graph so you can see what is going on at the beginning you can't see anything at the end, so what we will do is that we will progressively cut off numbers, i.e., cut off development stages from the beginning of the graph to try to see more information down in the tail. The difficult part of any loss projection is, in my mind, developing the tail.

If you have good, relatively stable data, and it quits at the end of six or eight years, then you are all done. There is no significant difficulty in that. The difficulty is when you have development beyond four or five or six years and you don't know how big it is going to be.

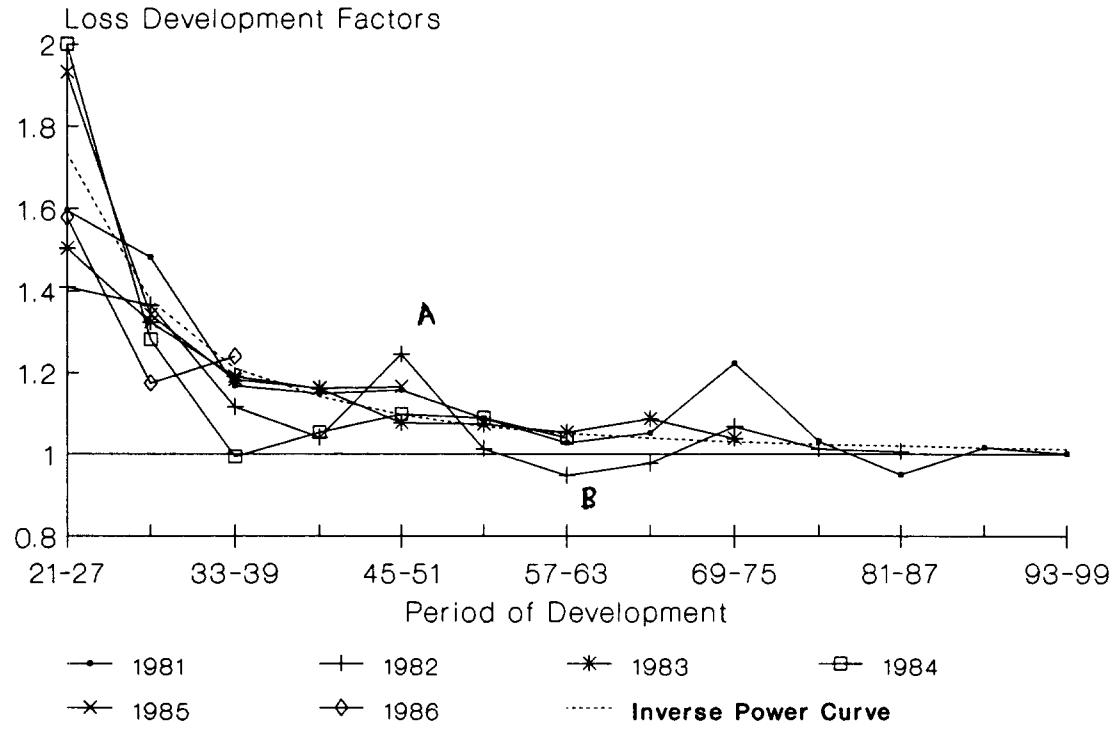
(SLIDE)

This is the same graph as what I had before, one colored line for each accident year. [Apologies to the readers who are limited to monochrome exhibits in the transcript.] In this particular case it is reinsurance data so it is by underwriting years, but the same techniques work. I have cut off the nine to fifteen factor so that the vertical scale can be expanded and we can see a little bit more information, but still not very much.

6 Month Paid LDF's - Marine



6 Month Loss Devl't Factors - Marine



(SLIDE)
So I cut off another one. Finally we are getting some sort of realistic scale where we can see what is going on down in the later development stages.

One of the other observations you can see from this particular graph is that I have added the dotted line coming down, which is the fitted loss development factors. I do a lot of curve fitting. As you can see from the erratic data, it appears that I need to perform some curve fitting in order to extract the patterns out of this data.

You can see here on this point (A) that there was a big jump up on the development factor and then it appears that there was some sort of correction afterward. The same thing occurred way out here. (B) There was a relatively large development factor and then there was a subsequent correction where the development factor went less than unity.

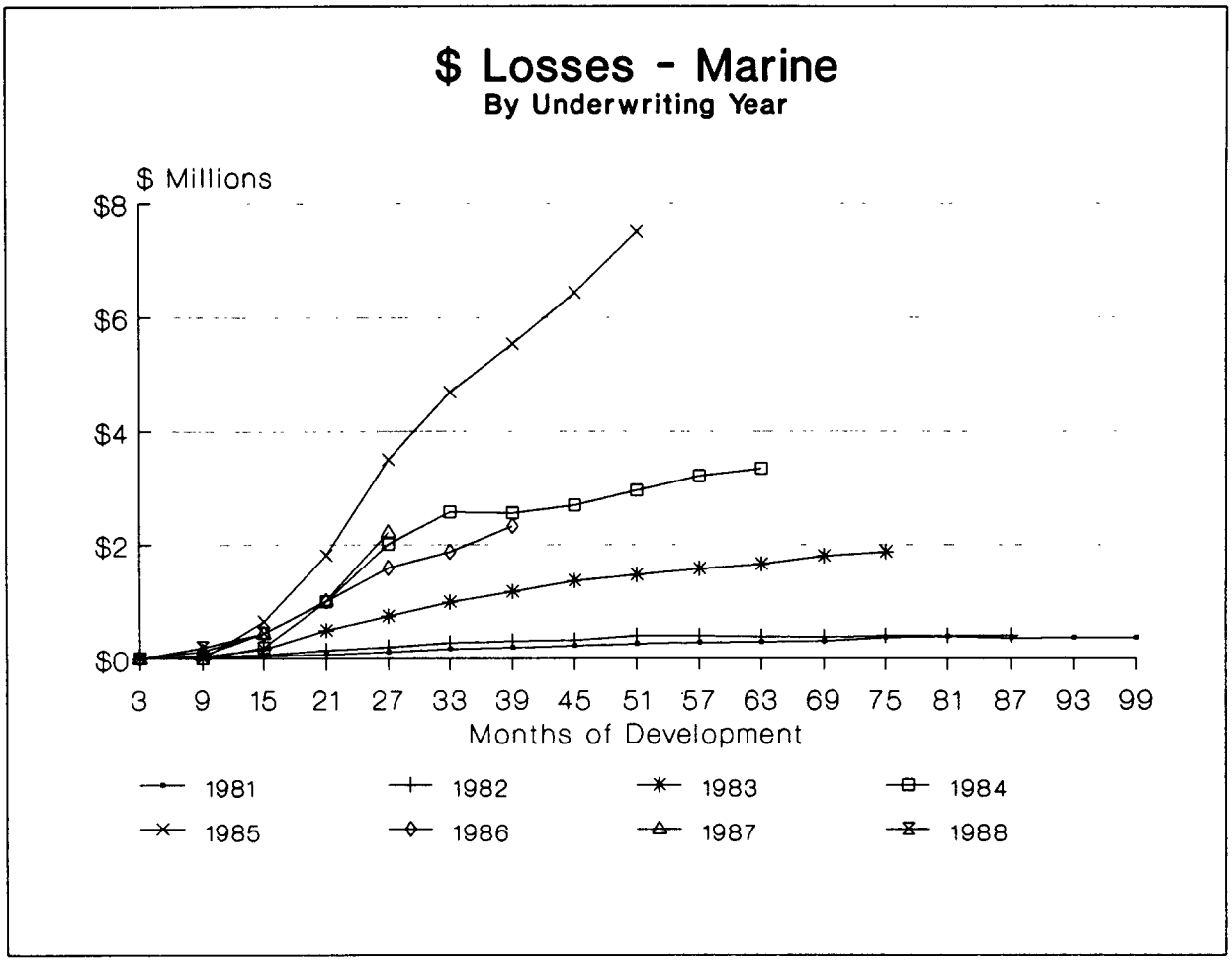
This gray horizontal line is unity, 1.00, and in theory we hope that the loss development factors are approaching it.

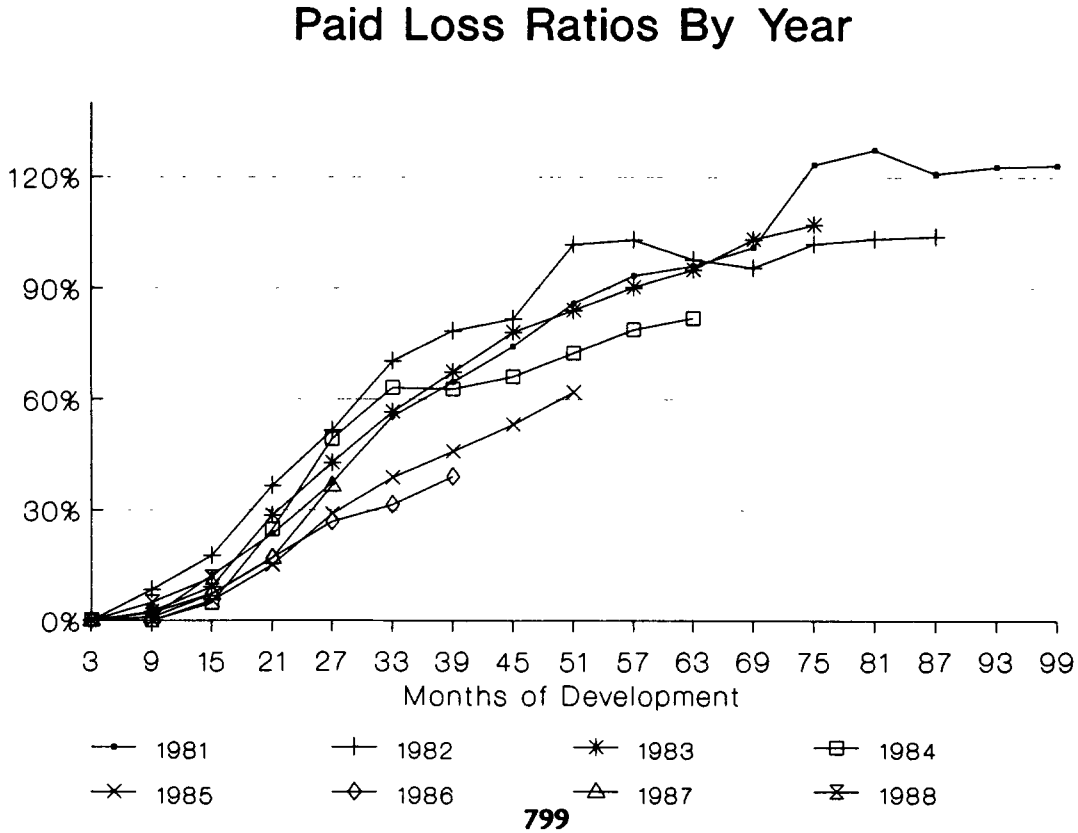
I showed these three graphs not because this is the way I look at loss development patterns, but basically to point out to you that if we had to use graphs like this we wouldn't make very much progress. There is not much information that I seem to get out of these graphs. I did these graphs of loss development factors simply for demonstration purposes.

(SLIDE)
So let's go back and look at some of the other statistics that we can look at. These are the dollars of losses on this graph by underwriting year. Any of you that were quick enough to read the data the first time I had the slide up on the screen would remember that 1981 and 1982, which are the oldest underwriting years, had very small dollar volumes. 1983 is this one and it is a little bit larger. 1985 contains a lot of loss dollars.

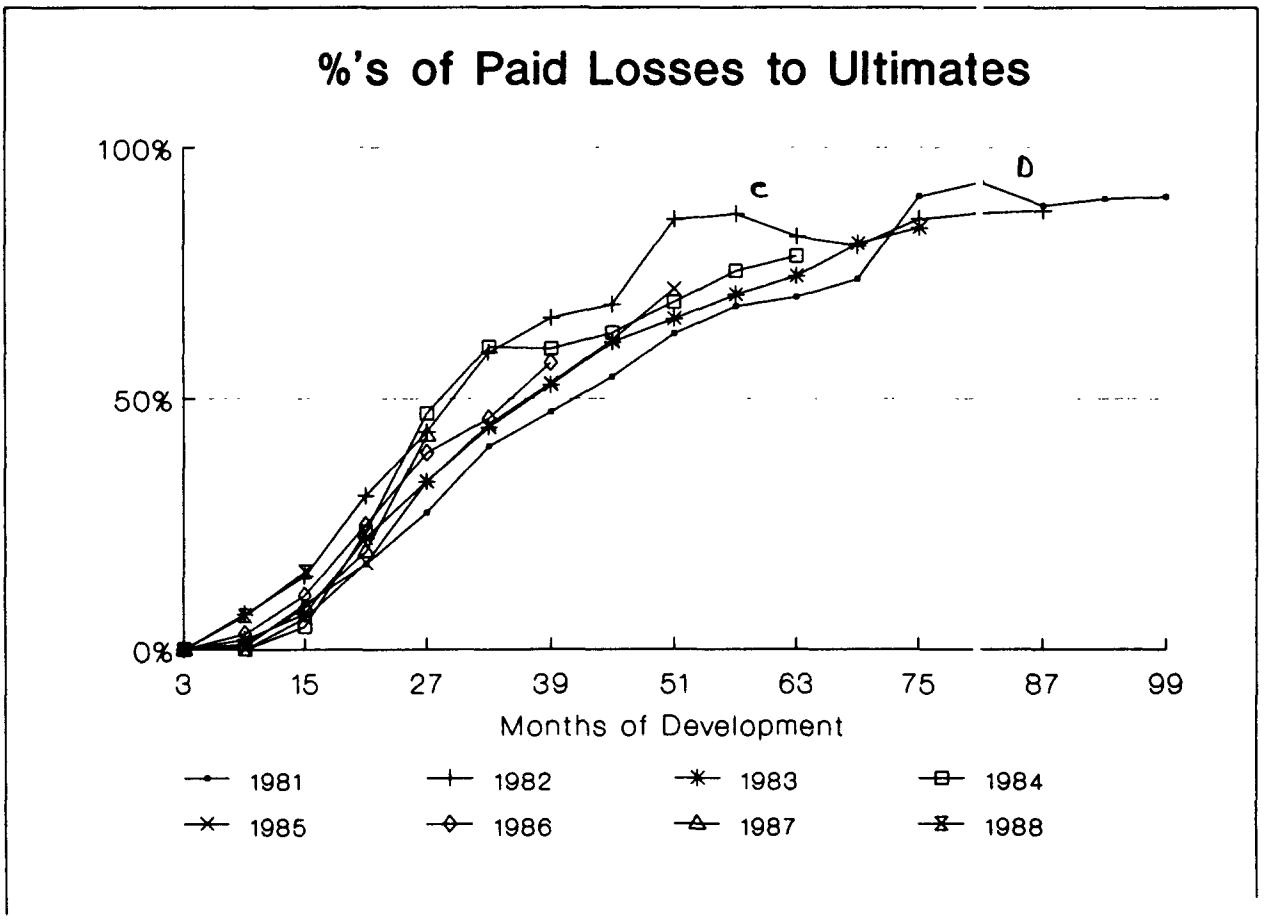
One of the things that we can see is that there is a generally rising pattern to the paid losses, but we are still not seeing very much information because of the lack of homogeneity among the years, that some years had bigger volumes than others. So we are sort of stymied in the examination of loss development patterns. The first option that we will do is that we will try to normalize these lines to reduce the scale and make them more comparable to one another by looking at loss ratios.

With graphs of the **loss ratios**, we get a much tighter packing of the patterns. Once again, this is 1981, 1982, 1983, 1984 and down to 1988. You can see that there was some bad loss experience in there, that the loss ratios went well above one hundred percent in this time period. The other observation that we can make from this is that 1981 and 1982 have relatively bad loss ratios, 1983 was even worse, 1984 was an improvement, 1985 was an improvement and 1986 was an improvement.


$ Losses - Marine
By Underwriting Year
$ Millions
$8
$6
$4
$2
$0
3 9 15 21 27 33 39 45 51 57 63 69 75 81 87 93 99
Months of Development
1981
1982
1983
1984
1985
1986
1987
1988


Paid Loss Ratios By Year
120%
90%
60%
30%
0%
3 9 15 21 27 33 39 45 51 57 63 69 75 81 87 93 99
Months of Development
1981
1982
1983
1984
1985
1986
1987
1988

Well, when we have a shifting premium adequacy like this, we are still not able to see the loss development patterns because we can't tell whether one line is developing faster or slower than another line unless we sort of look at the slope of it and try to get a feeling for it. So how are we going to get these on a scale where we can look at them all simultaneously and compare changes and development patterns?



The obvious thing is to show losses as a percent of losses. In this particular case losses are shown as a percent of ultimate losses. You can see all of the lines very closely packed on top of one another with the random variations and some noise still in there. We can see that there is a fair amount of signal surrounded by a lesser amount of noise.

Now, let me go back and reiterate the construction of this particular graph, because this is the basic building block that I will be using for the remainder of the presentation.

The vertical scale goes from zero to one hundred percent These lines are percentages of ultimate losses by year. Eventually the losses will reach one hundred percent of their ultimate status, so the top grid line is a horizontal asymptote and the lines will come up and eventually meet the horizontal line across the top.

In some cases -- and I will show you an example -- there are incurred losses that go above it and then come back down onto it, but all of the accident years will converge toward this line. That is the goal of the process, to figure out how big the ultimate losses are and how they converge toward it.

Now, let's look at this for a minute and see if we can make some interpretations out of what this data is saying to us. We can see that up here, (C) where in the past we had a downward loss development factor, and the same thing happened up here (D) with this one, the downward movement really was a correction after what appears to be an abnormal upward movement.

If we were to try to extract a pattern from this data, we might (after some investigation) determine that this up and down movement was spurious and that what we may want to do is do some data smoothing in order to extract the true pattern which is inside the data, i.e. a pattern which is not biased by this error. This is supposed to be Net data -- it could have been a case where they processed a gross loss and then didn't process the reinsurance recovery for it until twelve to eighteen months later.

Now, a further observation. The difference between the end point of each line and the 100% ceiling is the percent unreported, the percent unemerged. You can do the same graphs whether it be paid losses incurred losses, or whatever, because they will always converge to the ultimate losses (100%).

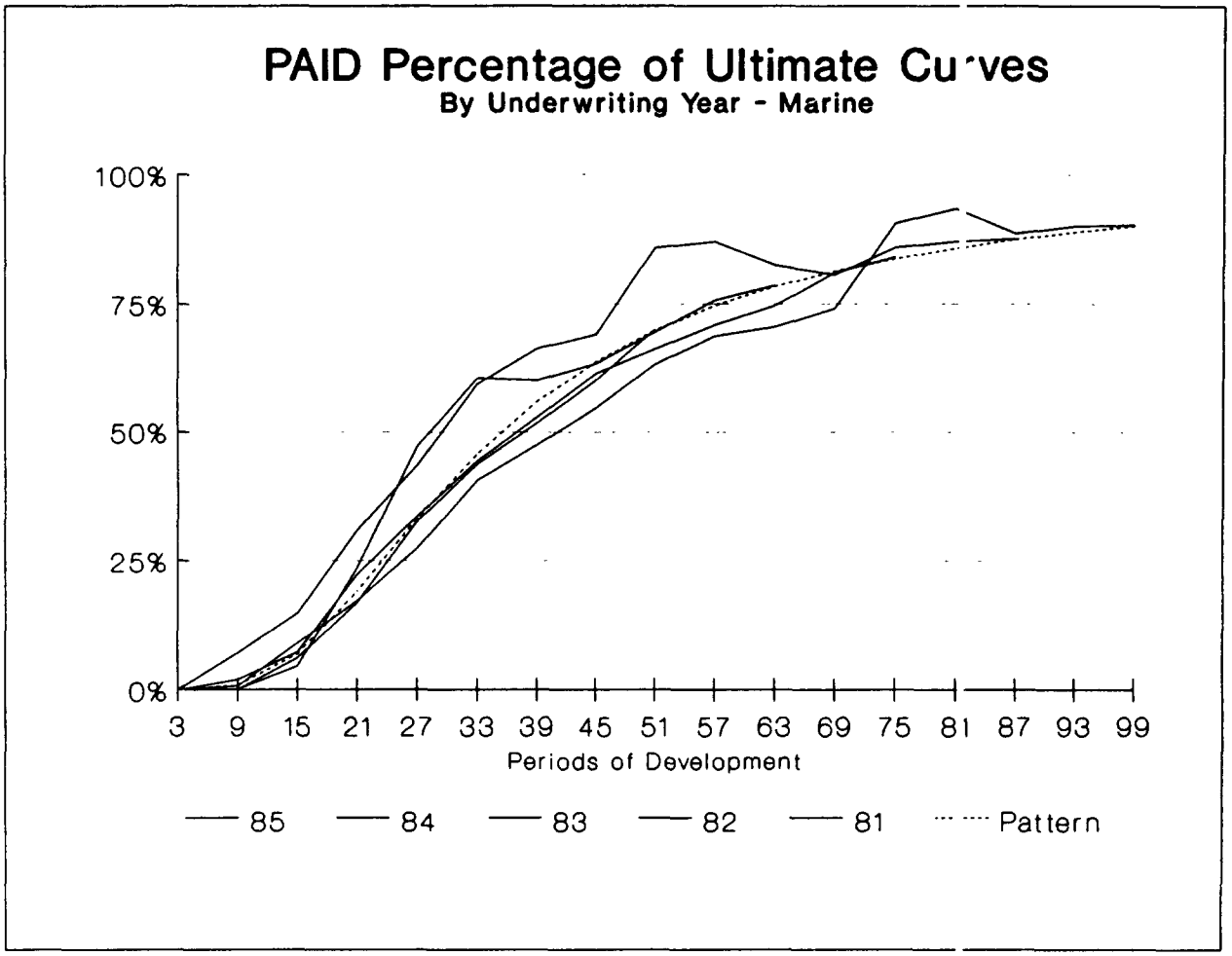
That is one of the advantages of this form of data presentation. You can look at the paid patterns and the incurred patterns with the same vertical scale. I will get to that after the next slide.

(Slide)
This is the same data that we had on the previous graph, but it is made with an inferior slide-making machine. That is why it is so difficult to read the scale and the grid on it, but the one thing that was on this graph, which is the reason that I retained it, is that you will notice that my sixth data range down there is the pattern. This dotted line with the markers on it is the pattern which is dictated by my fitted inverse power curve.

This gives me a very good feeling for how good my fit is to the actual data. You can see the data fluctuating on either side of the graph, but in general the fitted pattern provides a pretty good prediction for what is going on inside the data.

Let me make a couple of further comments and back up a minute. This is the graph of the loss ratios again. This is what I call an old style graph versus a new style graph. When I first started doing graphics one of the problems was that we didn't have very good capabilities for doing them on a computer with a plotter. So I ended up doing them by hand.

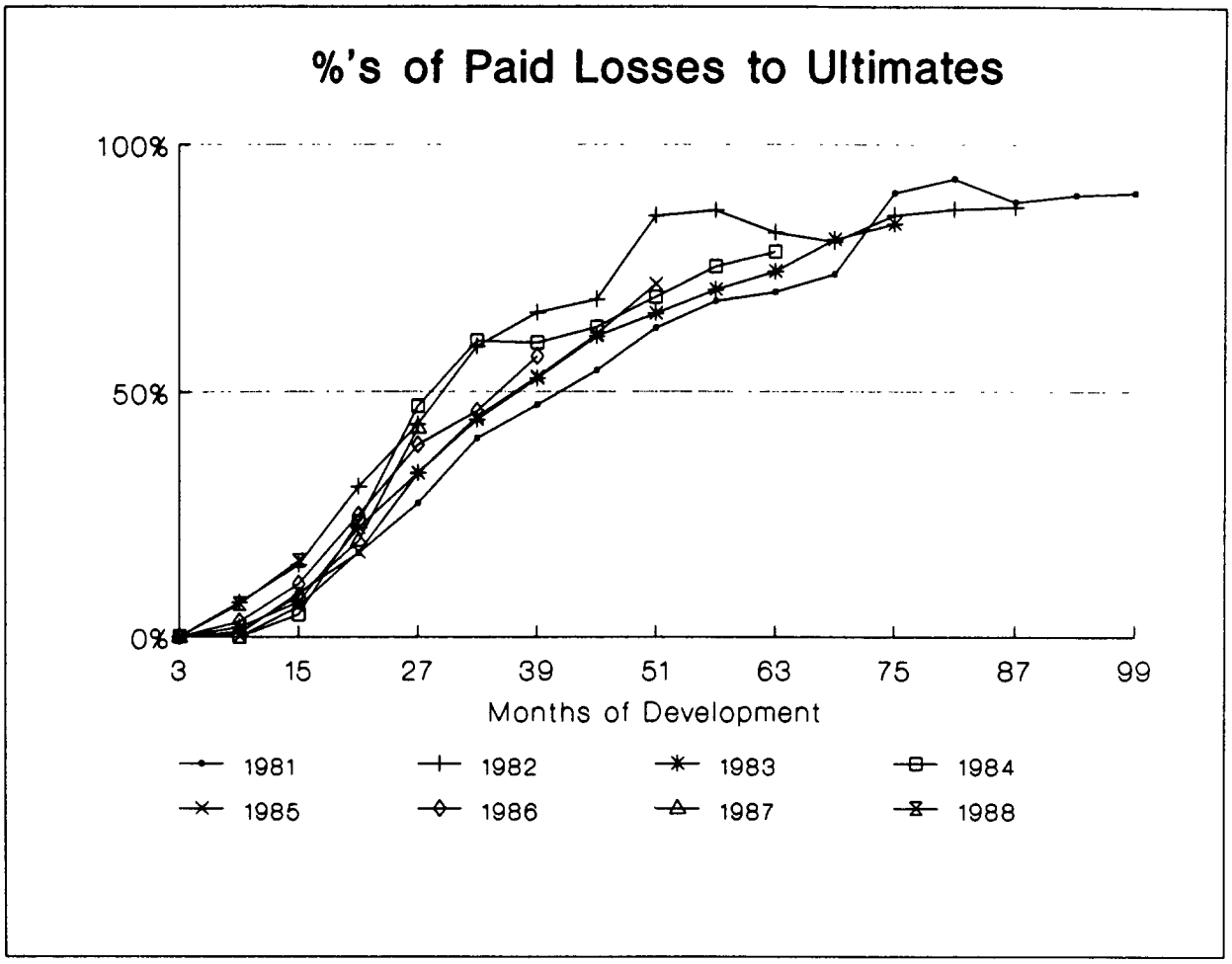
Any of you that have ever done a multicolor graph by hand will know that it is a very long, tedious process and you don't want to throw your work away every three or six months and recreate the graph from scratch.



So, you design your graph so that you can retain it, and all you have to do when you get another six months' worth of data is update the end points This is one such graph (graph of loss ratios), because the calendar year premiums, which were the starting point of the loss ratios, won't change. You will merely have movements in your losses which get added to the end points.

Now, the difference when we go to the losses as percent of ultimate losses is that every six months when we re-estimate how big the ultimate losses are, these lines will shift upward or downward. If the ultimate losses are increased the line will shift downward because it is historical losses as a percent of ultimate losses. If the denominator increases, the fraction decreases and vice versa. So if your ultimate losses increase six months from now, the whole line will shift down.

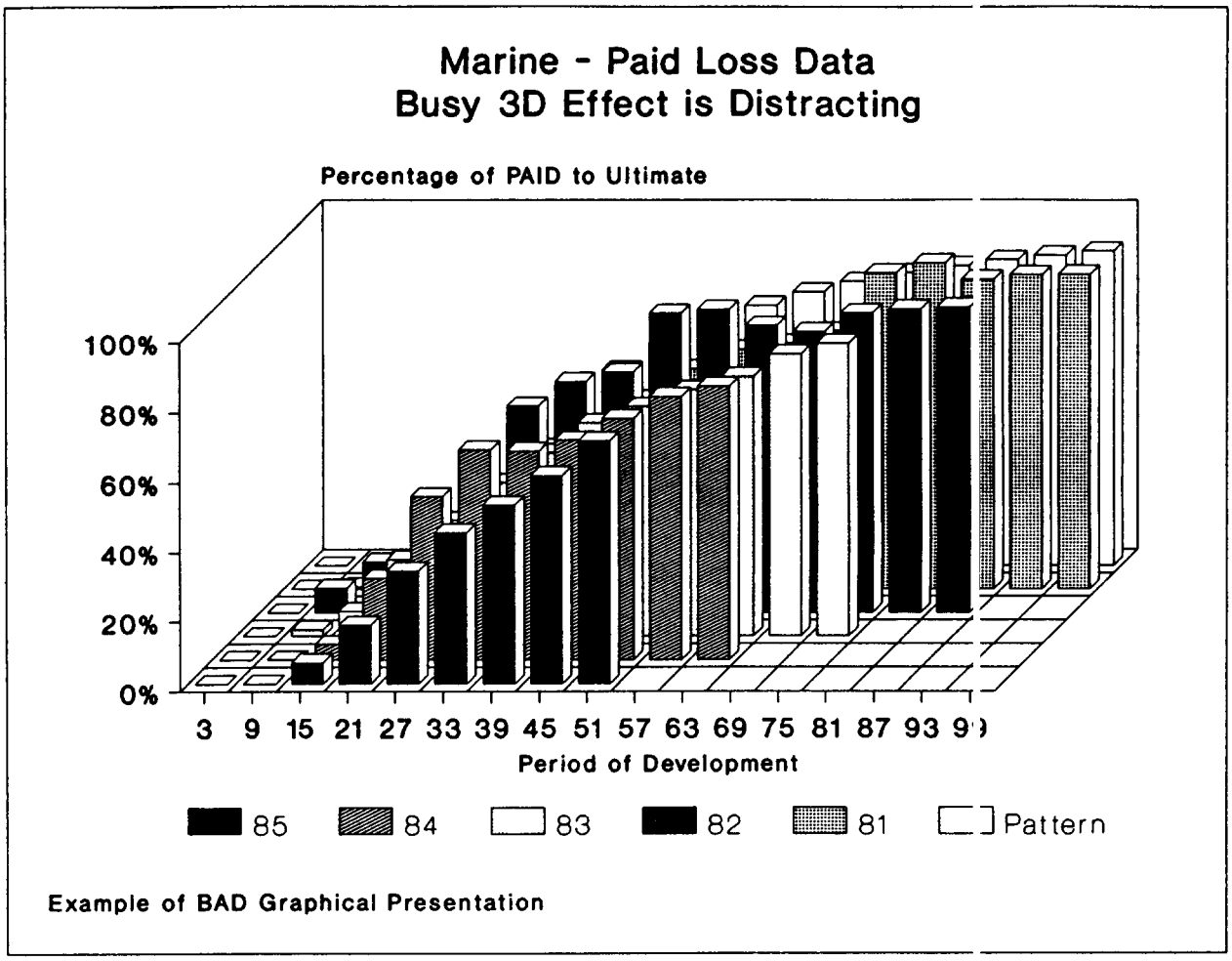
The other advantage is that we can instantaneously change an estimate of ultimate losses. This used to be a disadvantage, but now that we have got computers with plotters and laser printers and color screens, it is easy to produce many graphs for different "what if?" scenarios.



Let's look at the line for 1987; it is above four of the lines. It is above 1981. It is above 1983. It is not above 1982 and it is not above 1984, but it is pretty well up there. We might think that maybe this line really should be down lower instead of being up where it is. That might be an indication that the ultimate losses for 1987 are underestimated.

So, we can increase the ultimate for 1987 and shift that line down to see instantaneously if we like the larger estimate better. It is the power of the PC that allows us to do that. In the past we wouldn't have done an instantaneous review because to redraw the graph would have taken some drone two hours or maybe four. If you had gone to him three or four times to redraw the graph, he would be so tired of it he would be trying to discourage you from doing more graphs.

Now, with the PC and color monitors, color plotters, color printers, laser printers, etc., we can produce as many graphs as we want. In fact, we should be doing exactly that.



Example of BAD Graphical Presentation

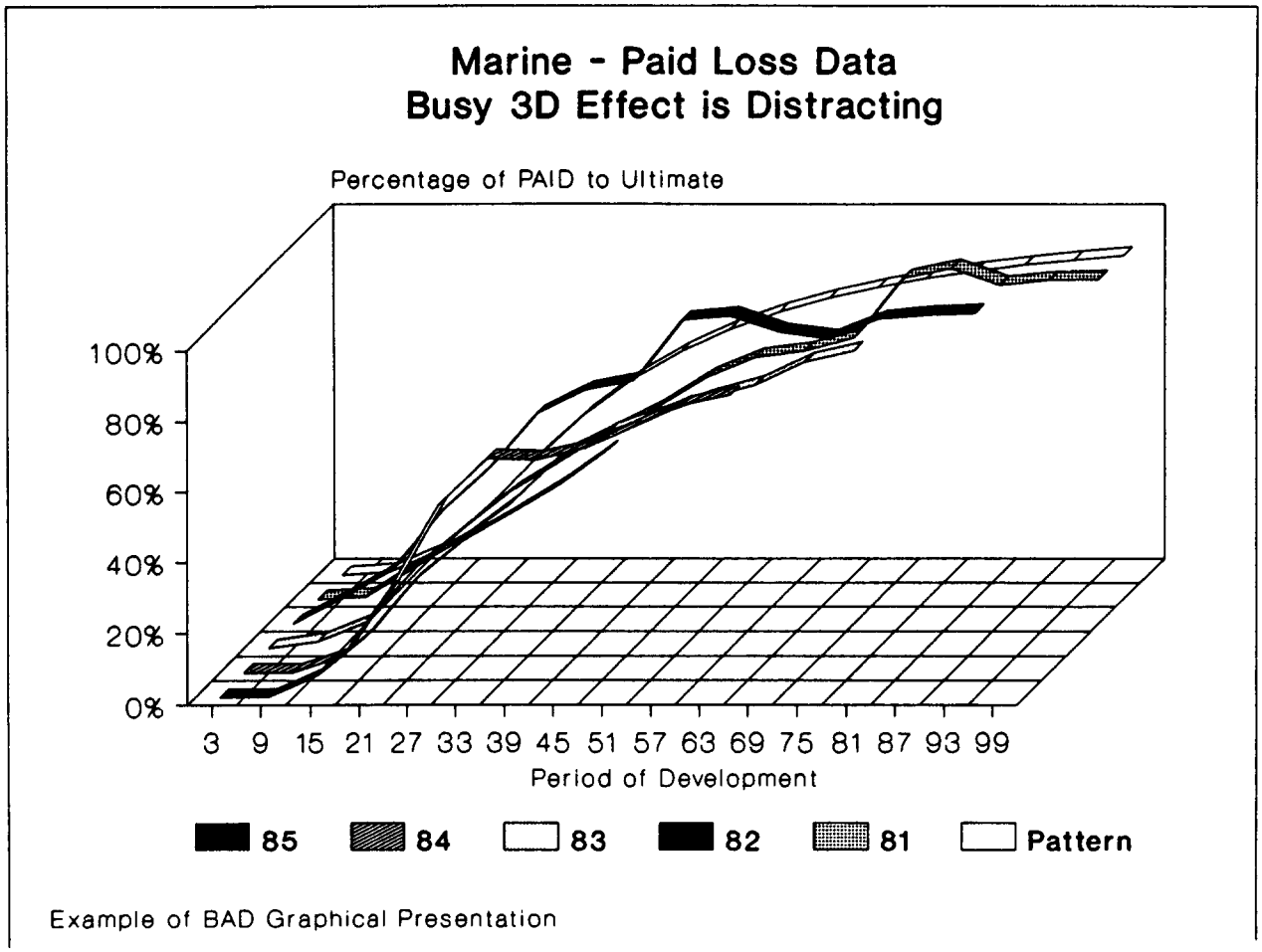
Now, this is an example of something you shouldn't do. I talked about the power of the PC. Be careful. It can be like a race car and you can go crashing into a wall and burn. I will explain why this is a bad graph. First of all, there is too much ink on it. It is a three-dimensional overlay bar chart, staggered, and highlighted, of the loss development patterns that we saw in the previous data.

One problem is that you can't see the loss development patterns for the data behind it because the bars are blocking it. The bad part is all of this excess ink; your eye is drawn to all of these bright columns with these 3-D effects and you are not really seeing the pattern. Your attention should be on the shape of this pattern, i.e. the generally rising curve which is the loss development curve.

You should be asking yourself, is the current year similar to the prior years? Have there been shifts in the pattern? Is there random noise in there?

When you look at this over decorated graph you don't see any of that. This is what a lot of people would call a duck. It exists strictly for the purpose of decoration and the interpretation that you can make from the data is secondary, if it exists at all.

Now, one of the problems that I pointed out with this is that the bars in the front obscure the bars in the back. So we will test the power of the computer and see if we can look at this another way. We will take another 3-D plot, but instead of looking at bars which obscure the data behind it we will look at lines or ribbons. Similarly, you don't see very much.



Example of BAD Graphical Presentation

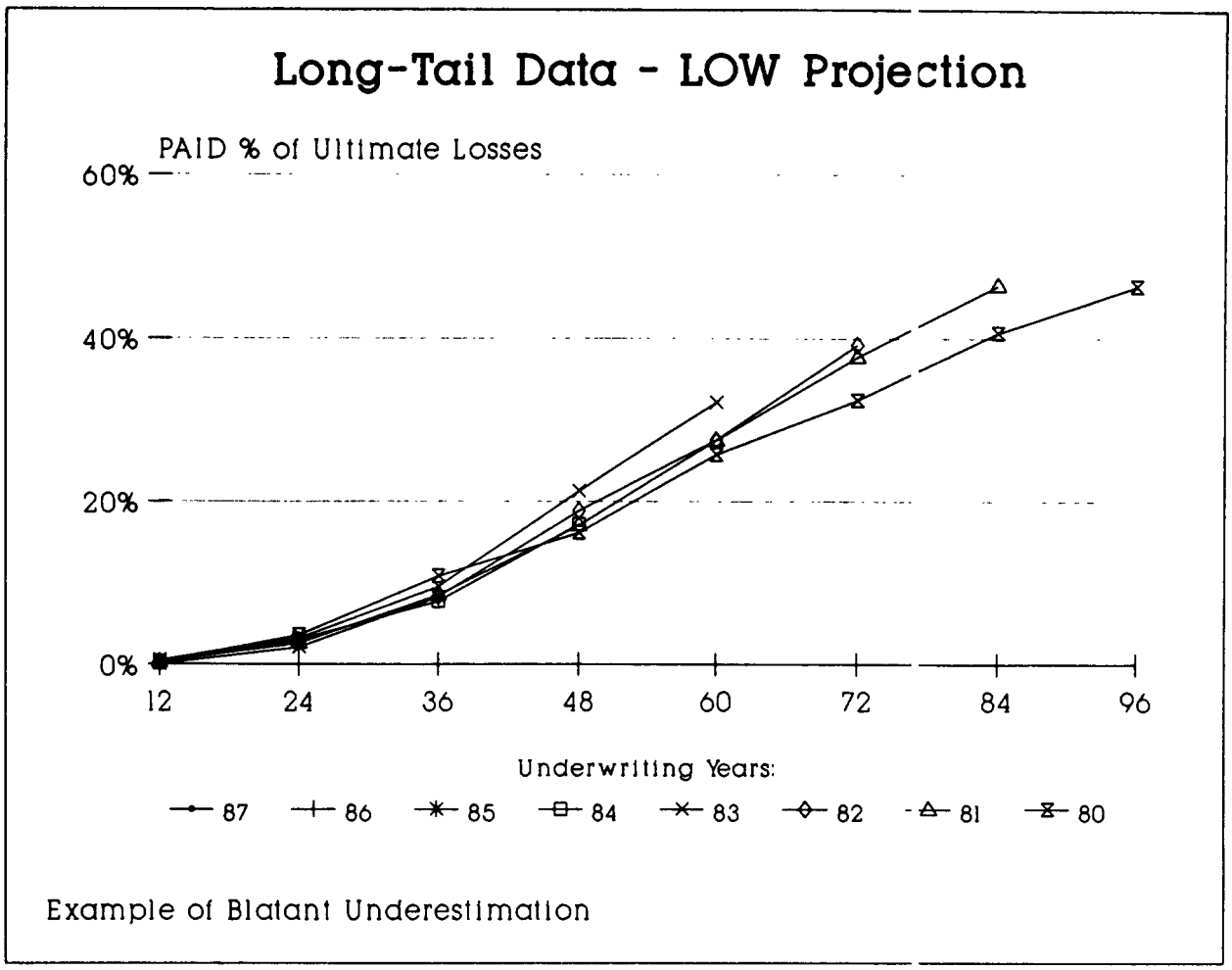
This is an area where I think some progress could be made because it is possible to envision the loss development process as a three-dimensional plane or surface. There probably is some way that we could rotate this around at some angle that we could look at it from and maybe make some sense out of the loss development process. But until you get there, stay away from the 3-D graphs because they merely confuse more than they illuminate.

It is very important when you look at graphs that one graph be consistent with another, i.e., that you take control of your vertical axis and that you know what you are looking at. Otherwise you can easily get confused.

Most graphics packages will take your data and put a default vertical scale on it. Try to avoid that. Get control of your graphs and specify your vertical scale on all of your graphs so that you know exactly what you are seeing.

The other advantage of common vertical and horizontal scales is that you can overlay one graph on top of another and look through them. In this particular case I have a maximum of eight lines on the graph. If I have a sixteen year history or twenty-four year history, I will print the graphs in black and white, and I will take them to the photocopier, photocopy them onto film and overlay the film on top of the underlying graphs and I can see all sixteen or twenty-four years at a time.

It is a very simple, easy technique. Make sure you get the film that goes through the photocopier, though. Not all films are designed to go through photocopiers and you will make a very big mess if you melt a piece of film in your photocopier.



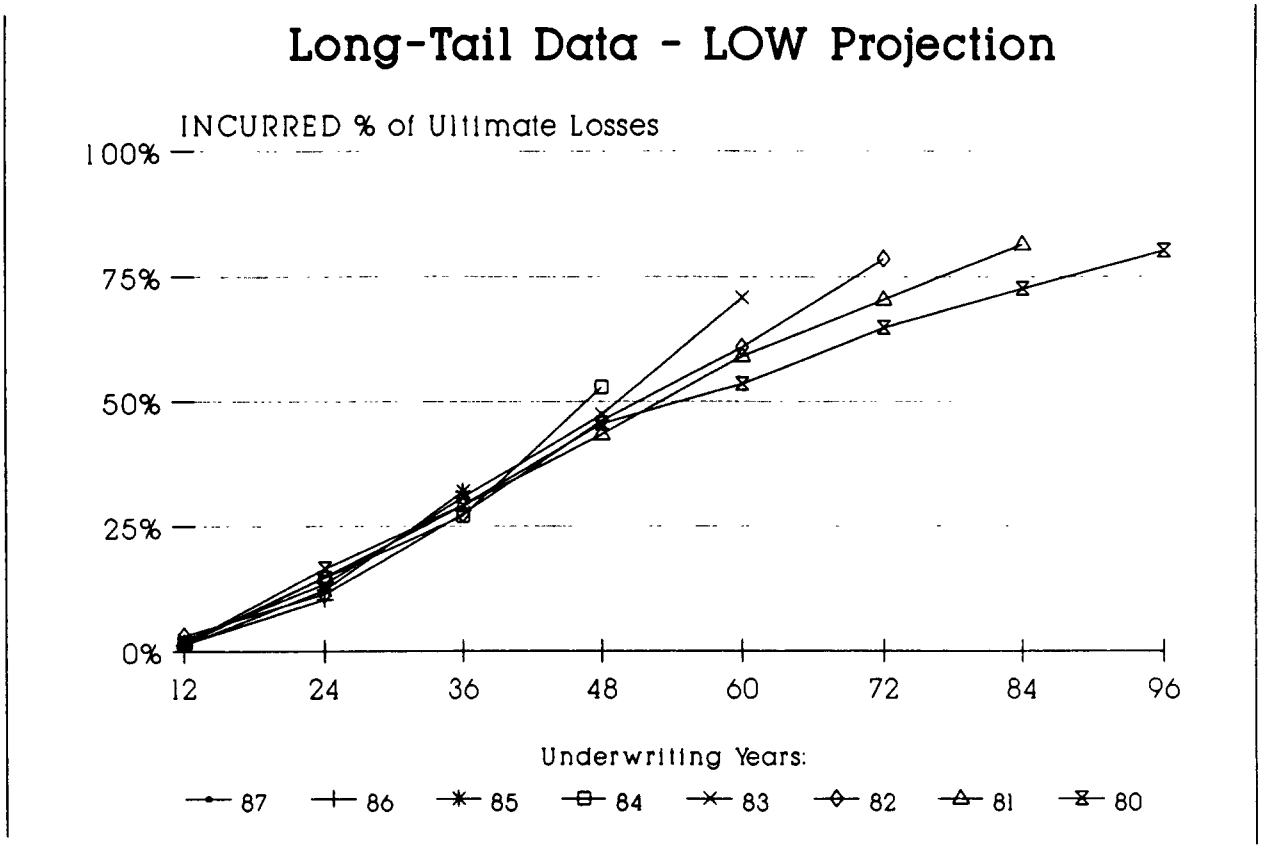
Now, this next series of slides will show probably what I feel is the most important lesson that can be gained from this technique of graphical review of loss development patterns.

This is very long tailed data. It runs out more than thirty years. This particular graph is Paid percent of ultimate, and I will be showing you incurred data also. Notice on this graph that the vertical scale only goes to 60%. Most of the other graphs that I have been showing you run out to one hundred. That has been very conscious effort on my part to make all of the vertical scales on the graphs equal to one hundred so that when you look at a particular graph, you may ask comparative questions. Is it a fast development pattern? Is it a slower development pattern than others? Is it erratic? What is the shape of it?

On this particular graph, the footnote says that this an example of blatant underestimation. Why do I say that?

Let's look at the 1983 observation. When we look at the three prior years at the same age of development (60 months), we see that they were at a lower percent of ultimate than what we are seeing for the 1983 year. On what basis can we justify that? The fact that these lines are all sort of spiking off the top is a classic example of underestimation.

Now I will show you the same data on an incurred basis and the underestimation will be even more blatant. That almost looks like a rooster tail the way that the lines are really peeling off. It will take you a fair amount of experience to recognize some of these symptoms that occur within the data. I will read you the ultimate loss ratios that are associated with those years. It will be an example to you of how difficult it can sometimes be to come up with good estimates of ultimate losses and how the graphs can prevent you from making mistakes.



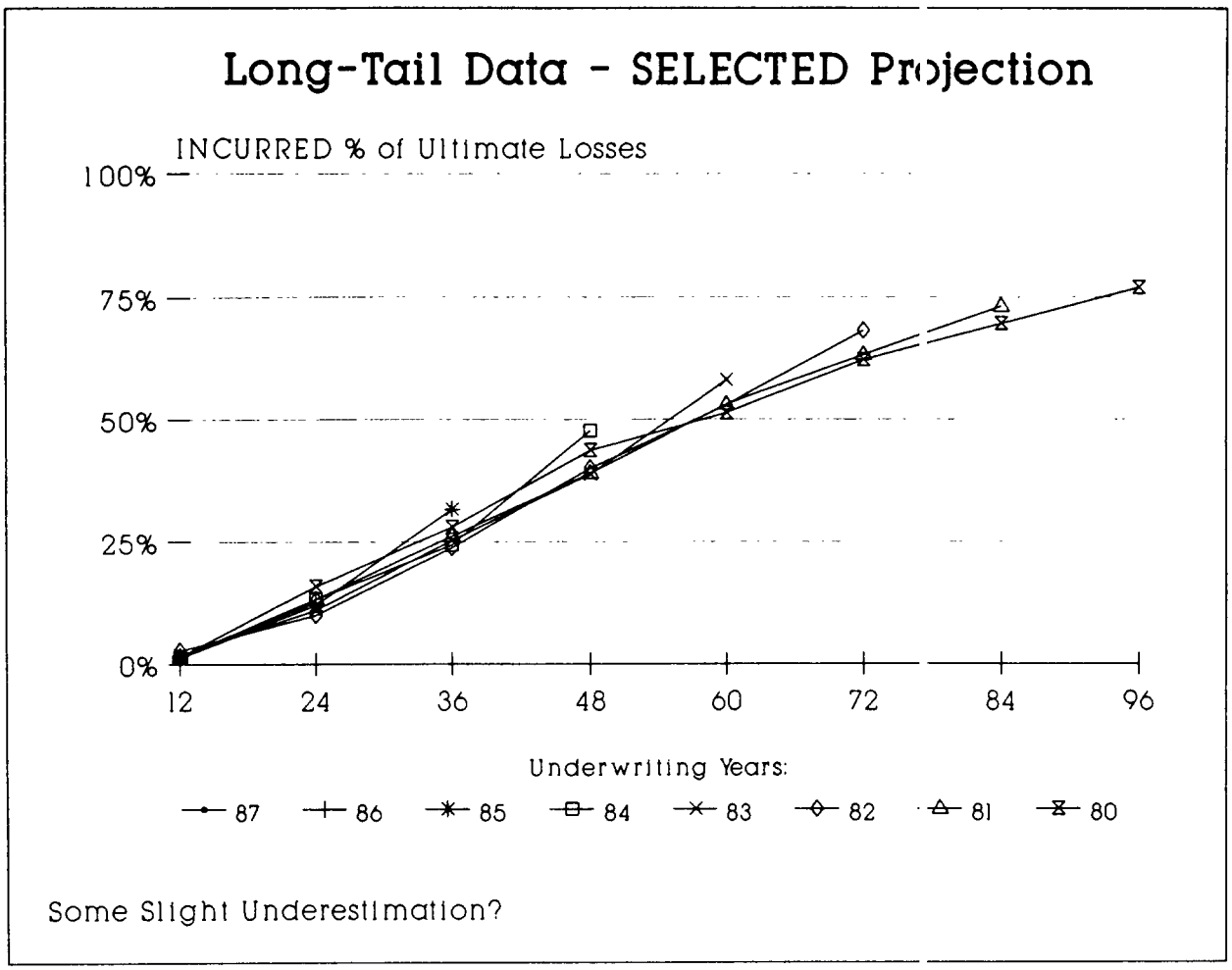
This is casualty business from the early 1980s, which was subject to the most severe rate deterioration which went on, so these loss ratios may sound like they are very high but the graphs indicate that the ultimate losses may be underestimated.

Year	Estimated Ratio
1980	170%
1981	214
1982	296
1983	319
1984	170
1895	77

The line I was pointing out, 1983 has an estimated ultimate loss ratio of 319%. How can a loss ratio of 319% be too low?

If you look at the graph of the data, unless somebody can explair why 1983 is much different than 1980, 1981 and 1982, then I don't believe 319% I think that the ultimate should be increased to such an extent that the line moves down.

It is very dangerous to use Bornhuetter-Ferguson loss projections in a situation where rate adequacy is shifting drastically and you are not certain of how severe the rate movement has been.



Here is the graph after I made some alternate projections of ultimate losses. It appears that there is still a little bit of spiking off the top. These are incurred losses. The scale on these two graphs is the same. One thing that you might notice also is that, in general, the selected projection on the next slide is longer tailed than this. So you can see that the 1983 line moved down fairly substantially so that the alternate projected ultimate was increased by a fairly significant margin.

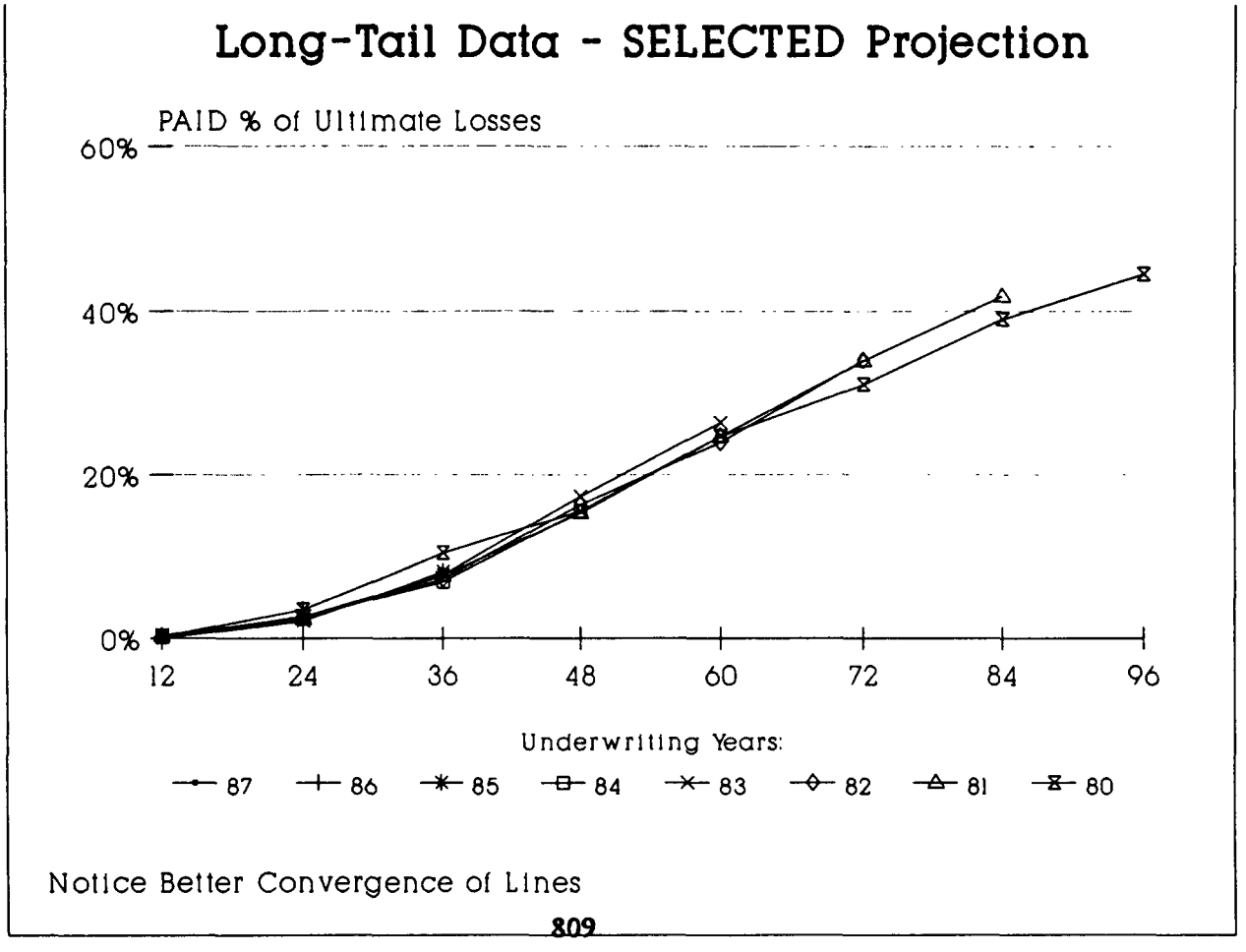
One of the other things that you have to remember in looking at the graphs is that a six or eight point movement can be very significant because you are only at sixty or seventy percent of ultimate. A six or seven point movement will push your ultimates up by ten percent, six over sixty. So a relatively small change at low percentages of ultimate can move the ultimate losses up very, very significantly.

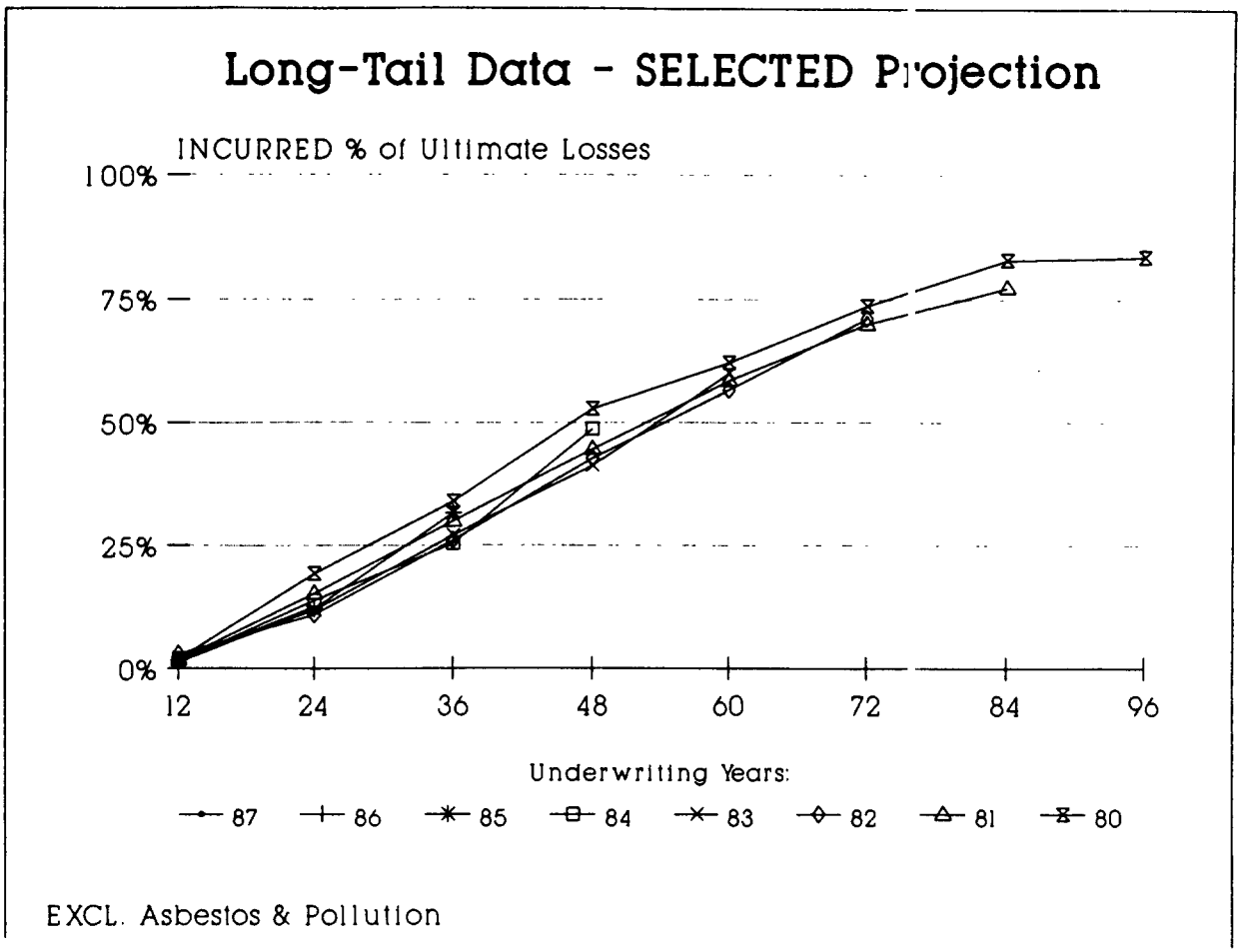
Year	Revised Ratio
1980	177%
1981	239
1982	341
1983	389
1984	189
1895	77

The 319% for 1983 went up to 389% under the revised projection.

There appears to be the possibility of some residual underestimation in the graph. There is a systematic flaw in this particular graph in that the data is distorted by some asbestosis and toxic tort type of claims. The next slide is the paid losses, which are packed on top of one another very nicely.

A number of speakers have talked about the constancy of paid losses. This is one of the things that I discovered in this particular portfolio. Despite the fact that the data ran out to well over thirty years, there was incredible consistency in the paid loss development patterns over time. I had more comfort in the paid loss development patterns than in the incurred, because I knew that with that severity of rate deterioration going on, management was probably going to go in and jerk around the claims department pretty severely.



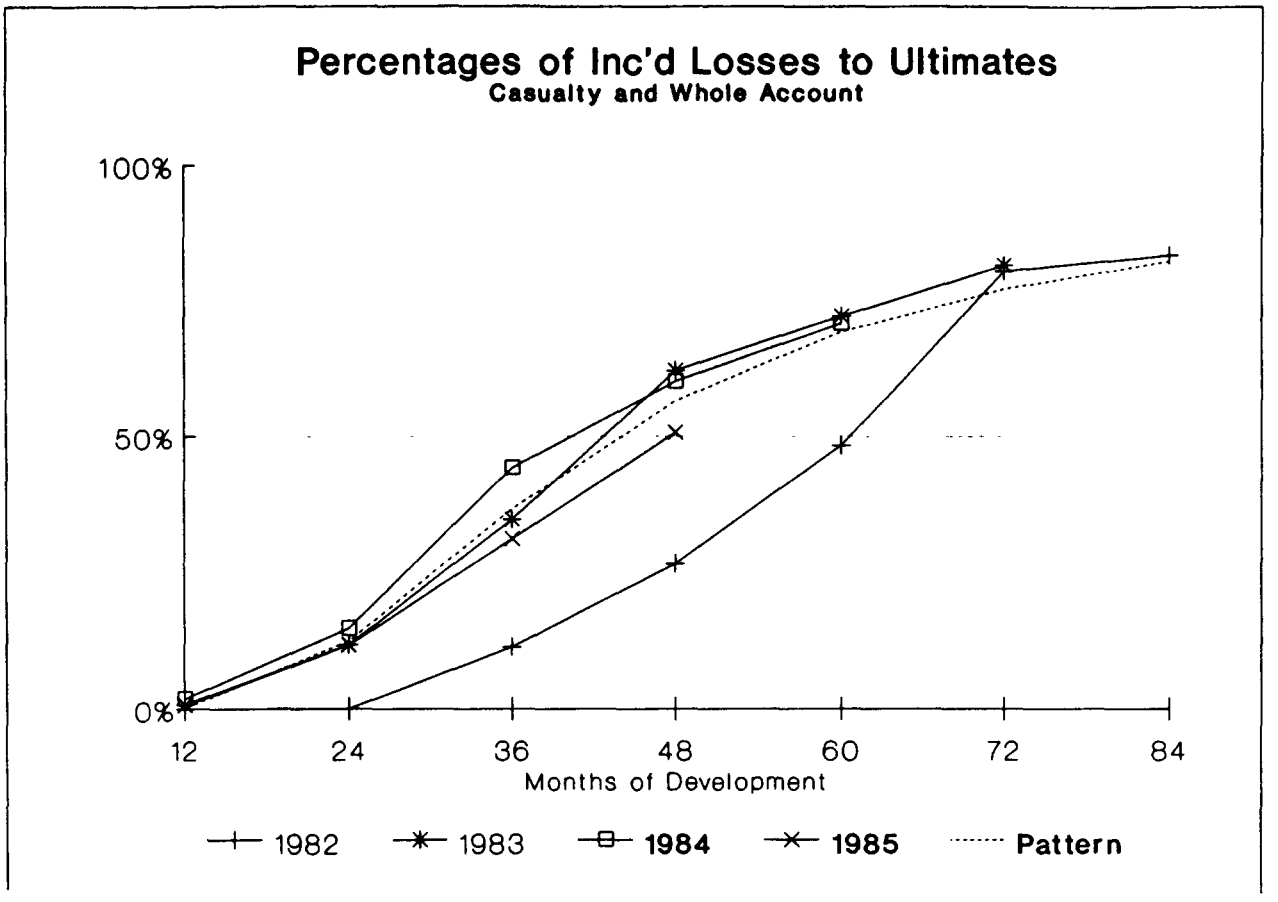


This is the incurred graph excluding asbestosis and pollution. You can see that the spiking off the top that was on the graph two graphs ago has disappeared now. What had happened was that the emergence of the asbestosis and pollution claims had been limited to the most recent year or two. They were all case reserves and there were effectively no paid losses on them. The company had done a review of all their claims files to determine those policies where there was a potential for asbestosis and they reserved all those policies to policy limits. So it was very much of a recent transient effect on the data. You can see that when you exclude that distortion, the remaining patterns are incredibly tightly packed.

Now, in the last series of graphs I have shown you both paid and incurred. One of the interesting things is that when you get the ultimate projection right, you have two different tests. You can test using the paid patterns and you can also test using the incurred patterns. That is what I will do in the next two graphs.

(SLIDE)
These slides are from a very small portfolio of reinsurance which operated from the years 1982 through 1985 -- horrible years in the history of the industry, I might add. As you can tell from the title, I had to combine some casualty and whole account business. I looked at the loss development patterns and they were sufficiently similar so that I was able to combine them.

Over the four year period there were only about 120-150 treaty years in total comprising this database. There is not very much data here, but still one is able to see some fairly smooth patterns over time.



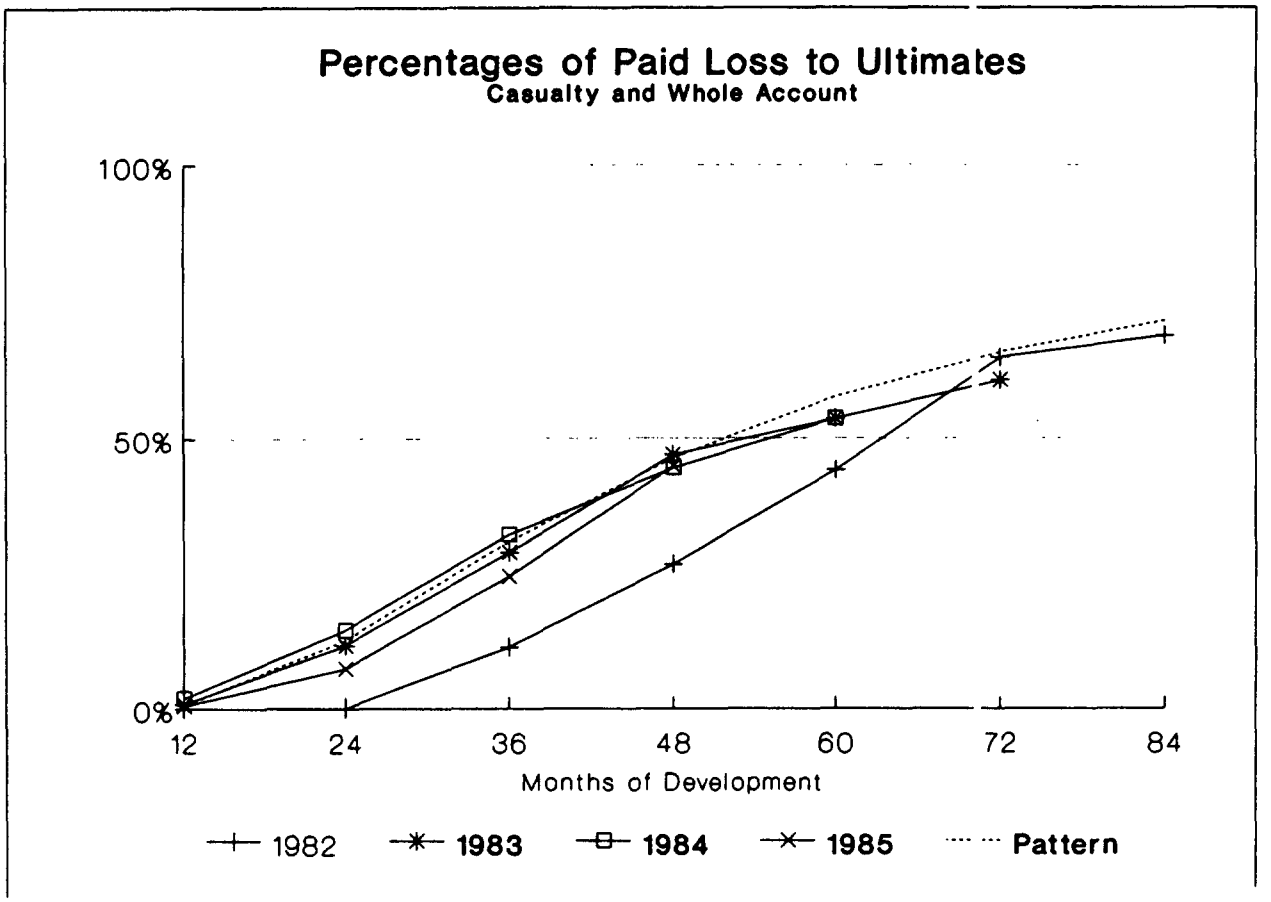
The dotted line is the pattern underlying the ultimates. Now, as you can see from the pattern, the lines for 1982, 1983 and 1984 are all above the pattern. That is because I used a Bornhuetter-Ferguson and the expected loss ratios are such that the selected estimates are lower than those which I would have picked had I used loss development factor projection.

If you do an LDF projection, by definition the end points of your lines will lie on the theoretical pattern. This is because what you are saying is that if your dotted line pattern indicates your percentage of ultimate the distance from here to here is the theoretical percent unreported and you merely take your losses to date times your loss development factor and you will by definition have to be on the fitted line at the end points.

Now, the advantage of the graph is that you can look at what is going on prior to the end point and determine whether or not the fitted pattern is intuitively acceptable.

Once again, it should be noted that I used an inverse power curve. The reason why I use an inverse power curve is quite simple; it is because the inverse power curve is very easy to implement. You can make very simple logarithmic transformations on the data and Lotus 1-2-3 has a data regression facility built right into it. It is a snap to produce fitted loss development patterns in Lotus 1-2-3. I am not advocating that the inverse power curve is the best curve to fit data, but I think it is better to use the company's own data than to try to extrapolate some external reinsurance pattern onto the data.

In this particular case there may be some underestimation, because the distance between the end point and the ultimate is less than that which is indicated by the pattern. On the paid curve I see exactly the opposite, i.e., that the end points are below the fitted pattern. Here I think that I may have some overestimation.

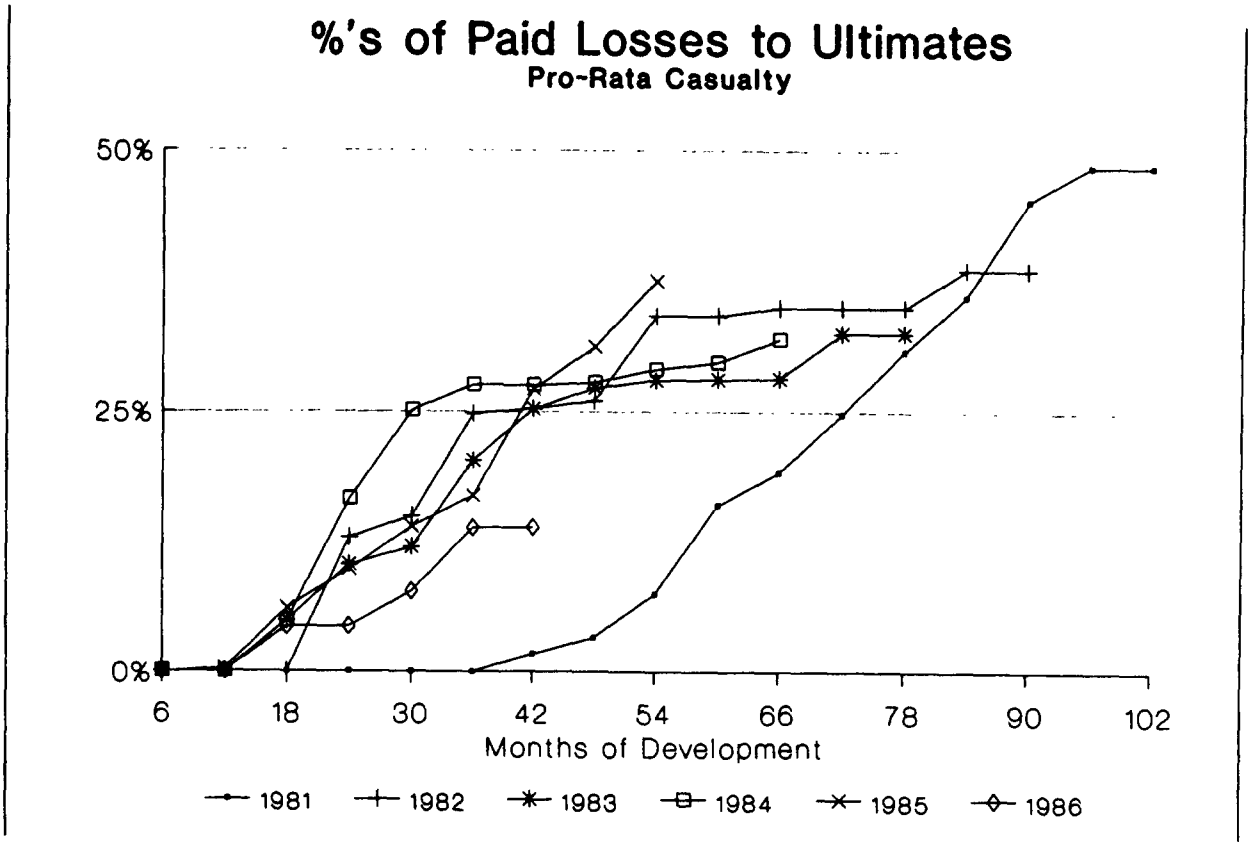


So what I have done is to select my ultimates to be an average, some sort of weighted average, between my paid indications and my incurred indications. I feel comfortable with my ultimate selected numbers because the paid indications say it should be higher and the incurred indications say it should be lower. The right answer is probably in the middle somewhere, and that is what I have selected (and as shown on the graphs).

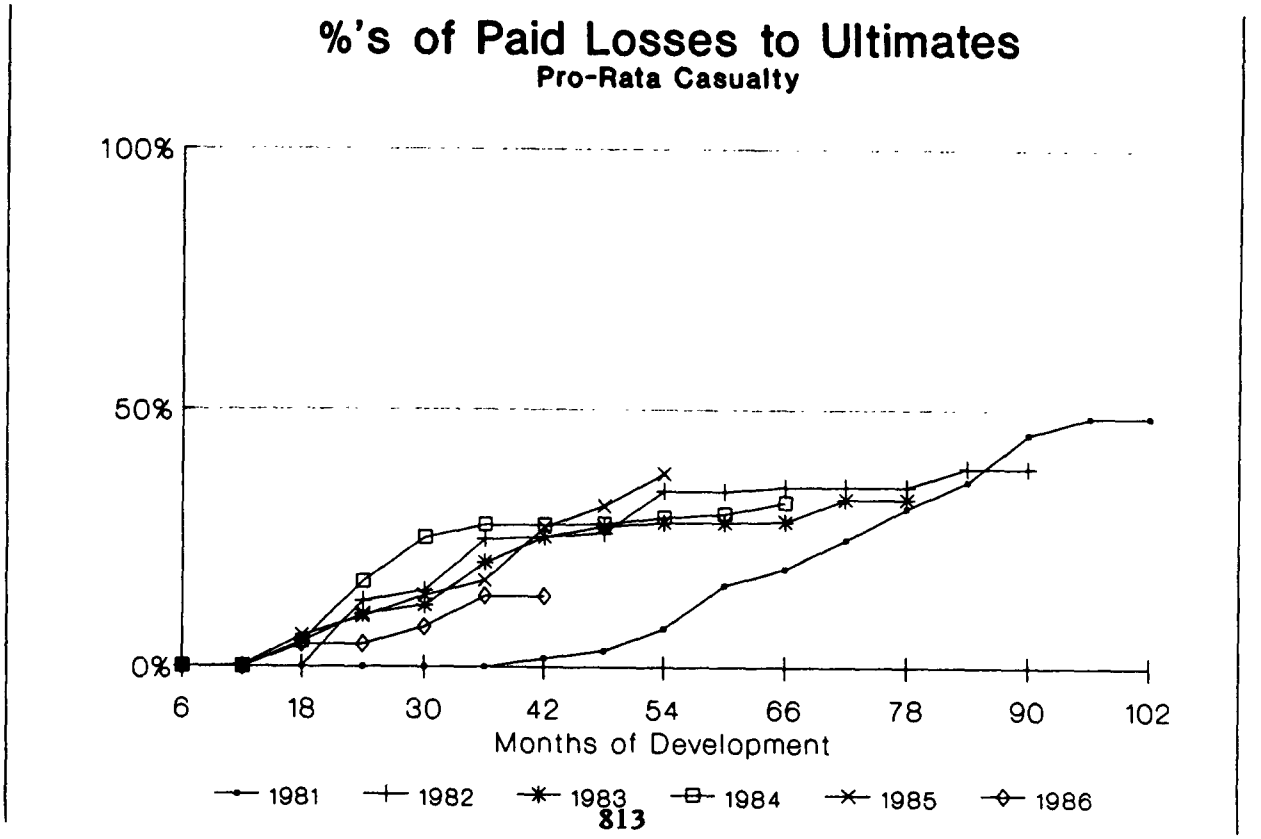
In this particular case the graphs were used to give me more comfort that the answers that I have selected were appropriate.

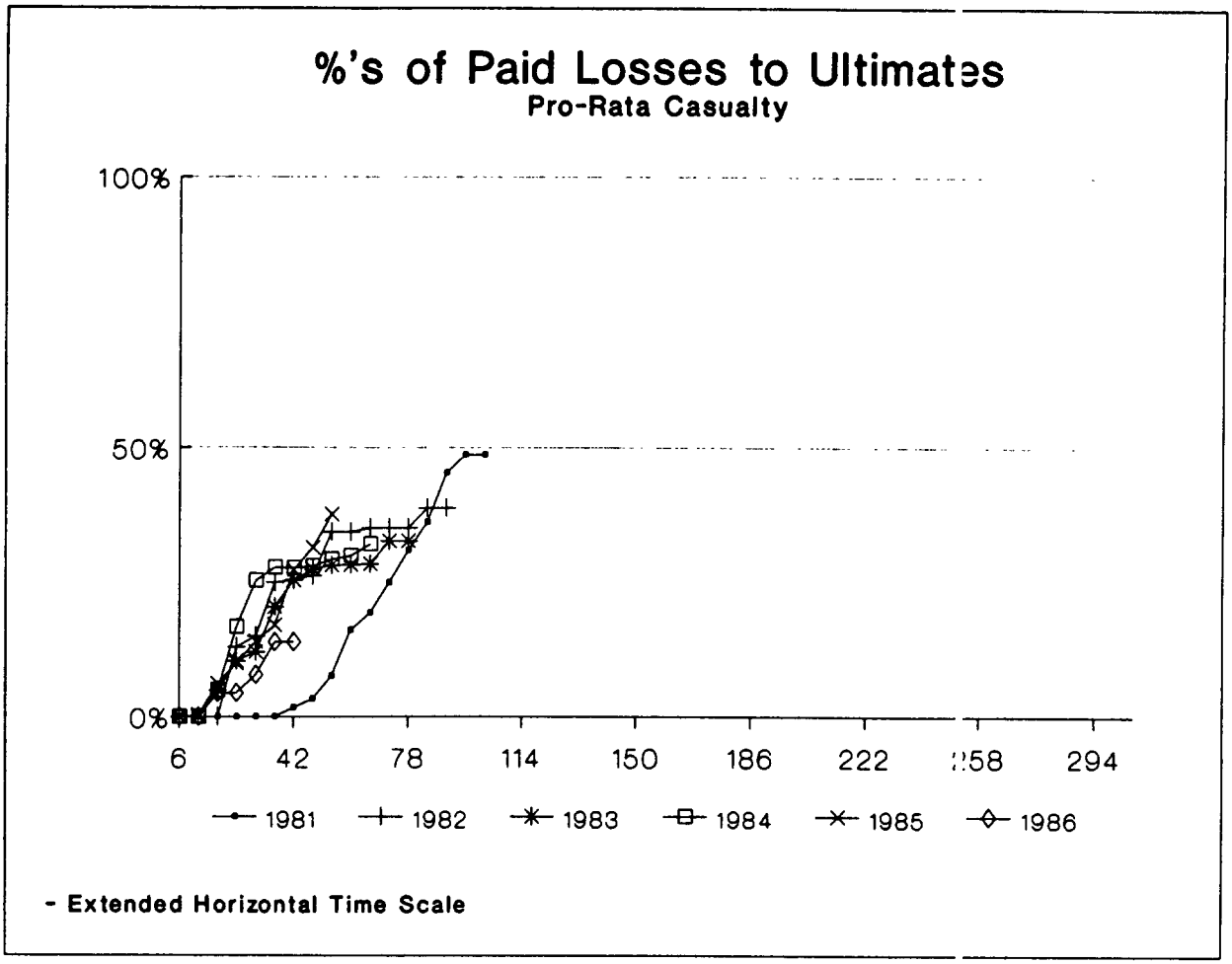
Now, getting into some long tailed casualty data, one of the observations you can make from this data is that it is less well behaved. There is a lot of noise in the patterns, but in general they are rising toward this upper line.

Now, who can tell me what is wrong with this next graph? It doesn't end at 100%. It ends at 50%. You have to be very careful when you look at graphs to notice the vertical and horizontal scales.



What happens when we switch and look at it on a one hundred percent vertical scale? ... Gee, that looks terrible. Are the lines really going to make it up to the 100% ceiling? Now, admittedly, it is paid loss data for casualty reinsurance, but how can we envision that it is eventually going to get up to 100%? The trick is that when you are looking at casualty data you expect it to take longer, so give it more horizontal scale to run out.





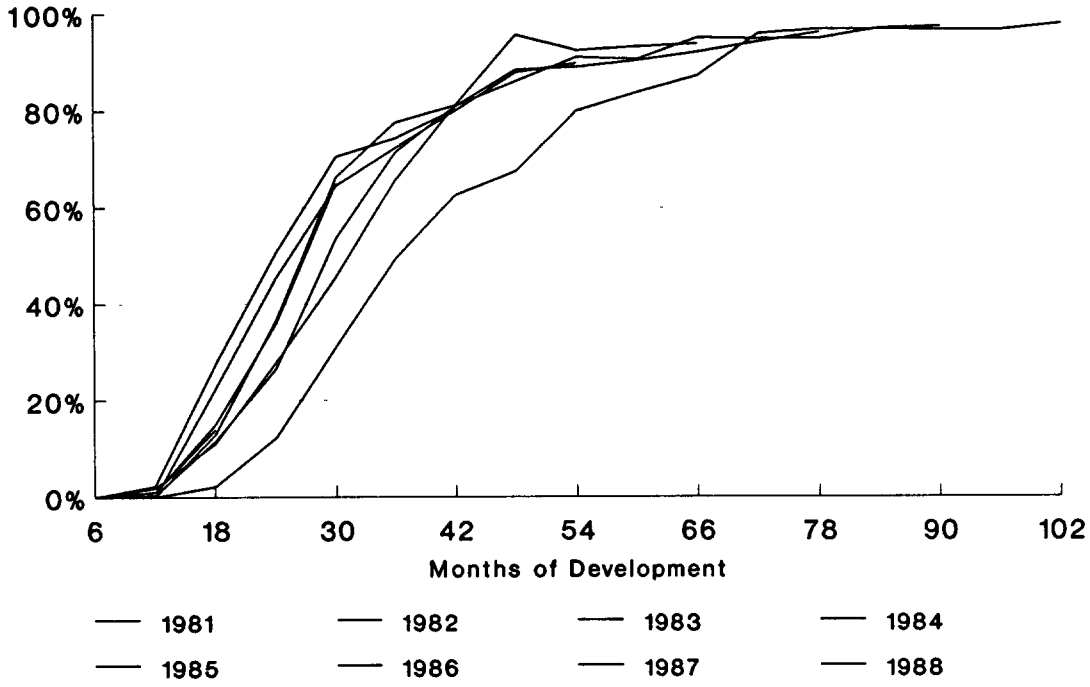
So I just tripled the horizontal scale. Admittedly there is no information out there but it alters the way you look at the data. Now when you see the rising patterns it appears somewhat realistic to think that they are going to continue up and then eventually reach the ceiling at 100%.

One of the tricks that I do many times is, when I have a fitted pattern and I have a choice between a fitted tail of 1.10 or 1.25 or 1.50, I will extend the horizontal scale, show various the fitted patterns on it, and by judgment select the one that looks like it makes sense.

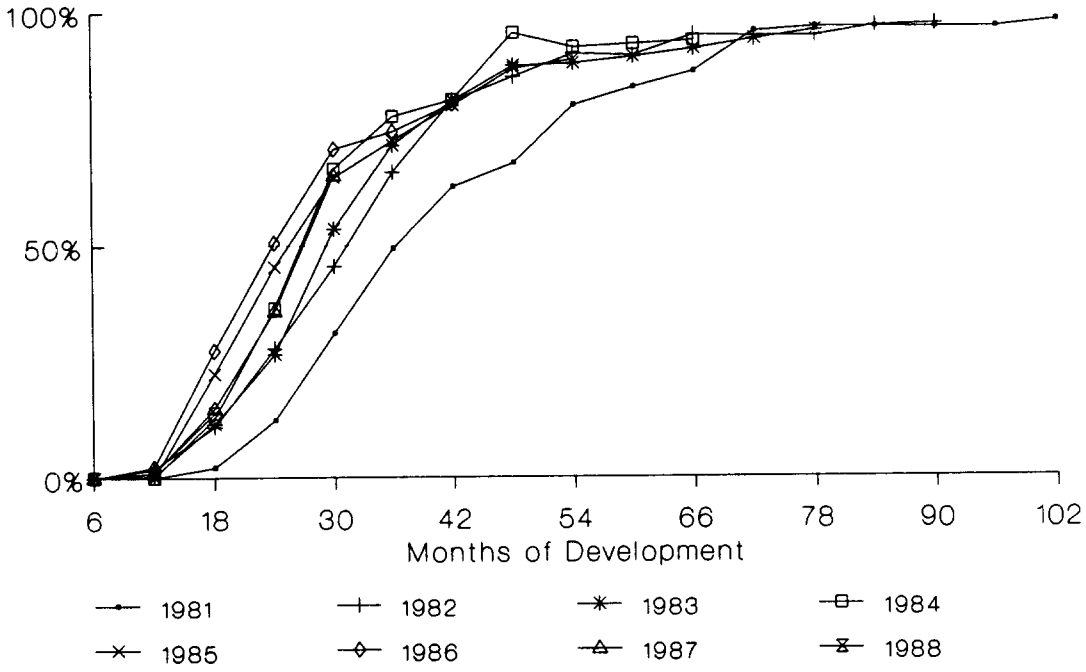
It is not as simple as that but I have been doing graphs of loss development curves like this for almost four years now, so I have a very good feeling of when they are right and when they are wrong. The important thing is to experiment with as many different data sets as possible to get a feeling for when your data is well behaved and when it isn't.

Now, the next data is some extremely well behaved data. This is property data, eight years of it again. The next graph I am going to show is exactly the same data, but without color this time, in black and white. [Markers and no-markers are used in the transcript to show alternate presentations.]

Percentages of Paid Losses to Ultimates
Pro-Rata Property



%'s of Paid Losses to Ultimates
Pro-Rata Property



Now, a lot of you probably don't have fancy color screens. I would definitely recommend that you get one. I use an EGA screen. I recommend that you move up to VGA color. The advantage of color is that you have different colors for the different years and will be able to differentiate among them.

You don't have to have a color printer necessarily. Most of these analysis techniques that I have been showing you are not printed in reports and are not necessarily presented to clients. The important thing is to use graphs as an analytical tool to help in the calculation of projections. In some cases where there is a significant shift in loss development patterns and I want to discuss it with a client I will print the graph, but a black and white image isn't as good as the color.

I did show the black and white image here so that you can get some feel for it. It is a very different message that comes across in black and white than what you see in color.

What you see in black and white is the general clustering of the loss development curves. This gives you some confidence that there really is an underlying pattern and that, despite the fact that some of these years are fairly jagged and jumping around, there is a very tight patterning.

I would recommend using color screens. Those of you that have CGA screens, I recommend that you upgrade them. You will go blind very quickly by just reading text if not for the graphics.

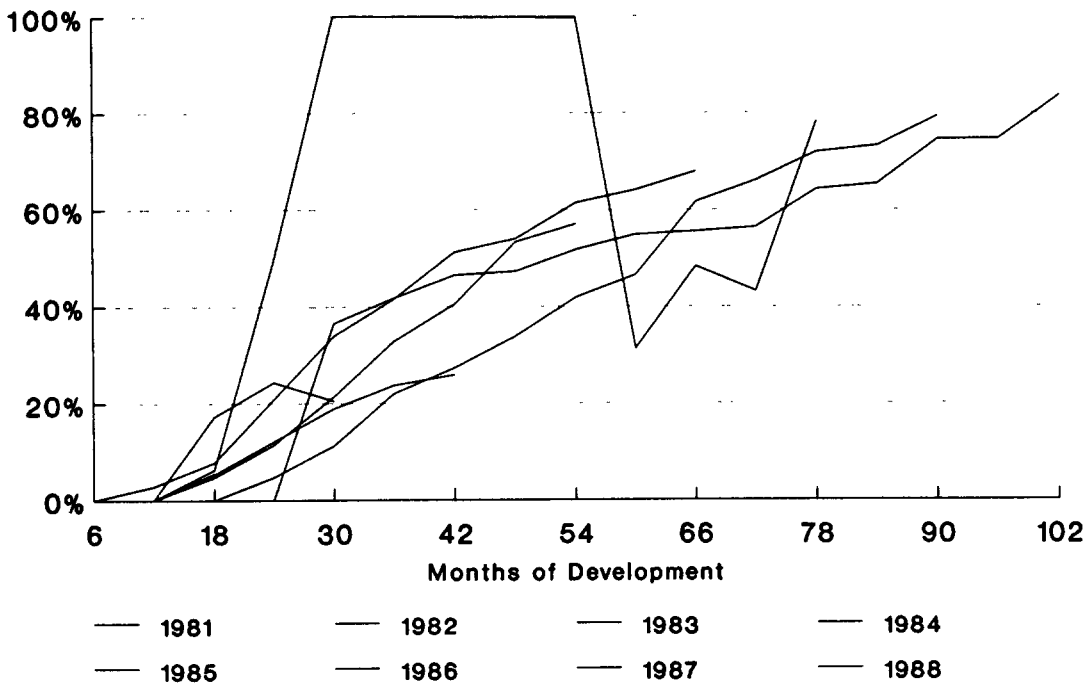
One of the other things that I get out of this graph is that this point, once again, looks like an oddball in that it went up and came back down, and that is an example where I might do some data smoothing in order to get that point out.

When you have dirty data and you want to do some smoothing for it, I find that the technique that I always use is to first project ultimate losses, using just a rough guess. Even though they are not going to be final estimates, graph the data. By looking at the graphs you can get a much better idea of which data points are oddballs. If you are looking at loss development factors, what you would see here is a big upward loss development factor and then a big down one. You wouldn't know how exactly to smooth it. Whereas when you look at the patterns you can see ... why don't we move this point down here and then see what loss development factors fall out of it?

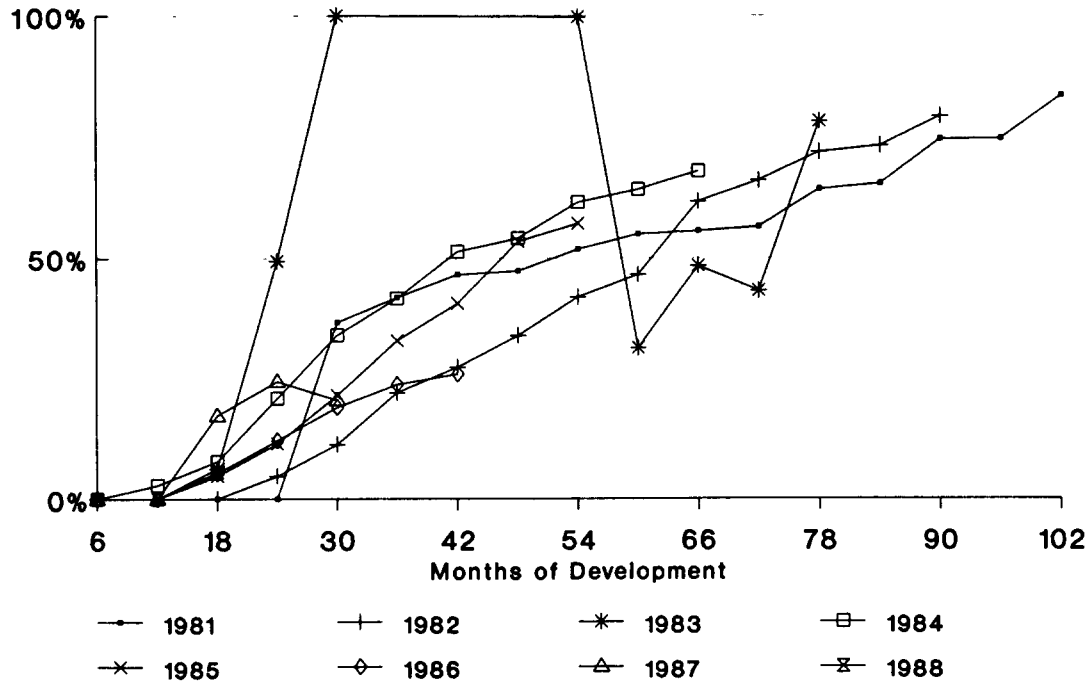
I threw this next graph in to show you some less well behaved data. This is excess property; 1983 was not a very good year for excess property with Hurricane Alicia and the winter freeze storms. This big spike that went up and came back down and out there, it is almost certainly due to reinsurance problems, that they pay the losses and they don't process the reinsurance collectible, and then they did process the reinsurance and then they started to pay losses again, and it is just a mess.

The other aspect of this that you can see is that the excess property is longer tailed than the pro rata property, which was the prior graph. For pro rata property, you can see how fast this is developing and the excess property, with the same time scale, is much slower. The percentages of ultimate are much lower for excess loss data.

Percentages of Paid Losses to Ultimates
Excess Property



%'s of Paid Losses to Ultimates
Excess Property



There is a footnote that 1986 (for excess property) appears too conservative. It does appear too conservative when you have all of the other years up so high and the endpoint for 1986 is so much lower. We think that the distance from the endpoint up to 100% is too big and that therefore our ultimate is too big and therefore if we reduce the ultimate we will have an estimate which is more in keeping with the historical data. This is distinctly an outlier, i.e. that the estimated reserve size is bigger than anything which existed in the history of data. Therefore it doesn't appear to be justified unless you can come back and explain why that data point is, or should be, treated differently.

I have been trying to show you slides which give you an image of what it looks like on the computer screen, with the black background and the colored lines, the text at the top, the legend at the bottom.

Wide colored lines are actually better for presentation. I am sure the people in the back row appreciate the wide lines versus the narrow lines, but when you are working with the computer screen, the little narrow colored lines are quite readable.

Most of the time I choose to turn the markers off. We will go into a little bit of terminology very quickly here. Titles are at the top, first and second titles, X axis, Y axis, and a grid here. I recommend that you use as little grid as possible. The problem with a grid is that it tricks your eye and you can't see the pattern. The idea is for the ink on the paper, (or the pattern on the screen) to show the loss development patterns and not all of this extraneous unnecessary information.

The items 1981 through 1988 across the bottom are usually called a "legend". On some graphics packages you will actually be able to label the lines. Lotus 1-2-3 allows you to do that with a fair amount of difficulty. It is much more difficult in Harvard Graphics.

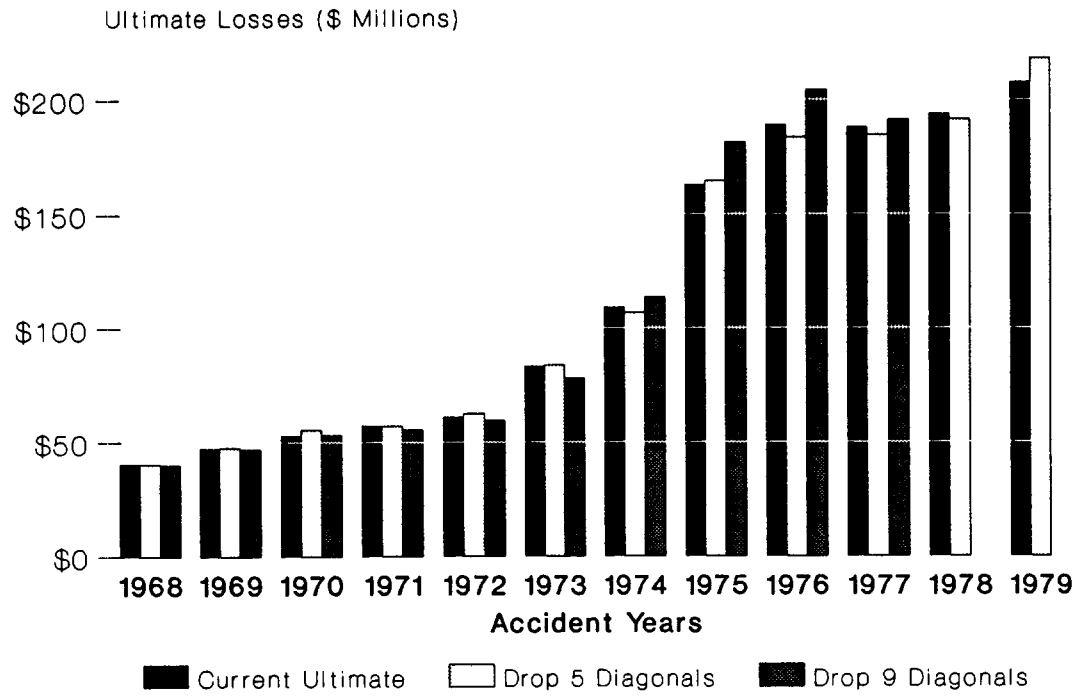
I have been singing the praises of the inverse power curve, and so this graph displays some of the results of testing or validating the inverse power curve model.

We used RAA automobile liability data from the 1987 RAA report, which is as of 12/86, and we started to strip off the most recent data diagonals and we modeled the remainder and projected it. Then we came back and asked "When we know what it eventually developed to, how was our old model?"

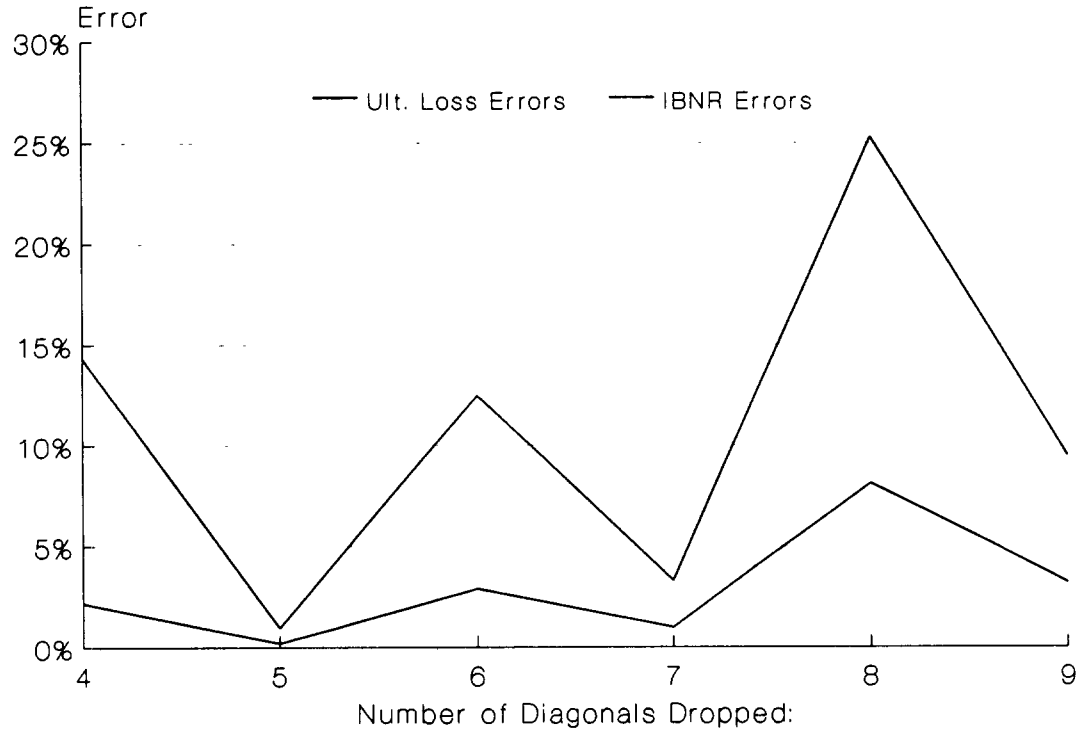
So here were the individual accident years and we selectively dropped off five and nine diagonals and then did projections of ultimate losses. Now the blue line shows the estimate as it stands now. The red line is what we would have projected if we dropped five diagonals, the yellow if we dropped nine diagonals. You can see that most of the years are pretty good with the exception of the more recent years.

One other aspect of this graph that those of you that create graphs should consider -- when I talked about the principle of making the ink on the paper and the image be as much data ink as possible and reducing the grid, what I did in this particular case is I used black lines as the grid, so out here you don't have any noise. Your eye isn't distracted by any grid lines coming through this. You can still see how tall

RAA - Auto Liability (at 12/86)
Retro Test of Inverse Power Curve



RAA - Auto Liability (at 12/86)
Retrospective Error of IBNR and Ult Loss



the columns are, but it is actually by erasing ink that you are able to display information.

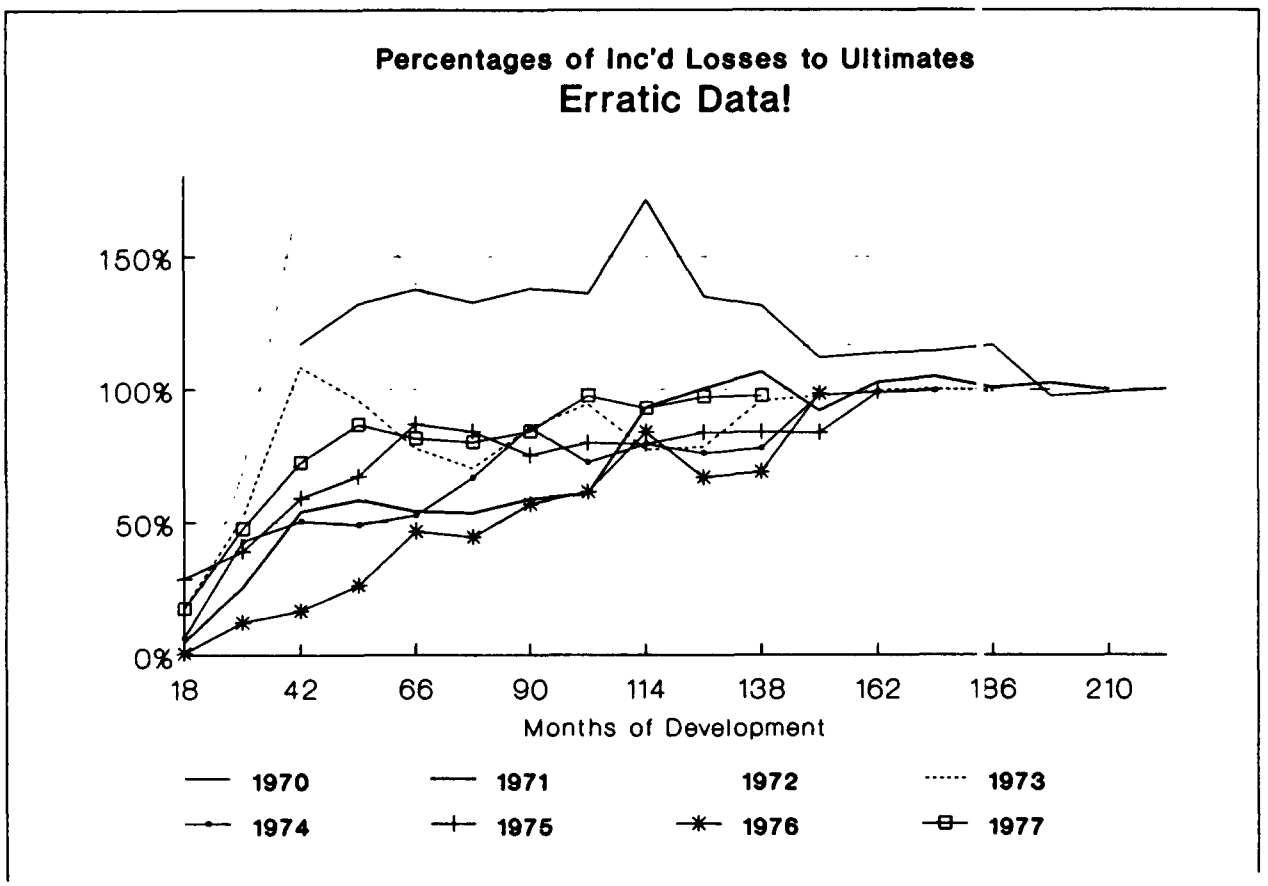
The important thing when you are putting together graphics is to try to get the message across with the least amount of ink. That way the viewer will concentrate on the data instead of the way it is being presented.

This is the similar test of the inverse power curve. When we cancel out the pluses and the minuses among the accident years it shows you that over time we had very good success as we dropped successively more diagonals in estimating the ultimate losses. The marginal estimation of the IBNR was a little bit less successful.

I will show the same graph, but with a different presentation in a bar chart instead of a line chart. I think the bar chart is actually better, but it is the same information and the same technique as before, using blank lines to show the grid.

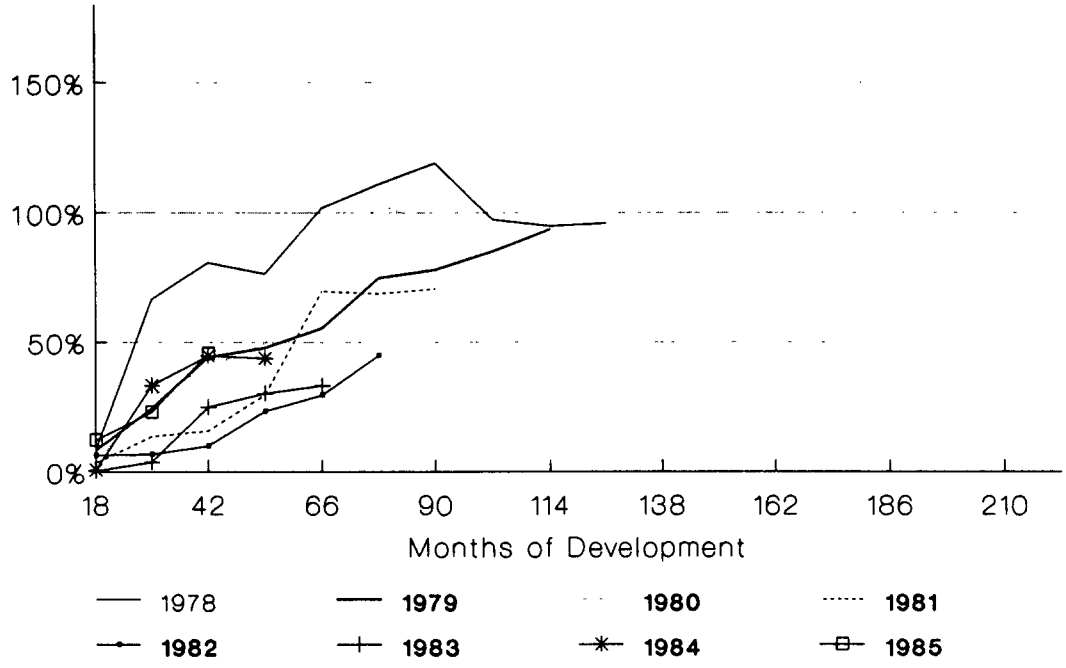
Now, just to prove to you that not all data is well behaved, this is some very poorly behaved data. With most of the data that you will look at you should have a fairly tight clustering of the loss development patterns over time and you should have a great degree of comfort in using the graphs that the ultimate losses you are projecting are quite meaningful.

I put this slide and the subsequent slide in the presentation so that when you see difficult data you are able to recognize it.



Percentages of Inc'd Losses to Ultimates

Product Liability



Hints for Good Graphs

- Avoid overdecoration
- Limit Fonts & Colors
- Use Common Vertical & Horizontal Scales
- Use Color for Analysis
- Use Black & White in Reports
- Keep Titles Small
- Let the Data tell the Story

Hints for Good Graphs

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- **o Keep Titles Small**
- **o Let the Data tell the Story**

Once again, be careful of the capabilities of your computer. Use nice, simple, readable fonts. This is exactly the same text, but you can read this and you can't read the prior one, so be careful in using the capabilities of the computer. Just because the computer can do something nifty and tricky doesn't mean you should necessarily be using it. As I said, avoid overdecoration. Fonts and colors -- don't go too crazy with them. Use common vertical and horizontal scales so that when you create multiple graphs you can compare them to one another. Use color for analysis.

I highly recommend for people to get high quality graphics screens for their PCs. Almost by definition you are going to have to use black and white for reports. It is very expensive to make color photocopies and it is ridiculously time consuming to run off ten or twelve copies on a color printer or a color plotter.

My recommendation is to keep the titles small and let the data tell the story. Other people in generally discussing graphics would say, "Make the titles big so they are readable." I disagree with that. My particular feeling is that we are creating graphs to highlight the numbers, to highlight the data, not to highlight some catchy title.

I would like to list one source which has been very helpful and very beneficial. It is a book called The Visual Display of Quantitative Information, by Edward Tufte. The only way to buy it is to write to the publisher. It is Graphics Press, Box 430, Cheshire, Connecticut 06410 ($36.00 including postage as of 12/89). It is a wonderful book on what to do and what not to do with graphics.

These were five principles that he had:

1) show the data
2) maximize the data/ink ratio -- I tried to show you some examples where I erased the non-data ink,
3) getting rid of grids and frames
4) erase redundant data ink
5) revise and edit.

When you are putting together graphs for presentation you will probably have to do them over and over and over again. I had to do two complete sets of slides for this presentation and I will probably do them again before I do the same topic again. It does take a lot of time to do graphs for presentation purposes, but for analysis purposes it is very quick.

I highly recommend that you look at percent of ultimate curves as shown in this presentation and to start looking at other graphs also.

Unfortunately I am alone up here this year. Next year I would like one of you to join me and we can help more people to hit the bull's eye. Any of you that are interested in swapping notes, learning more techniques, or whatever, I would be thrilled to entertain questions, comments, or correspondence. I look forward to next year and then subsequent years when you are producing some beautiful graphs also.

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1989 CASUALTY LOSS RESERVE SEMINAR

4G: REGRESSION METHODS — APPLICATIONS

Moderator & Panelist

Ben Zehnwirth
School of Economics and Finance
Macquarie University

STOCHASTIC REGRESSION MODELS

WITH APPLICATIONS TO LOSS RESERVING

A PAPER PRESENTED IN SESSION 4G,
AT THE 1989 CASUALTY LOSS RESERVE
SEMINAR, HELD IN CHICAGO

Ben Zehnwirth, F.S.S., A.I.A.
B.Sc.(Hons , M.Sc., Ph.D.

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Killara NSW 2071
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TABLE OF CONTENTS

0. INTRODUCTION AND SUMMARY

The recent surge of interest in stochastic loss reserving models has sadly created the impression, in some quarters, that stochastic models are only of theoretical interest and are not of practical use. We have aimed in this paper to demonstrate the practical applications of stochastic models (with varying parameters). With this principal object in mind, we concentrate on modelling concepts, including:

- PARSIMONY;
- MAXIMUM INFORMATION;
- SIMPLICITY AND TESTABILITY;
- VALIDATION;
- STABILITY;

and methodological aspects including:

- SEPARATION OF SYSTEMATIC COMPONENTS FROM RANDOM COMPONENTS;
- EFFICIENCY AND OPTIMALITY.

Last year, at the CLRS held in Atlanta, Zehnwirth (1988) discussed the advantages of stochastic regression models and contrasted them with the disadvantages of chain ladder, equivalently, age-to-age development factor techniques. Kahane (1989) and Sundt (1989) also demonstrate the superiority of stochastic models discussed in the current paper.

There are two categories of models discussed in the sequel:

- STOCHASTIC REGRESSION MODELS WITH FIXED (NON-RANDOM) PARAMETERS;
- STOCHASTIC REGRESSION MODELS WITH VARYING (OR RANDOM) PARAMETERS.

The second category of models are much more powerful and useful than the first. They accommodate the principle of parsimony by credibility weighting the data and consequently afford the following main critical advantages:

- SMALL(ER) PREDICTION ERRORS;
- INCREASED STABILITY;
- SEPARATION OF NON-ORTHOGONAL SYSTEMATIC TRENDS;

. AVOIDANCE OF MULTICOLLINEARITY;

. OBSERVATIONS ARE NOT ASSUMED TO BE NECESSARILY (UNCONDITIONALLY) INDEPENDENT.

The paper is organised in six sections as follows:

Section 1 presents an introduction to regression models. Regression is the workhorse of Statistics and is also often misused and abused.

Section 2 describes the three directions (dimensions) of a loss development array, emphasising the non-orthogonality of payment year and accident year directions. Various components of a general family of stochastic models are also presented.

Section 3 presents a general family of stochastic regression models that fall into two categories, viz., fixed parameter and varying parameter. A number of specific models belonging to the general model are described.

Section 4 discusses the principal modelling concepts and presents a number of test statistics. It is emphasised that a model contains 'information' and that each assumption of a model must be tested.

Section 5 involves model identification of a real-life development array. The identified model is tested, validated and checked for stability.

Section 6 presents conclusions.

IN SESSION 6G, THE FRAMEWORK DESCRIBED HEREIN IS USED TO ANALYSE MEDICAL MALPRACTICE PAYMENTS

1. INTRODUCTION TO STOCHASTIC MODELS

1.1 INTRODUCTION

The central theme of quantitative techniques of forecasting is that the future can be predicted by discovering the systematic pattern of events in the past. Such a systematic pattern may be identified directly from historical arrays and combined with perceptions that the claims reserver may have of future systematic patterns.

The ability of a given statistical technique to forecast effectively in a specific situation depends largely on accurately identifying the systematic patterns and trends and selecting the correct technique and model to handle them.

In this section we present some fundamental principles of statistical forecasting, including concepts of uncertainty and standard error. Mean forecasts are meaningless without a quantitative assessment of uncertainty. Additional modelling and forecasting principles are discussed in Section 4.

Consider the experiment of tossing a fair coin 100 times. The probability of observing 50 heads is only 0.08, yet we expect 50 on the average. By that, we mean that if we repeated the experiment many times, the average of the observed outcomes is 50. It is important to also quantify how far the outcomes are from 50.

If, after repeating the experiment many times, we compute the average distance of the outcomes from the expected value (of 50), we obtain 5, approximately. That is, the standard deviation is 5. The value 5 is just as important as the value 50. The first time the experiment is conducted, we may observe 58 heads, the second time we may observe 45 heads, yet it is the same coin.

The value 50 is called the systematic component whereas the value 5 represents the quantification of randomness or noise. Even though we know everything there is to know about the coin, our forecast of 50 is subject to a 10% error (5/50 = 0.1)! We have no control over the inherent variability in the coin.

1.2 NORMAL DISTRIBUTION

The distribution most common in scientific work is the "normal" distribution, described by a bell-shaped curve; it was first investigated in depth by Gauss and is sometimes called the Gaussian distribution. It is constructed by assuming that the random variable can take on any value along some axis; the probability that it falls within any given interval is then made equal to the area under the same interval of the bell-shaped

curve. The curve is completely specified by two parameters: the mean, μ (mu), which lies at the peak of the curve, and the standard deviation, σ (sigma), which measures how closely the values are distributed around the mean. The larger the standard deviation is, the more widely dispersed the data are.

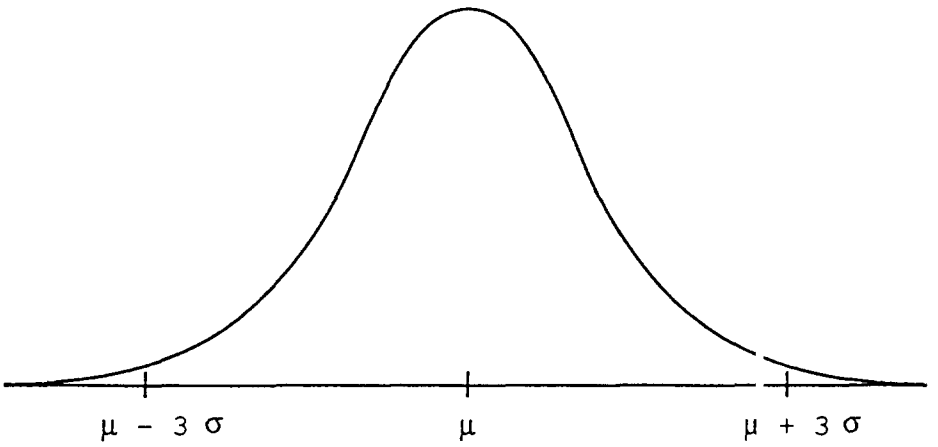


Figure 1.2.1 Normal distribution

A normal distribution (depicted in Figure 1.2.1) is bell-shaped and symmetric about the mean μ. Although the range of a normal random variable Y is from $-\infty$ to ∞, the probability that Y takes very small or very large values is small. Put another way, it is about 95% certain that Y lies within two standard deviations on either side of the mean. For more information on the normal distribution the reader is advised to refer to Hossack et al (1983).

1.3 RANDOM SAMPLE FROM A NORMAL DISTRIBUTION - THE SIMPLEST REGRESSION MODEL

In this section, we present some of the principles of regression modelling via a series of examples.

Example 1

Imagine that the IQ of Sydney actuaries is normally distributed with mean $\mu = 110$ and standard deviation $\sigma = 10$. The distribution is depicted in Figure 1.3.1 below. In probability theory a known mean and standard deviation are employed to predict future behaviour.

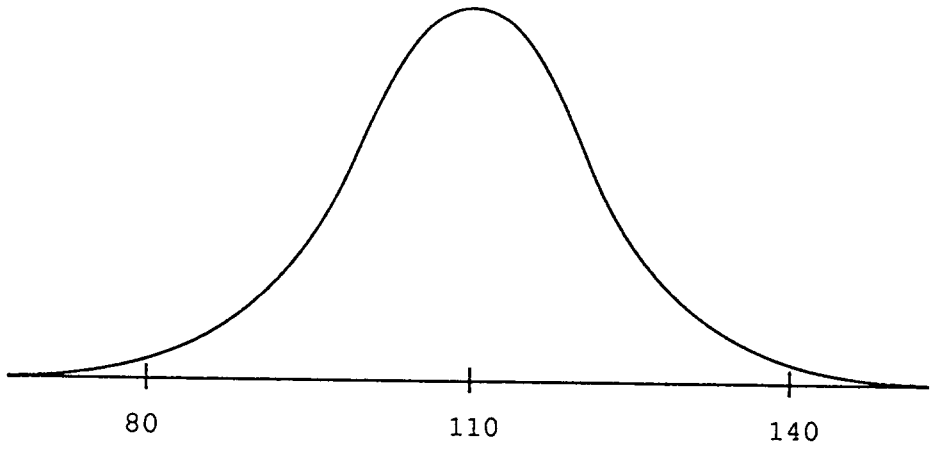


Figure 1.3.1 Distribution of IQ of Sydney actuaries

Our forecast of the IQ of a Sydney actuary chosen at random, is 110. This forecast is, of course, not spot on. There is a small chance that the IQ of an actuary chosen at random is less than 90. A 95% confidence interval is about (90,130). If instead σ is larger than 10, say 30, so that there is a very large variation in IQ's amongst actuaries, our forecast of 110 has a high likelihood of being wide of the mark. A 95% confidence interval in this case is (50,170).

The standard deviation σ of a distribution is important in determining the accuracy of a forecast. Without it, the forecast of 110 is quite meaningless. For a typical problem in statistics the mean μ and the standard deviation σ are unknown: from observed data the statistician must infer the mean μ and the standard deviation σ.

Example 2

Suppose that in Example 1 we do not know the values of μ and σ. However, we do have a random sample $y_1,\ldots,y_n$ taken from a normal population of IQ's with mean μ and standard deviation σ. A plot of the random sample (equally spaced) is depicted in Figure 1.3.2.

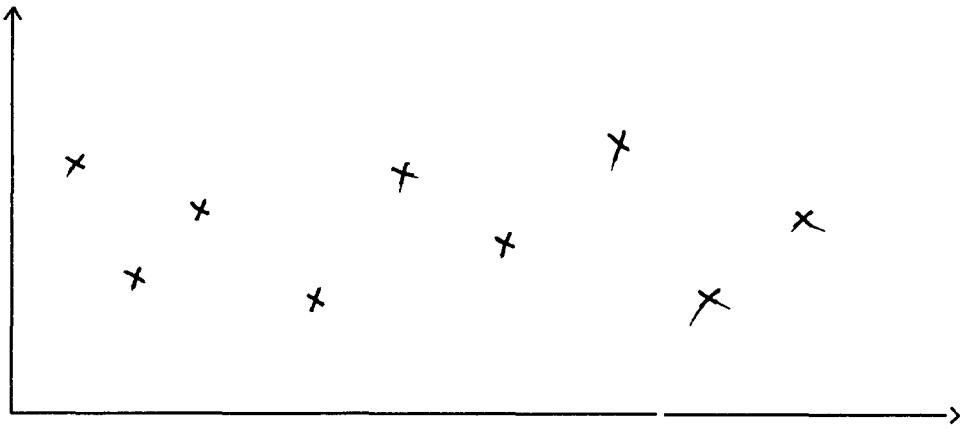


Figure 1.3.2 A random sample of IQ's

We assume that each y_i is a measure of μ with some degree of error. A model for this is each observation y_i is equal to μ plus a zero mean error term ε, that is,

$$y_i = \mu + \varepsilon_i$$

where each ε_i is normally distributed with mean zero and standard deviation σ. The mean μ is the systematic component whereas the error term ε_i is the random component. This model is the simplest regression model! The regressor is unity, that is, 1. The model is depicted in Figure 1.3.3 below.

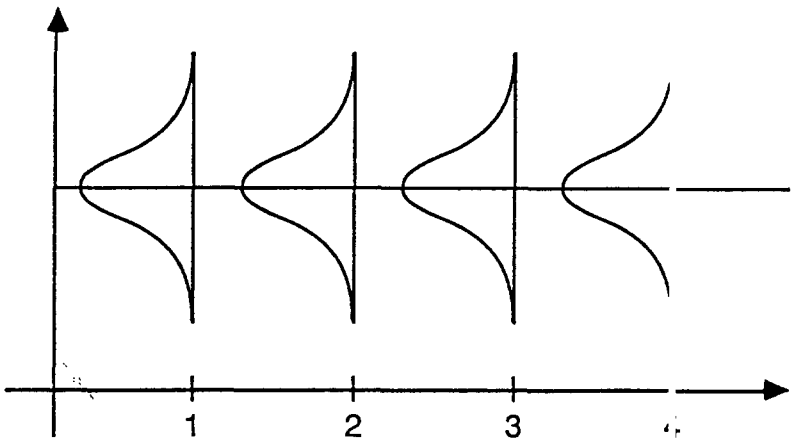


Figure 1.3.3 The simplest regression model

Equivalently, $y_1, y_2, \ldots, y_n$ are independent observations from a normal distribution with mean μ and standard deviation σ. In general we can write

DATA = SYSTEMATIC + ERROR ,

or

DATA = SIGNAL + NOISE .

Here, μ is the systematic component and ε is the random (error) component.

The least squares estimator $\hat{\mu}$ of μ is obtained by minimising $\Sigma(y_i - \mu)^2$ over all μ. The answer, as expected, is

$$\hat{\mu} = \bar{y} = \Sigma y_i / n \ .$$

That is, the sample mean $\bar{y}$ is the least squares estimator of the population mean μ. <u>That is, the sample mean is a regression estimator</u>! It is the best line with zero slope.

The Sum of Squares of Error (SSE) by fitting this model is

$$SSE = \Sigma(y_i - \hat{y}_i)^2$$

where $\hat{y}_i$ is the 'expected value' of y_i under the model. Since each y_i is predicted by $\bar{y}$ we have

$$\hat{y}_i = \bar{y}.$$

The estimate of σ is given by $S = \sqrt{(\Sigma(y_i - \bar{y})^2/(n-1))}$, the sample standard deviation.

The forecast $\hat{y}$ of the IQ, y, of a random Sydney actuary is $\hat{y} = \bar{y}$.

But there are now two sources of error in the forecast.

---- The amount of noise in the process denoted by σ as in Example 1.

---- <u>S</u>ampling error, or parameter estimation error. The quantity $\bar{y}$ is only an estimate of μ.

Accordingly, the standard error (estimate of standard deviation) of the forecast $\hat{y}$ is $(S^2/n + S^2)^{\frac{1}{2}}$ where S is an estimate of σ, the noise in the process, and $S/\sqrt{n}$ is an estimate of the sampling error inherent in the estimate $\bar{y}$ of μ.

STANDARD ERROR AND UNCERTAINTY

Since an estimate is based on information obtained from a 'sample' it is subject to sampling variability; that is, it differs from the figure that would have been produced if all the population values had been observed. A measure of the likely difference is given by the standard error. There are about two chances in three that a sample estimate will differ by less than one standard error from the true figure that would have been obtained if all population values had been observed, and about

nineteen chances in twenty that the difference will be less than two standard errors. The standard error measures the uncertainty associated with the estimate. The same arguments apply to the standard error of a mean forecast.

1.4 REGRESSION MODELS

In Section 1.3 we described the simplest regression model, viz., a random sample taken from a normal distribution (population).

Suppose we conduct the following experiment. We sub-divide the population of Sydney actuaries into sub-populations based on systolic blood pressure. All actuaries with the same blood pressure x belong to the same sub-population. Suppose there are p sub-populations denoted by blood pressures $x_1, x_2, \ldots, x_p$. We now determine the distribution of IQ's in each sub-population. The distributions are depicted in Figure 1.4.1 below.

We observe: (i) each sub-population of IQ's has a normal distribution;
(ii) each sub-population has the same variance; and
(iii) the means of the sub-populations are connected by a straight line.

This model has two equivalent formulations:

$$E[Y|X=x] = \alpha + \beta * x \quad ,$$

$$Var[Y|X=x] = \sigma^2$$

and

$Y|X=x$ is normal,

or

$$y_i = \alpha + \beta * x_i + \varepsilon_i \qquad (1.4.1)$$

where each ε_i is $N(0,\sigma^2)$.

That is, for a given X=x, the corresponding Y observation consists of the value $\alpha + \beta * x$ plus an amount of error ε. The quantities α (alpha) and β (beta) are unknown parameters. Model (1.4.1) is a model that we initially assume fits the data, but at a latter stage, we must enquire if indeed it does. The error term ε is an integral component of the model.

Figure 1.4.1 represents model (1.4.1) graphically. For a value of X=x, Y has a normal distribution with mean $\alpha + \beta * x$ and variance σ^2. For each x value, the corresponding sub-population of Y values has a normal distribution with a variance σ^2. For different x values the means of the sub-populations are related linearly ($\alpha + \beta * x$), but the variances are the same (σ^2).

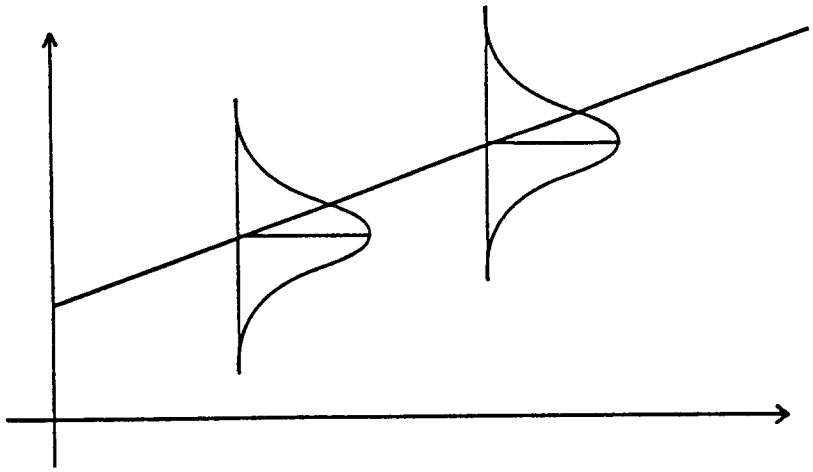


Figure 1.4.1 Representation of a linear model with error

Again,

DATA = SYSTEMATIC + ERROR,

where now,

SYSTEMATIC = $\alpha + \beta * x_i$.

Note that this simple linear regression model contains a lot of information. Once we estimate the parameters α, β (and σ^2) of the model using a sample $(x_1, y_1), \ldots, (x_n, y_n)$, we have an estimate of the distribution of IQ's for any sub-population, alternatively, any x value.

Of course, each assumption of the model must be tested. Are the data consistent with the model assumptions?

(A1): Linearity of means

(A2): Constancy of σ^2

(A3): Normality of distribution of Y conditional on X=x.

The least squares estimators of the parameters α (intercept) and β (slope) are obtained by minimising the sum of squares of errors

$$\Sigma (y_i - (\alpha + \beta * x_i))^2$$

with respect to α and β. We let $\hat{\alpha}$ and $\hat{\beta}$ denote the least squares estimators. The estimated regression equation is given by

$$\hat{y} = \hat{\alpha} + \hat{\beta} * x \ .$$

Typically the least squares line $\hat{\alpha} + \hat{\beta}*x$ does not pass through all the n data points. It does not explair all the random variation in the data $y_1, \ldots, y_n$.

The difference between the observed and the estimated values of Y at $X=x_i$ is the deviation (or residual),

$$\hat{\varepsilon}_i = y_i - \hat{y}_i ,$$

which is an estimate of the error ε_i at $X=x_i$.

Figure 1.4.2. shows the relationships among the theoretical regression line, the least-squares line and the sample points.

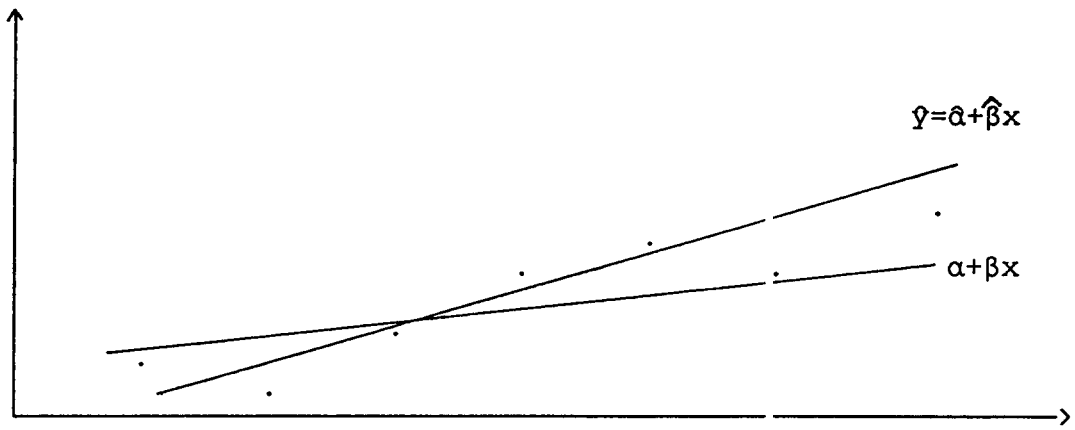


Figure 1.4.2. Relationship between theoretical regression line and least-squares line

In general for any regression model (and in particular here),

Total Variation in y = Variation explained by the model + Sum of Squares of Error

Equivalently,

Sum of Squares about the mean = Sum of squares due to model + Sum of Squares about model

Expressed notationally,

$$SST = SSR + SSE$$

TOTAL SUM OF SQUARES = REGRESSION SUM OF SQUARES + ERROR SUM OF SQUARES

and mathematically,

$$\Sigma(y_i - \bar{y})^2 = \Sigma(\hat{y}_i - \bar{y})^2 + \Sigma(\hat{y}_i - y_i)^2$$

This shows that, of the variation in the y's about their mean $\bar{y}$, some of the variation is explained by the model and some by the fact that the actual observations do not lie on the straight line. A way of assessing how useful a model will be as a predictor, is to see how much of the variation in y is explained by the model. We should be pleased if the variation explained by the model is very much greater than the variation about the model (noise), or, what amounts to the same thing, if the ratio

$$\text{R-squared} = \frac{\text{Variation explained by model}}{\text{Total variation}}$$

$$= \Sigma(\hat{y}_i - \bar{y})^2 / \Sigma(y_i - \bar{y})^2$$

$$= \text{SSR/SST}$$

is not too far from unity.

If there is no error, then the line passes through all the n data points (a perfect fit), $\Sigma(\hat{y}_i - y_i)^2 = 0$, so that R-squared = 100%.

We also mention that

$$\text{R-squared} = r^2_{y,\hat{y}} \quad , \text{ where } r_{y,\hat{y}}$$

is the correlation coefficient between observed values and expected values under the model.

With the assumption of normal error terms, it can be shown that the least-squares estimators $\hat{\alpha}$ and $\hat{\beta}$ are normally distributed with mean α and β respectively and variances $\delta^2_{\hat{\alpha}}$ and $\delta^2_{\hat{\beta}}$ respectively.

In the output of a regression program the quantities $\delta_{\hat{\alpha}}$ and $\delta_{\hat{\beta}}$ are called the standard errors of $\hat{\alpha}$ and $\hat{\beta}$ respectively. They may be used in drawing inferences about α and β. For example, to test the hypothesis H: $\alpha = 0$ (zero intercept) the "T-ratio" $\hat{\alpha}/\delta_{\hat{\alpha}}$ is compared with an appropriate value from the T-distribution. A T-ratio whose absolute value exceeds approximately 2 will often be regarded as significant for our purposes, i.e., if

$$|\hat{\alpha}/\delta_{\hat{\alpha}}| > 2$$

we leave the parameter in the model. Otherwise, we may assume it to be effectively zero.

The estimate of σ for model (2.4.1) is given by S where

$$S = \sqrt{(SSE/(n-2))}.$$

Corresponding to the observation x_0, the value y predicted by the model (1.4.1) is

$$\hat{y} = \hat{\alpha} + \hat{\beta} * x_0 .$$

The standard error of the forecast $\hat{y}$ is given by

$$s.e.(\hat{y}) = S[1 + 1/n + (x_0 - \bar{x})^2 / \Sigma(x_i - \bar{x})^2]^{\frac{1}{2}}$$

where S is the estimate of σ.

The standard error is a minimum when $x_0 = \bar{x}$ and increases as we move away from $\bar{x}$. For values of x outside our experience - that is outside the range observed - our predictions have an even higher standard error and are therefore less precise.

Our model describes the distributions of the Y values for each value of X. Our estimated distributions are: for $X=x_0$, Y has a normal distribution with mean $\hat{\alpha} + \hat{\beta} * x_0$ and variance $s.e.^2(\hat{y})$.

Note that a small R-squared may mean a large S and thus a large forecast error. On the other hand, even though an additional parameter added to the model increases R-squared, it also increases the forecast error by approximately S^2/n. A compromise has to be found between the number of significant parameters and small forecast errors. See Section 4.

For the reader who is interested in a lucid exposition of regression analysis, the text by Chatterjee and Price (1977) makes for excellent reading.

1.5 RESIDUAL ANALYSIS

We have stated some of the basic theoretical results that are used for making inferences in the context of the simple linear regression model. Many of these results also apply to any regression model. It is emphasised that these results are valid and have meaning only if the assumptions (A1)-(A3) of Section 1.4 are satisfied. We have also assumed that the error terms are independent observations from a normal distribution with mean 0 and variance σ^2. This assumption must be checked. For this reason, graphs of standardised residuals are of paramount importance.

"Almost all the greatest discoveries have resulted from a consideration of what we have elsewhere termed RESIDUAL PHENOMENA, of qualitative or numerical kind, that is to say, of such portions of the numerical or quantitative results of observation as remain outstanding and unaccounted for after subtracting and allowing for all that would result from the strict application of known principles." Sir John F.W. Herschel, Bart K.H. in Outlines of Astronomy, Lea and Blanchard, Philadelphia, 1849, p. 548.

Recall that the residuals are defined as the n differences

$$\hat{\varepsilon}_i = y_i - \hat{y}_i, \quad i=1,2,\ldots,n$$

where y_i is an observation and $\hat{y}_i$ is the corresponding fitted value obtained by use of the fitted regression equation. The residuals $\hat{\varepsilon}_i$ are the differences between what is actually observed, and what is predicted by the regression equation - that is, the amount that the regression equation has not been able to explain. The quantity S is the estimate of the average variation about the regression line. Accordingly, the ratio $\hat{\varepsilon}_i/S$ is called the 'standardised' residual. The standardised residuals allow us to identify any unusual observations. If our fitted model is correct, the residuals should exhibit tendencies that confirm the assumptions that we have made, or at least should not exhibit a denial of the assumptions. We should ask, "Do the (standardised) residuals make it appear that our assumptions are wrong?"

If the model being entertained holds (and n is relatively large) the n standardised residuals are independent observations from a normal distribution with mean 0 and standard deviation 1. Accordingly we expect approximately 1 in 20 standardised residuals to be greater than 2 or less than -2. Figure 1.5.1 depicts well behaved residuals.

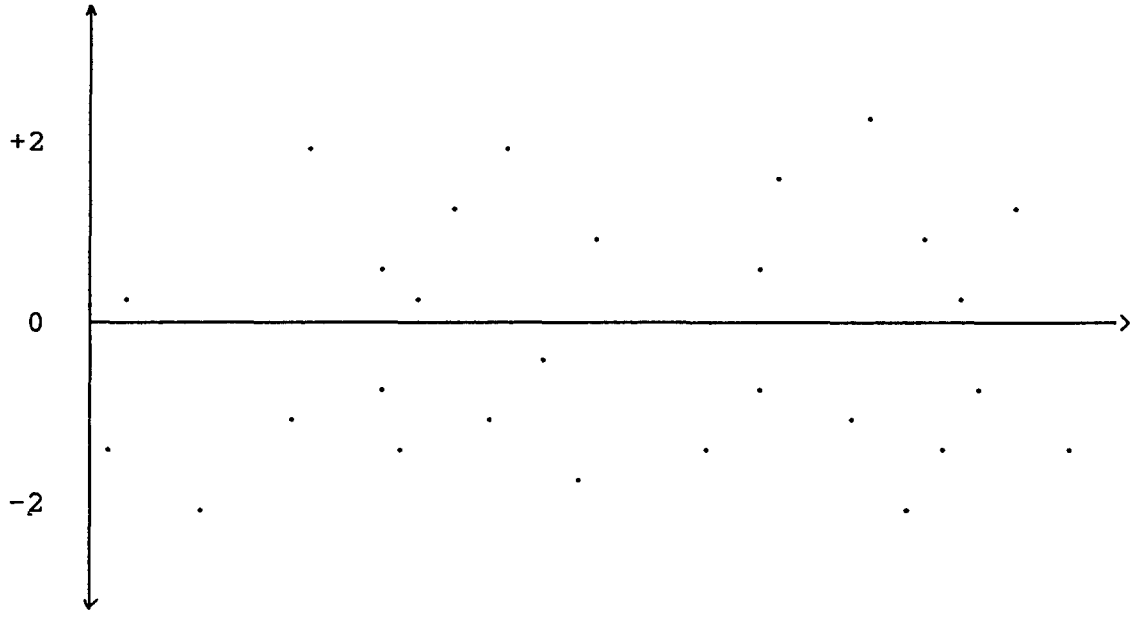


Figure 1.5.1. An example of well behaved residuals

The reader should bear in mind that residual plots should be regarded as <u>diagnostic</u> tools. In the context of claims reserving, our assumptions will not appear to be violated if plots of the residuals against (i) **delay**, (ii) **accident years** and (iii) **payment years**, do not exhibit any systematic trends or patterns. If a model is properly specified and explains most of the variation in the data, then the unexplained variation (residuals) should represent randomness (that is, white noise). There are

tests both diagnostic and formal, involving residuals. See Sections 5.4 and 5.5.

Anscombe (1973) has constructed four interesting data sets. The data and corresponding plots are given in Table 1.5.1 and Figures 1.5.2 - 1.5.5.

TABLE 1.5.1

FOUR DATA SETS HAVING THE SAME SUMMARY STATISTICS

X1	Y1	X2	Y2	X3	Y3	X4	Y4
10	8.04	10	9.14	10	7.46	8	6.58
8	6.95	8	8.14	8	6.77	8	5.76
13	7.58	13	8.74	13	12.74	8	7.71
9	8.81	9	8.77	9	7.11	8	8.84
11	8.33	11	9.26	11	7.81	8	8.47
14	9.96	14	8.10	14	8.84	8	7.04
6	7.24	6	6.13	6	6.08	8	5.25
4	4.26	4	3.10	4	5.39	19	12.50
12	10.84	12	9.13	12	8.15	8	5.56
7	4.82	7	7.26	7	6.42	8	7.91
5	5.68	5	4.74	5	5.73	8	6.89

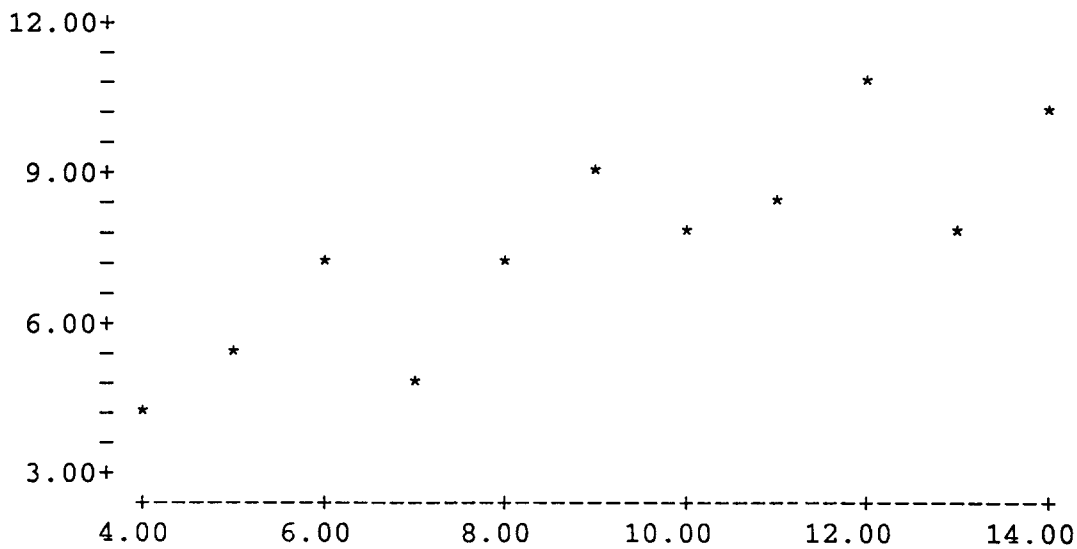


Figure 1.5.2 Plot of the data (x1,y1)

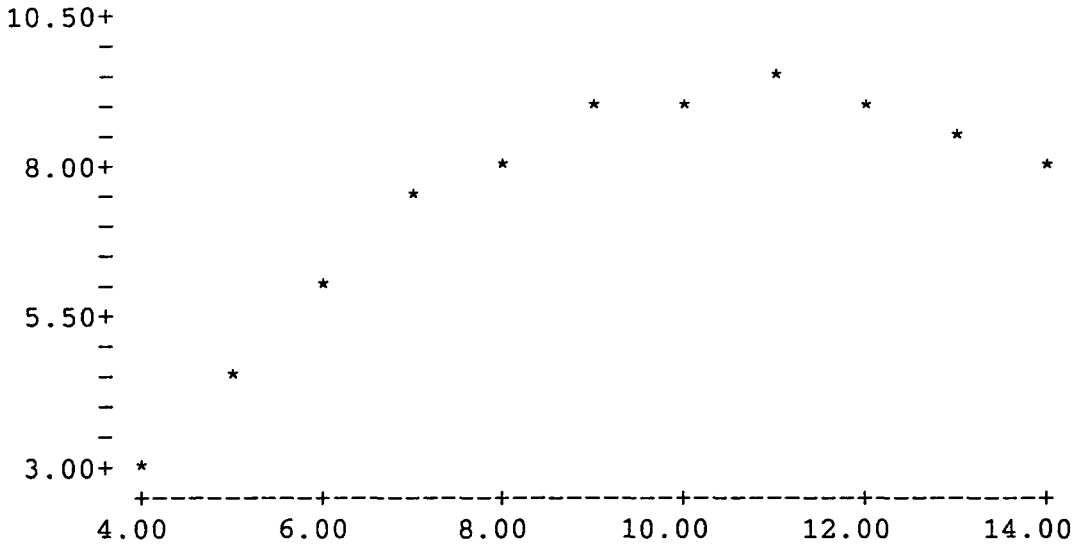


Figure 1.5.3 Plot of the data (x2,y2)

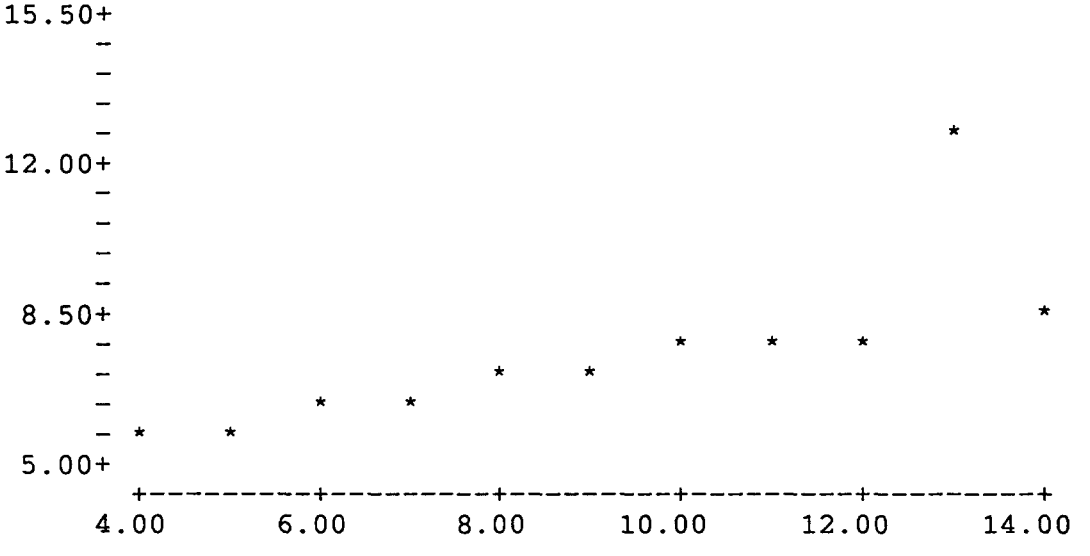


Figure 1.5.4 Plot of the data (x3,y3)

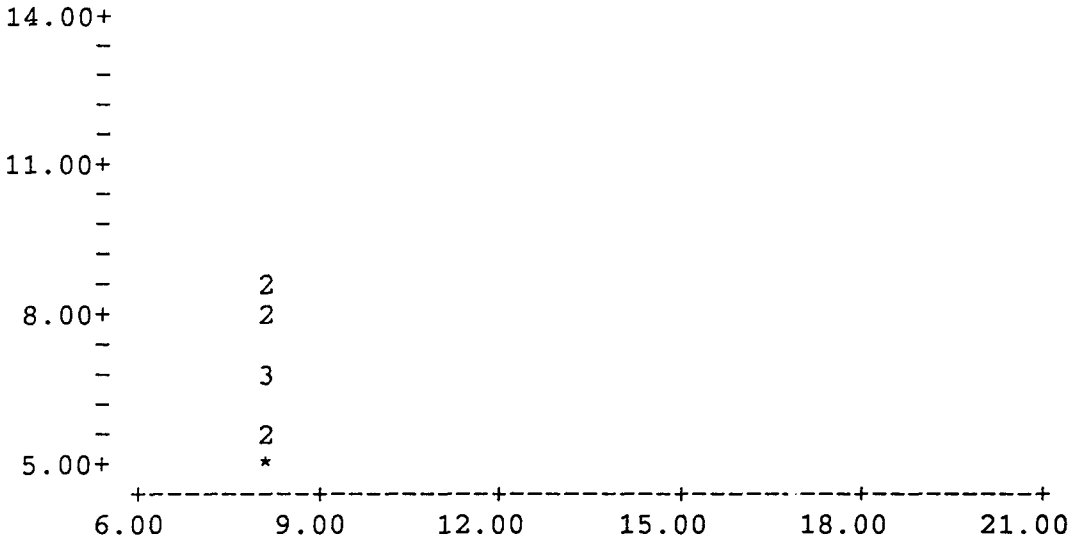


Figure 1.5.5 Plot of the data (x4,y4)

Each of the four data sets gives the same simple linear regression results shown in Table 1.5.2.

TABLE 1.5.2

REGRESSION FOR THE FOUR SETS OF DATA

PARAMETER	ESTIMATE	ST. ERR. OF ESTIM.	T-RATIO
ALPHA	3.00	1.125	2.67
BETA	0.50	0.1179	4.24

S = 1.237

R-SQUARED = 66.7 PERCENT

The T-ratio indicates that both the parameters alpha (α) and beta (β) are significant. The satisfactory value of R-squared and significant T-ratios do not ensure that the data has been well fitted, therefore, any analysis based exclusively on R-squared and examination of $\hat{\alpha}$ and $\hat{\beta}$ and their standard errors would not have been able to detect differences in patterns. Gross violations of model assumptions can seriously distort conclusions.

The residual plots for the four data sets are given in Figures 1.5.6 to 1.5.9. Only the first one seems satisfactory.

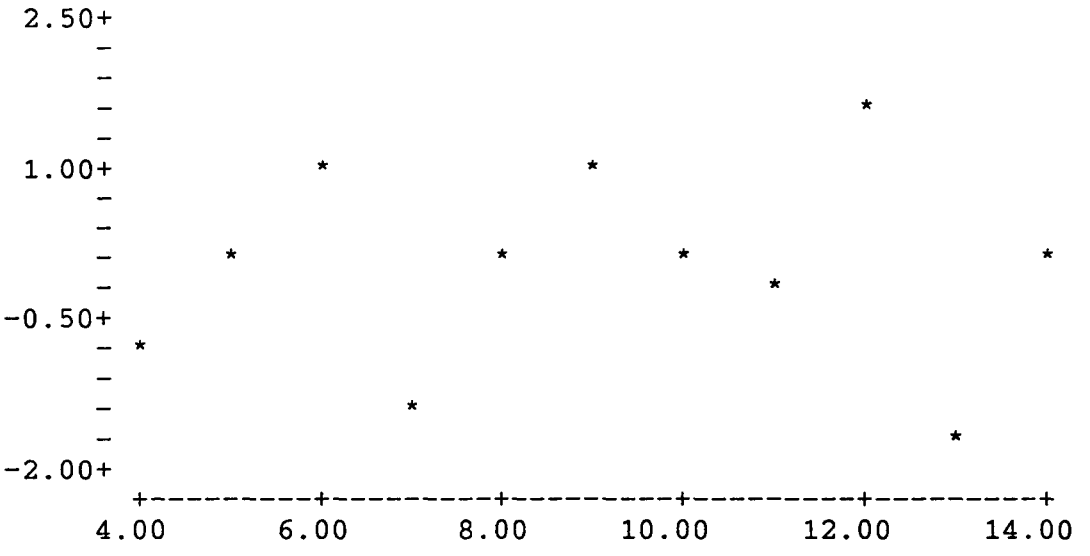


Figure 1.5.6 Plot of standardised residuals for first data set (Figure 1.5.2) against x1

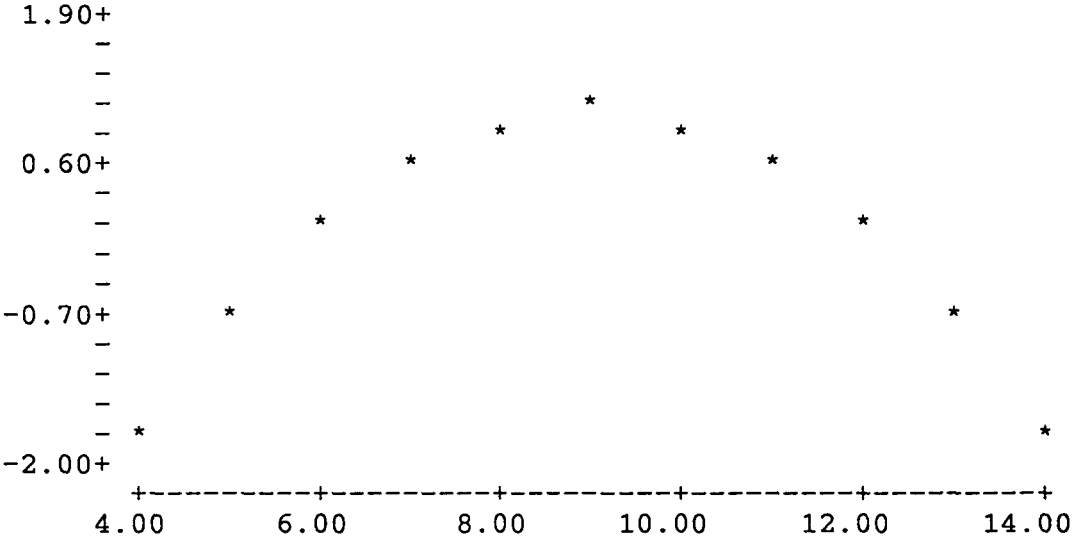


Figure 1.5.7 Plot of standardised residuals for second data set (Figure 1.5.3.) against x2

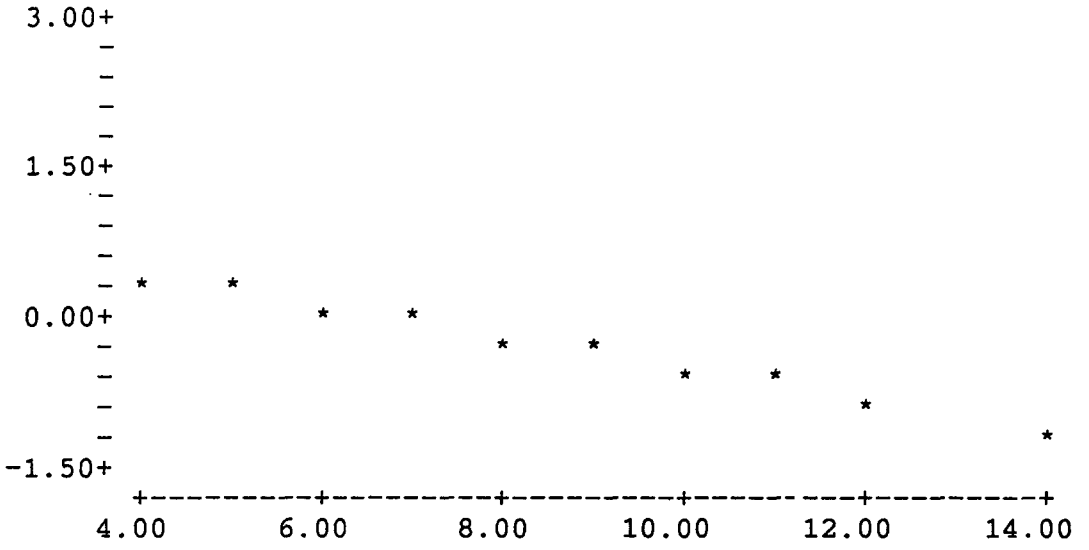


Figure 1.5.8 Plot of standardised residuals for third data set (Figure 1.5.4) against x3

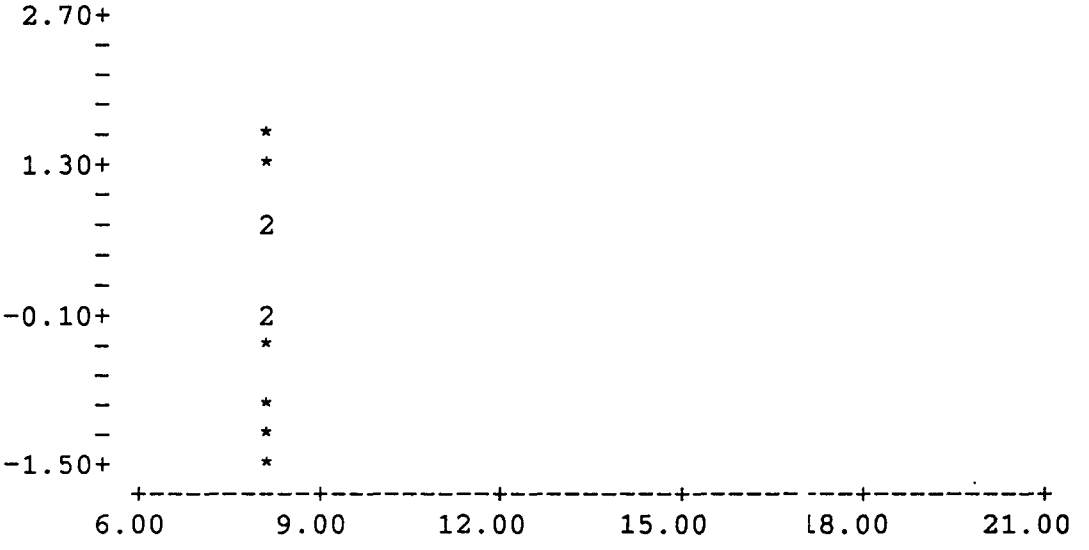


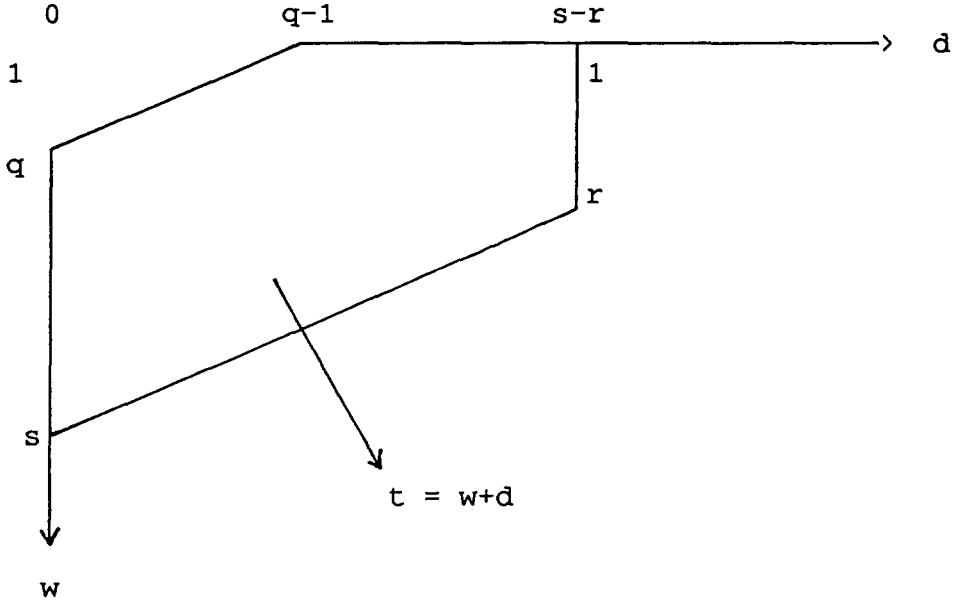
Figure 1.5.9 Plot of standardised residuals for fourth data set (Figure 1.5.5) against x4

2. COMPONENTS OF A STOCHASTIC MODEL

2.1 THE THREE DIRECTIONS

Loss development arrays necessarily involve three directions, viz., development year (or delay), accident year and payment (or calendar) year.

Development years are denoted by d; d=0,1,2,...; accident years by w; w=1,2,...,s; and payment years by t; t=q,...,s.



Payment year t can be expressed as t=w+d.

The two directions, delay and accident year, are orthogonal, equivalently, they have zero correlation. That is, systematic trends in either direction are not projected onto the other. Most importantly, the payment year direction t is not orthogonal to either the delay or accident year directions. That is, a systematic trend in the payment year direction is also projected onto the delay and accident year directions. Similarly, accident year trends are projected onto payment year trends.

Any realistic loss reserving model must include some regard to the payment year direction. Indeed, it is the most 'critical' direction, since it represents the direction in which payments evolve over time. Any changes to payment streams due to endogenous or exogenous factors are likely to manifest themselves in the payment year direction.

The non-orthogonality of payment year and accident year trends makes it difficult in many circumstances to separate systematic

accident year trends from systematic payment year trends, especially if one is confined to fixed parameter stochastic models. The non-orthogonality is one property of a loss development array that cries out for varying parameter models that use parameters that vary over time in place of adding new (free) parameters to explain changing systematic trends.

Fixed parameter models, involving payment year and accident year parameters, quite often suffer from what is commonly known as multicollinearity, so that the parameters cannot be estimated with any precision. See Sections 3.9 and 3.11.

A model should be designed in order to separate what is systematic in each direction with what is random!

2.2 LOSS DEVELOPMENT DATA

We assume, without loss of generality, that the loss development array is composed of incremental paid losses and that the exposure for accident year w is e(w). The incremental paid loss for accident year w and delay d will be denoted by p(w,d). The 'normalised' payment is

$$c(w,d) = p(w,d)/e(w) \ .$$

The best data array to analyse from the point of view of loss reserving are the <u>incremental</u> paid losses for the following reasons:

- we want to separate what is systematic from what is random in the payments;
- cumulating the data in the development direction masks the systematic component in the payments, especially if trends are changing in the payment year direction;
- we want to forecast future payment streams.

If you wish to obtain forecasts of incurred losses, then the incremental paids and case reserves should be analysed separately.

A stochastic regression model possesses a number of <u>integral</u> components.

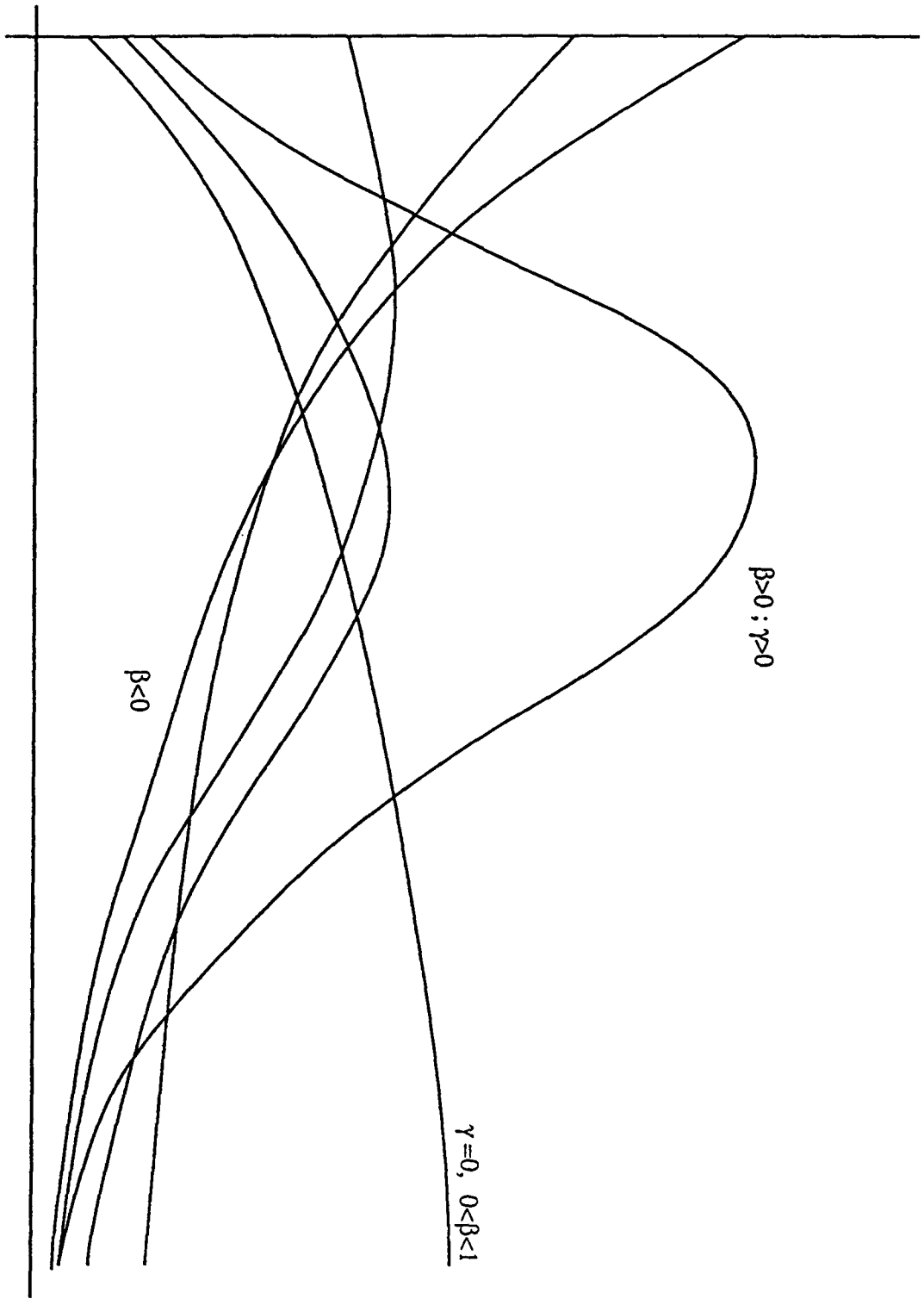


Figure 2.3.1 Hoerl Curves.

2.3 HOERL RUN-OFF CURVES

Experience and pragmatic considerations (see Section 4) suggest the following functional form for c(w,d),

$$c(w,d) = k_w((1+d)^{**}\beta_w)*\exp(\gamma_w*d). \qquad (2.3.1)$$

That is, the systematic run-off curve for each accident year is represented by a curve

$$c(d) = k((1+d)^{**}\beta)*\exp(\gamma*d). \qquad (2.3.2)$$

The quantities k, β (beta) and γ (gamma) are the parameters of this curve, and need to be estimated from the data.

The family of curves represented by equation (2.3.2) is very rich - it is a super family of the family of gamma distributions. Figure 2.3.1 depicts some of the curves belonging to this family. In the case $\beta > 0$ and $\gamma < 0$ it is assumed that 'claims' die out monotonically and eventually exponentially as the delay d increases. Note, however, that in the case $\beta < 0$ the tail is a power tail which is heavier than a negative exponential tail. The coefficient k represents the level of the curve. The maximum of the curve occurs at $d = -(1+\beta/\gamma)$.

We define a new parameter

$$\alpha \text{ (alpha)} = \log(k)$$

so that α represents the level on a percentage scale.

The parameters β and γ represent the shape of the curve. That is, the systematic development (factors).

The parameter α plays a very special role. An increase in α represents a percentage change in normalised payments made in the accident year. Figure 2.3.2 below shows two curves with the same β and γ parameters (same systematic development), but with two different α parameters.

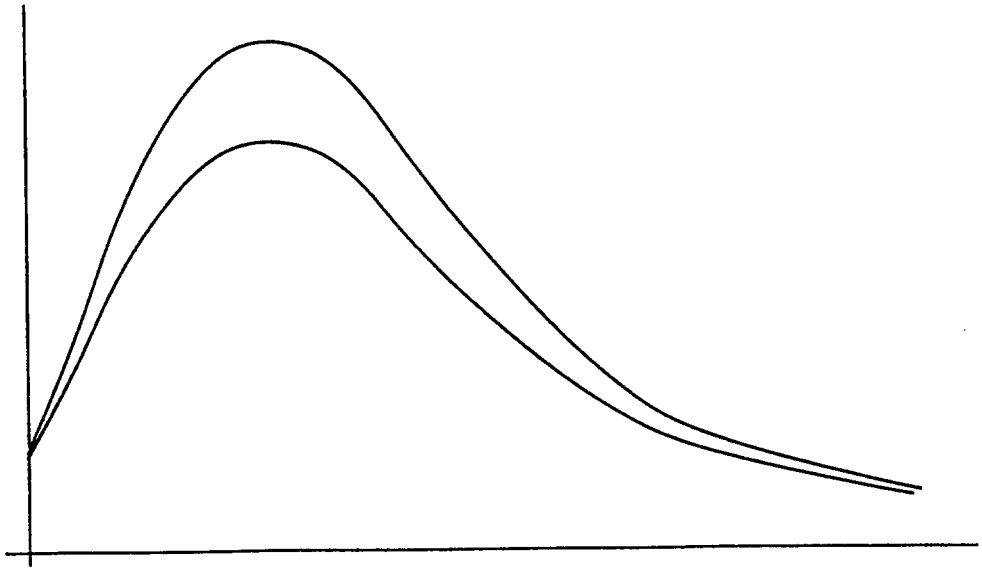


Figure 2.3.2 Two Hoerl curves with the same β and γ but different α's

We now summarise the roles of the three parameters α (alpha), β (beta) and γ (gamma).

α (alpha)

The parameter α represents the level of the curve. An increase in α will raise the run-off curve by a fixed percentage amount at each delay d. This means that the aggregate payments also increase by this same percentage.

Changes in the parameter α from accident year to accident year are indicative of changing levels.

β (beta)

The parameter β can have two effects.

(i) $\beta > 0$ produces a run-off curve which first increases before dying off monotonically when $\gamma < 0$. The maximum of the run-off curve is attained when $d = -(1+\beta/\gamma)$. The tail is an exponential tail that decreases asymptotically to zero fairly quickly. If $\gamma \geq 0$, the run-off curve is always increasing.

(ii) $\beta < 0$ produces a run-off curve which does not increase initially. It is decreasing with a tail that is logarithmic and is heavier than an exponential tail. The closer β is to 0 the heavier the tail, other parameters remaining the same. If γ is simultaneously positive then the tail can come up again!

γ (gamma)

The parameter γ in association with β describes the type of tail. If $\beta > 0$ and $\gamma < 0$, the smaller γ is, the more quickly the tail decreases asymptotically to zero. If $\beta < 0$ and $\gamma < 0$, the larger γ is, the less heavy the logarithmic tail is. On the other hand, if $\beta < 0$ and $\gamma > 0$, the larger γ is, the heavier the tail.

Analysis of incurred losses will usually present monotonic increasing 'run-offs', so that gamma may take the value zero and beta a value greater than zero.

2.4 HOERL CURVE WITH "SCALE" AND "A" PARAMETERS

The family of Hoerl curves is fairly rich. However, there are some systematic run-off patterns that cannot be captured adequately by any member of the family. Accordingly, we add two parameters. The resulting systematic run-off curve is given by:

$$c(d) = k(1 + scale*d)^{\beta} * \exp(\gamma * d^{a}) \quad .$$

In particular, for *scale*=1 and *a*=1, we have the Hoerl curve given by equation (2.3.2).

The two parameters "*scale*" and "*a*" make the family of curves much richer.

In what follows we will always write the Hoerl curve with default *scale*=1 and *a*=1, assuming that all the arguments will also apply to each positive scale value for which *scale* ≥ 0.01 and to each *a* value for which $0<a\leq 5$.

2.5 LOGNORMAL DISTRIBUTION

In contrast to the normal distribution, the lognormal distribution is asymmetric; it is skewed to the right. For this reason it is often useful as a model for claim sizes (equivalently severities or payments). It has a range from zero to infinity.

A variable Y is said to have a lognormal distribution with parameters μ and σ if X = log Y has a normal distribution with mean μ and standard deviation σ. That is, if we have claim sizes whose histogram has a shape depicted in Figure 2.5.1 then the logarithms of the claim sizes will have a histogram whose shape is shown in Figure 1.2.1.

The mean and variance of a lognormal distribution are respectively,

$$\text{mean} = \exp(\mu+\tfrac{1}{2}*\sigma^2) \quad . \tag{2.5.1}$$

$$\text{variance} = \exp(2\mu+\sigma^2)[\exp(\sigma^2)-1] \quad . \tag{2.5.2}$$

It is important to note that the mean of a lognormal distribution is greater than exp(μ). The latter quantity represents the median of the lognormal distribution. That is, 50% of claim payments are less than the median and 50% are greater. However, payments greater than the median could be far out in the tail! The mean is larger than the median by a factor of exp(½*σ²). This is because if $y_1 \ldots y_n$ is a set of n numbers, then

$$1/n \sum_{i=1}^{n} e^{y_i} > e^{\bar{y}} \quad .$$

The difference between the left side and the right side of the inequality, is larger, the larger the variation in $y_1 \ldots y_n$. For more information on the lognormal distribution see Hossack et al (1983).

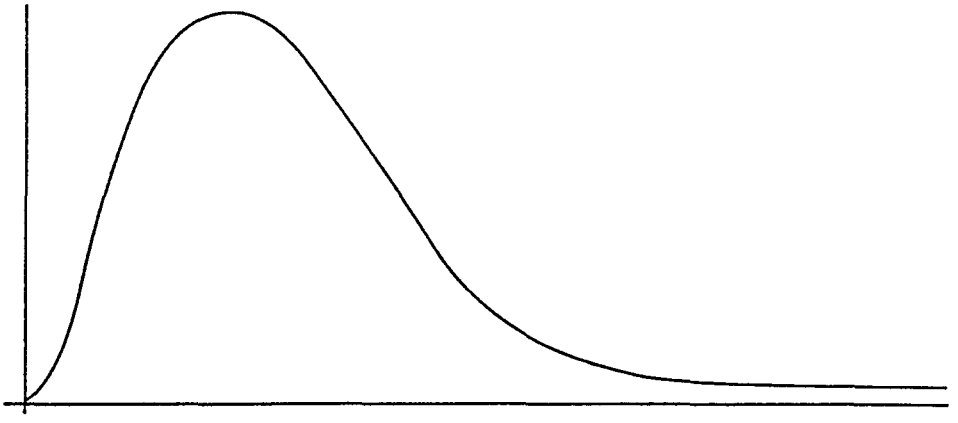


Figure 2.5.1 A typical lognormal distribution

2.6 LOGNORMAL REGRESSION BASED ON HOERL CURVES

In order to satisfy the assumptions of the standard regression model we need to linearise equation (2.3.2). This is achieved by taking logarithms of both sides giving

$$y(d) = \log(c(d)) = \alpha + \beta*\log(1+d) + \gamma*d. \tag{2.6.1}$$

If we estimate the parameters α, β and γ of (2.6.1) using least squares, we are assuming

$$y(d) = \alpha + \beta*\log(1+d) + \gamma*d + \varepsilon, \tag{2.6.2}$$

where the ε's are unobservable error terms that are assumed to be independently and normally distributed with zero mean and constant variance σ^2.

Transforming back we obtain

$$c(d) = k((1+d)^{**}\beta)*\exp(\gamma*d)*\varepsilon' \quad , \tag{2.6.3}$$

so that ε' has a lognormal distribution with mean

$$\exp(0.5*\sigma^2) \tag{2.6.4}$$

and standard deviation

$$\text{mean}*\sqrt{(\exp(\sigma^2)-1)} \quad . \tag{2.6.5}$$

If each accident year has the same run-off curve (2.6.1), then for fixed delay $d=d_0$, the 'normalised' claim payments' ($c(d_0)$) distribution is lognormal with median equal to

$$k((1+d_0)^{**}\beta)*\exp(\gamma*d_0), \tag{2.6.6}$$

$$\text{mean} = \text{median} * \exp(\tfrac{1}{2}*\sigma^2) \tag{2.6.7}$$

and

$$\text{variance} = (\text{mean}^{**}2)*(\exp(\sigma^2) - 1). \tag{2.6.8}$$

Figure 2.6.1 depicts the model expressed by equation (2.6.3). It shows a 'typical' Hoerl curve with c(d) having a lognormal distribution. The Hoerl curve passes through the <u>medians</u> of the lognormal distributions at the different development years. That is, the curve connects the medians of lognormal distributions.

Figure 2.6.2 depicts the same model on a logarithmic scale expressed by equation (2.6.2). If the normal distributions on a log scale have constant variance (equivalently, are homoscedastic), then the corresponding lognormal distributions (Figure 2.6.1) exhibit increasing standard deviation with increasing mean. The higher the curve, the more the variability.

The long tail of the lognormal explains why some payments may be far above the run-off curve. Observe also that since the standard deviation of the lognormal is proportional to the mean level we expect more extreme observations for larger mean levels.

There is one characteristic of the lognormal distribution that needs to be mentioned again. The distribution is skewed to the right. This means that although 50% of payments are above the run-off curve and 50% are below the run-off curve, those above the curve are on the average further away from the curve than those below. It follows that the average or mean payment can sometimes be well above the curve. How far the mean is above the curve can be seen from equation (2.6.7). The median is on the curve whereas the mean is always above it unless $\sigma^2 \approx 0$, in which case they are the same.

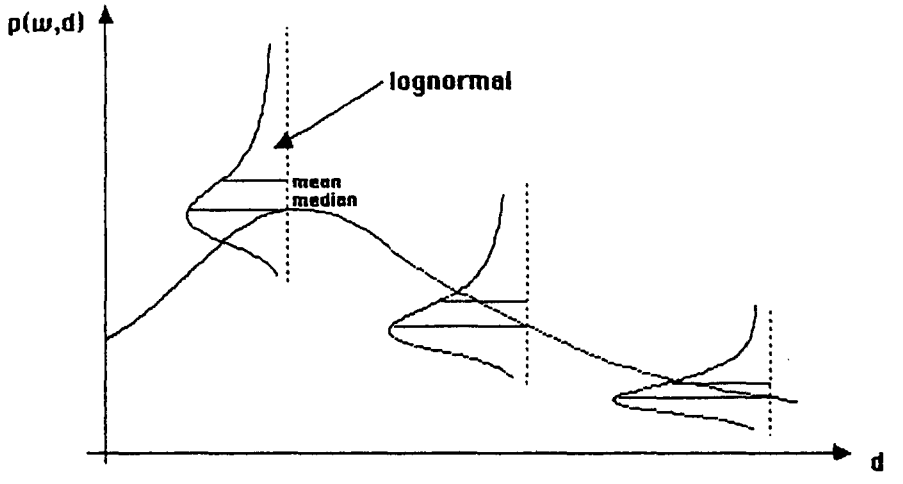


Figure 2.6.1 Lognormal distributions about a Hoerl curve

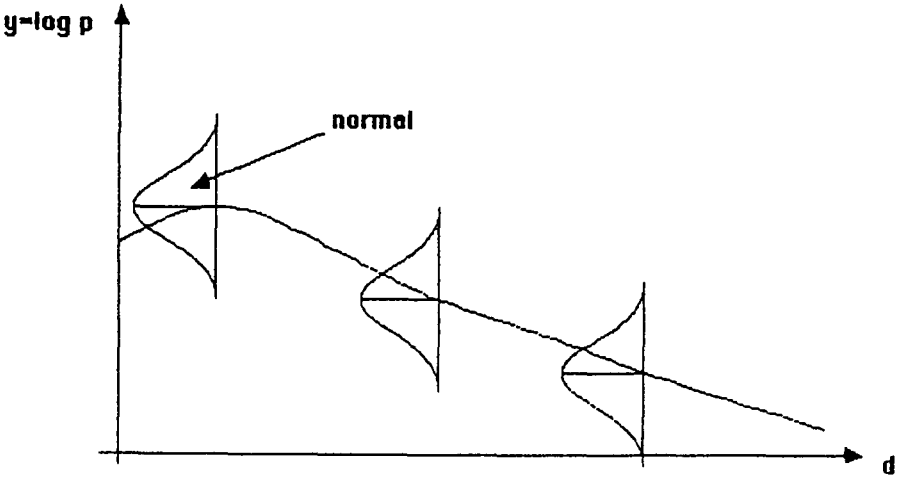


Figure 2.6.2 Normal distributions on a log scale

2.7 THE LOG TRANSFORM - REMOVAL OF HETEROGENEITY

Payments for a long tail portfolio are made over time. Time, itself, introduces a source of heterogeneity in the incremental paid losses that we know about - the variability of severities increases with increasing mean level. Let's illustrate this well known phenomenon.

If in 1955 average severity was 1,000 with standard deviation of 200 and in 1988 average severity is 100,000, then it is likely that the standard deviation in 1988 is around 20,000. The variability of severity increases with mean level.

This type of heterogeneity may be removed by analysing logarithms of incremental paid losses instead of the incremental paid losses. Indeed, it is well known that if severities follow a lognormal distribution, then the sample average of severities is not a good estimator of the mean severity.

Our models are multiplicative (the error is multiplicative) stochastic models.

2.8 LOGNORMAL REGRESSION WITH AN INFLATION PARAMETER

We introduce an additional parameter ι (iota) to the Hoerl curve stochastic model. The parameter ι represents the annual (force of) inflation across payment (calendar) years.

Consider the homogeneous accident years single curve model:

$$y(w,d) = \alpha + \beta*\log(1+d) + \gamma*d + \varepsilon \quad . \qquad (2.8.1)$$

That is, every accident year has the same curve, equivalently, the same α, β and γ parameters. This model is discussed at length in Section 3.4.1.

If the systematic component of the payments, viz., $\alpha + \beta*\log(1+d) + \gamma*d$, is subjected to a constant (continuous) annual inflation rate ι, then the inflated payments are given by

$$y(w,d) = \alpha + \beta*\log(1+d) + \gamma*d + \iota*(w+d-q) + \varepsilon \qquad (2.8.2)$$

where q denotes the first payment year in the array.

Note that this last equation (2.8.2) can be re-cast,

$$y(w,d) = \alpha - \iota*q + \iota*w + \beta*\log(1+d) + (\gamma+\iota)*d + \varepsilon \qquad (2.8.3)$$

so that a trend ι in the payment year direction is projected both onto the accident year direction and the development year direction. The 'level' of accident year w is $\alpha - \iota*q + \iota*w$ so that there is a straight line trend in levels with a yearly

increase of ι. There is also an additional trend ι in the development year direction. Equivalently, each accident year has the same shape curve with levels increasing linearly across accident years.

Note that the error term, ε, describing the distribution about the systematic component is an integral part of the model.

2.9 HETEROSCEDASTICITY

The error, ε, in equation (2.6.2) is assumed to have a constant variance - we call it homoscedastic. If the variance is changing, we call the error heteroscedastic.

Recall that we take a log transform of the data so that the variance of the error, ε, measures variability of percentages. Accordingly, heteroscedasticity implies changing percentage variability. The percentage variability of incremental paid losses may increase in late development years since the paid losses are based on a small number of claims with large variance of severity.

For an incurred losses array, however, the percentage variability in early development years may be higher than that in late development years. This phenomenon is explained by the fact that in the early development years the estimate of outstanding is inaccurate and represents a large component of the incurred.

We can use a multiplicative specification of heteroscedasticity. That is,

$$\text{Var}[\varepsilon(d)] = \sigma^2(d) \ ,$$

where $\sigma^2(d)$, the variance at delay (development year) d, is given by

$$\sigma^2(d) = \sigma_0^2 (1+d)^{\delta} \quad . \tag{2.9.1}$$

The parameter δ (delta) is called the heteroscedasticity parameter. If it is not significant, that is, it is zero, then the error term is homoscedastic and

$$\sigma^2(d) = \sigma_0^2 \quad . \tag{2.9.2}$$

Heteroscedasticity is diagnostically detected by examining a variety of plots. The parameter δ can be estimated and its significance tested statistically. If the standard deviations of the standardised residuals tend to change across development years, then the presence of heteroscedasticity is indicated.

Heteroscedasticity may not be multiplicative, that is, could not be represented adequately by the single parameter δ. Non-

multiplicative heteroscedasticity is not treated in this paper.

The models presented involve two equations on a logarithmic scale. Equation (2.6.2), describing the evolution of the mean, is called the primary equation, whereas equation (2.9.1), describing the evolution of the variance, is called the secondary equation.

3. GENERAL FAMILY OF STOCHASTIC MODELS

3.1 INTRODUCTION

In this section we present an extremely rich family of stochastic regression models. Recall that a stochastic regression model can be expressed as:

DATA = SIGNAL + ERROR,

alternately,

DATA = SYSTEMATIC + RANDOM.

The data (or transform thereof) is decomposed into a systematic component called signal and the random component called error. The distribution of the error is an integral component of the model. It assigns the data a probabilistic structure. The model separates the systematic components from the random.

3.2 THE GENERAL MODEL

The general model is given by

$$y(w,d) = \alpha_w + \beta_w * \log(1+d) + \gamma_w * d + \sum_{t=q+1}^{w+d} \iota_t + \varepsilon \quad . \qquad (3.2.1)$$

This model has three parameters (α_w, β_w, γ_w) for each accident year, and an inflation parameter ι_t between every two contiguous payment years (t-1, t). The index t takes values q+1 to s. The error term is an integral part of the model. It is normally distributed with zero mean and variance denoted by σ^2. The systematic component of c(w,d) is

$$(1+d)^{\beta_w} * \exp[\alpha_w + \gamma_w * d + \sum_{t=q+1}^{w+d} \iota_t] \quad .$$

The quantity c(w,d) has a lognormal distribution with

$$\underline{\text{median}} = (1+d)^{\beta_w} * \exp[\alpha_w + \gamma_w * d + \sum_{t=q+1}^{w+d} \iota_t] \quad ,$$

$$\underline{\text{mean}} = \text{median} * \exp[\tfrac{1}{2} * \sigma^2]$$

and

$$\underline{\text{variance}} = \text{mean}^2 * (\exp[\sigma^2]-1) \quad .$$

Each model in the rich family contains a lot of information. A model assigns a probabilistic distribution to c(w,d) for each accident year w and each delay d. The parameters $\{\alpha_w, \beta_w, \gamma_w\}$ and $\{\iota_t\}$ relate the medians of all the distributions in the array. That is, the 'surface' only connects or relates medians of lognormal distributions. It is only one component of the model!

Each model in the rich family is a sub-model of (3.2.1). Models can be classified into two categories:

- regression models of the type (3.2.1) having fixed (constant) parameters and therefore an integral number of free parameters;
- regression models of the type (3.2.1) having parameters that vary over time and are related stochastically.

The family of models described by equation (3.2 1) is very rich. The number of fixed parameter models is two raised to the power of the number of parameters. The number of parameters is 3*w+s-q, so the number of fixed parameter models is

$$2^{(3*w+s-q)} \cong 10^{(w+(s-q)/3)}.$$

This is just the number of fixed parameter models for one set of *scale* and *a* values.

3.3 FIXED PARAMETER MODELS

A fixed parameter model is a sub-model (fewer parameters) of (3.2.1), where each parameter is regarded as a constant, to be estimated from the available data (and any a priori information). There is no (stochastic) relationship between the different parameters. Sections 3.4 to 3.9 below, discuss a number of fixed parameter models.

3.4 SINGLE CURVE (HOMOGENEOUS SYSTEMATIC DEVELOPMENT FACTORS)

3.4.1 WITHOUT INFLATION (SC MODEL)

Recall that the chain ladder (age-to-age development factors technique), contrary to popular belief, assumes not only homogeneity of systematic development factors across accident years, but also that accident years have necessarily their own independent levels. The single curve (SC) model, however, assumes complete homogeneity between accident years (after adjusting the data for exposures and 'known' inflation).

Algebraically,

$$y(w,d) = \alpha + \beta*\log(1+d) + \gamma*d + \varepsilon \qquad (3.4.1)$$

so that accident years have identical levels (α parameters) and identical systematic development factors (β and γ parameters). The systematic development factors are smoothed and are represented by the two parameters β and γ, in contrast to the chain ladder that involves the computation of s-1 'independent' age-to-age development factors. Note that accident years are homogeneous (with respect to systematic age-to-age development factors) for a cumulative array if and only if they are homogeneous for the corresponding noncumulative array.

The single curve model (SC model) assumes complete homogeneity between accident years. By complete homogeneity is meant that the distribution of each c(w,d) (for each d) does not depend on the accident year w. The SC model, and indeed any model, should only be used for forecasting if <u>all</u> the model assumptions are supported by the empirical evidence.

3.4.2 WITH INFLATION (SCI MODEL)

The single curve model with a constant inflation parameter ι across payment years is given by

$$y(w,d) = \alpha + \beta*\log(1+d) + \gamma*d + \iota*(w+d-q) + \varepsilon.$$

For convenience this model is denoted by SCI.

If the data generated by the homogeneous accident years model (SC) of Section 3.4.1 are subject to a constant (force of) inflation ι across payment years, then the resulting inflated data follow the above model. The model may be re-cast,

$$y(w,d) = \alpha - \iota*q + \iota*w + \beta*\log(1+d) + (\gamma+\iota)*d + \varepsilon \quad .$$

This model has four parameters. The inflation ι in the payment year direction has been projected onto both the accident year direction and the development year direction. Accordingly, a constant inflation ι in the payment year direction may be alternatively captured by a straight line trend in the α's and an adjusted γ viz., $\gamma+\iota$. Note that the (adjusted) systematic development factors are β and $\gamma+\iota$ and moreover are homogeneous across accident years.

However, a changing inflation ι in the payment year direction cannot be captured solely by a changing α across accident years.

Note that if inflation ι is not constant, systematic development factors are not homogeneous across accident years.

3.5 SMOOTH CHAIN LADDER MODEL (SCL MODEL)

This model assumes, as in the chain ladder, that accident years are homogeneous with respect to systematic development factors (systematic run-off patterns), but that each accident year has a level (α parameter) determined by its own individual experience. This is expressed by,

$$y(w,d) = \alpha_w + \beta*\log(1+d) + \gamma*d + \varepsilon \quad . \qquad (3.5.1)$$

We term this model the "smooth" chain ladder, because in place of estimating s-1 development factors, the job is done by the two parameters β and γ. The model involves s+2 parameters; fewer than the chain ladder, but for most circumstances it is still overparametrised. When this model is estimated, the reader will observe that the standard errors of $\hat{\alpha}_w$ increase with increasing w, as a result of the more recent accident years having fewer observations. Indeed, the quality of 'fit' to the more recent accident years will often be excellent.

We remark that since $\log(p(w,d)/e(w)) = \log p(w,d) - \log e(w)$, the SCL model produces output independent of the exposures used. The quantities $\log(e(w))$ are incorporated in the 'level' parameters α_w. Equivalently, the α_w parameters account for changing exposures.

The smooth chain ladder model (SCL model) should only be used for forecasting if heterogeneity of levels between accident years is supported by the empirical evidence. Apart from using residual displays as a diagnostic tool, the significance of the difference in alphas between contiguous accident years and other statistics are relevant here in determining the usefulness (predictive power) of the SCL model. The model will typically give large forecast errors for the more recent accident years and will be unstable.

Note that if the trend in α's is approximately linear, then the SCI model should be used in place of the SCL model. The smooth chain ladder is a fixed parameter regression model having an integral number of parameters, viz., s+2.

3.6 SMOOTH SEPARATION MODEL (SS MODEL)

The <u>separation method</u> separates the <u>base</u> systematic run-off pattern (assumed homogeneous across accident years) from exogenous influences, viz., payment year inflation (or effects). The deterministic model is expressed as

$$p(w,d) = e(w)b_d \lambda_{w+d} \quad ,$$

where the $\{e(w)\}$ are the exposures, proportional to number of claims incurred, $\{b_d\}$ are the development factors and the

parameter λ_{w+d} expresses the 'effect' of payment year t = w+d.

The corresponding stochastic model, known as the smooth separation (SS) model, is written as

$$y(w,d) = \alpha + \beta*\log(1+d) + \gamma*d + \sum_{t=q+1}^{w+d} \iota_t + \varepsilon, \qquad (3.6.1)$$

where the parameter pair (β, γ) are the 'smoothed' base systematic development factors and ι_t is the annual inflation from payment year t-1 to payment year t.

The model is a fixed parameter model with 3+s-q parameters.

Note that this model necessarily assumes that there are significant changes in inflation rates between every two contiguous payment years. Moreover, the systematic development factors are heterogeneous across accident years.

The SS model is related to the deterministic separation method by the relation

$$\lambda_{w+d} = \alpha + \sum_{t=q+1}^{w+d} \iota_t \ .$$

Analogous to the SCL model, the SS model accounts for changing payment year 'inflation' rates, so that some of the regression output is independent of the inflation factors used.

3.7 HETEROGENEOUS SYSTEMATIC DEVELOPMENT FACTORS

Models involving variations in the two parameters β and γ may be estimated much in the same way as the models described in the preceding section. However, for most data arrays, the parameters that represent the tail, viz., γ or both γ and β, should only be allowed to vary greatly in the early accident years; it is difficult to determine the tail parameters from accident years that have very little development.

The family of models (3.2.1) include a wide variety of models that involve heterogeneous development factors. For example, all accident years may have the same α and γ parameters, but different (based on individual experience) β parameters.

Or it may turn out that the first three accident years are completely homogeneous and that the remaining are completely homogeneous, that is,

$$y(w,d) = \begin{cases} \alpha_1 + \beta_1*\log(1+d) + \gamma_1*d + \varepsilon \ ; & 1 \le w \le 3 \\ \alpha_2 + \beta_2*\log(1+d) + \gamma_2*d + \varepsilon \ ; & 4 \le w \le s \end{cases}$$

The model may reflect a change in mix of risks between accident years three and four. This model is a fixed parameter model with six parameters.

Consider the situation where the <u>base</u> systematic run-off represented by the parameters β and γ remains stable, and payment year inflation changes only from payment year t_1-1 to t_1. The corresponding model is,

$$y(w,d) = \begin{cases} \alpha + \beta*\log(1+d) + \gamma*d + \iota_1*(w+d-q) & \text{for } w+d \le t_1-1 \\ \alpha + \beta*\log(1+d) + \gamma*d + \iota_1*(t_1-1-q) & \\ \qquad + \iota_2*(w+d-t_1+1); & \text{for } w+d \ge t_1 \end{cases}$$

This model has heterogeneous systematic development factors across accident years. There is a break between payment years t_1-1 and t_1. Systematic development factors are homogeneous across accident years for payment years $t \le t_1-1$ and also for payment years $t \ge t_1$. Figure 3.7.1 below depicts the two trapeziums within which systematic development factors are homogeneous. If payment year inflation is not stable, then systematic development factors are necessarily heterogeneous.

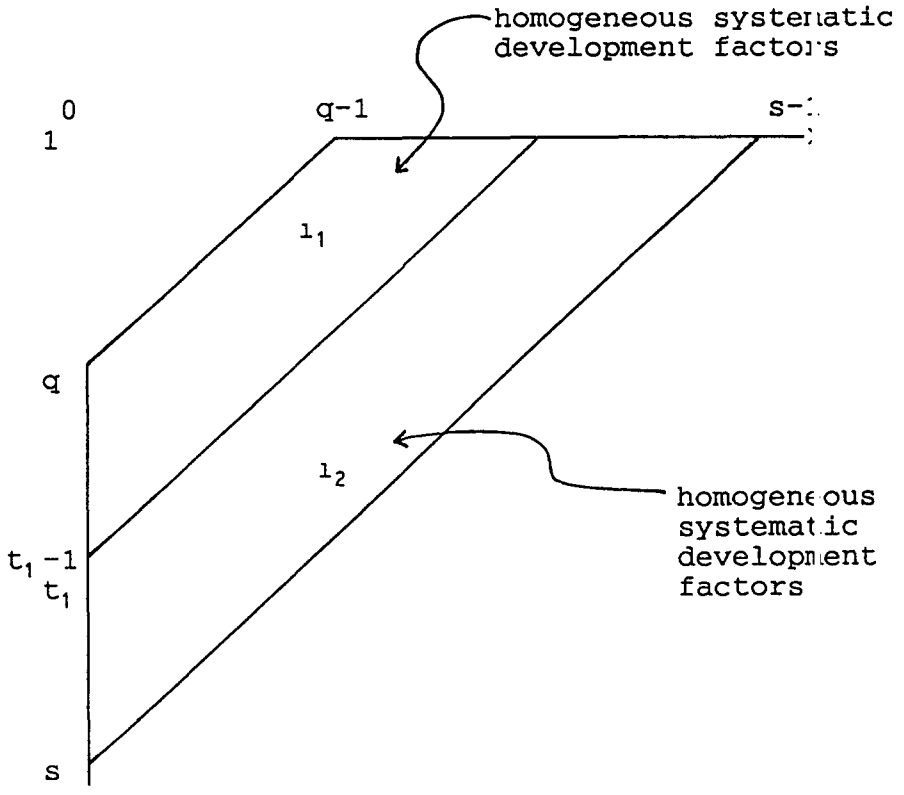


Figure 3.7.1

The change in inflation from ι_1 to ι_2 is depicted in Figure 3.7.2 below.

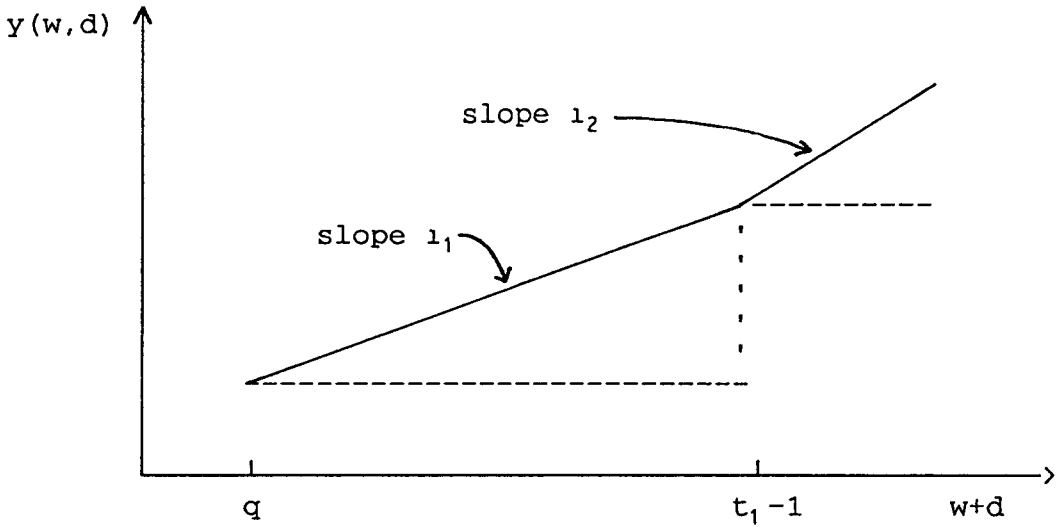


Figure 3.7.2

Inflation changes for ι_1 to ι_2 from payment year t_1-1 to t_1.

The figure below depicts three inflation rates. A constant inflation from payment years q to t_1-1, a constant inflation from payment year t_1-1 to t_1 and a constant inflation from payment years t_1 to s. Contrast this figure with Figure 3.7.2 .

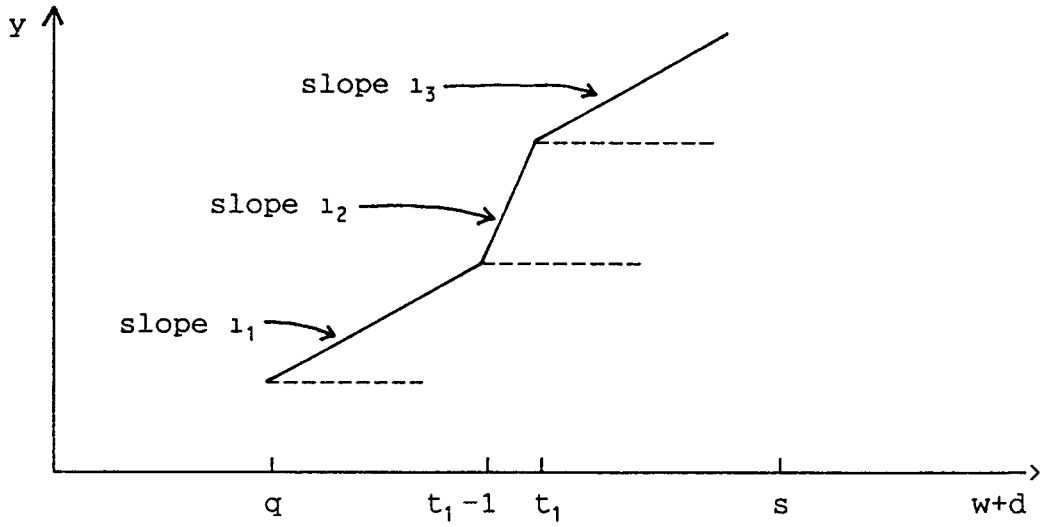


Figure 3.7.3

3.8 OTHER FIXED PARAMETER MODELS

We present other models included in the rich family (3.2.1).

1. $y(w,d) = \alpha + \varepsilon$.

   Here all the $y(w,d)$ observations are regarded as random observations from a normal distribution with mean α and variance σ^2. The 'best' estimate of α, that is the Ordinary Least Squares (OLS) estimate, is the mean of the $y(w,d)$ observations and the standard error of the estimate is given by $S/\sqrt{N}$ where S is the standard deviation of the $y(w,d)$ observations and N is the number of observations. The model is identical to the one discussed in Section 1.3.

2. $y(w,d) = \alpha_w + \varepsilon$.

   Here the observations $y(w,0)$, $y(w,1)$,... are regarded as independent observations from a normal distribution with mean α_w and variance σ^2. This model is a one-way analysis of variance model where the different accident years represent the levels of a factor. The estimate of α_w is the mean of $y(w,0)$, $y(w,1)$... .

3. $y(w,d) = \alpha + \sum_{t=q+1}^{w+d} \iota_t + \varepsilon$.

   This model is a one-way analysis of variance model applied to the payment years. The mean of payment year t is $\alpha + \sum_{j=q+1}^{t} \iota_j$.

4. $y(w,d) = \alpha_w + \sum_{t=q+1}^{w+d} \iota_t + \varepsilon$.

   This model is a two way analysis of variance model. The two factors are accident year and payment year. For some loss development arrays, this model may present good residual displays but high standard errors of parameters. This model is similar to the chain ladder model except that here age-to-age development factors are computed for each payment year rather than each accident year. The parameter α_w represents the "effect" of accident year w, whereas the parameter $\iota_t - \iota_{t-1}$ represents the "effect" of payment year t ($t \geq q+1$).

Note that there are many fixed parameter models that are reduced versions (fewer parameters) of models 2, 3 and 4 above. For example, a sub-model of model 2 is

$$y(w,d) = \begin{cases} \alpha_1 + \varepsilon & ; \quad 1 \le w \le 3 \\ \alpha_2 + \varepsilon & ; \quad 4 \le w \le s \end{cases} .$$

In general, no matter what type of 'loss' development array (incurreds, paids, etc.) is being analysed, the parameter ι_t represents the effect of (payment year t - payment year t-1) and the parameter α_w represents the effect of accident year w.

3.9 OVERPARAMETRISED FIXED PARAMETER MODELS

Many of the fixed parameter models that belong to the rich family are overparametrised. That is, they have too many parameters. Basically, some of the parameters will have estimates whose absolute correlation with each other is close to one. Some of the accident year parameters are proxies for the payment year parameters (and vice versa). Moreover, the AIC (see Section 5.2) is likely to be 'large' and many of the parameters not significant. This phenomenon is known as multicollinearity. Let us illustrate with a simple example.

Consider the model expressed by

$$y(w,d) = \alpha_w + \beta*\log(1+d) + \gamma*d + \iota*(w+d-q) + \varepsilon.$$

This is a 'smooth chain ladder with one inflation parameter' model. It may be recast:

$$y(w,d) = \alpha_w + \iota*w - \iota*q + \beta*\log(1+d) + (\gamma+\iota)*d + \varepsilon.$$

It is not possible to separate the α_w parameters from the ι parameter, since the level for accident year w is given by $\alpha_w + \iota*w - \iota*q$.

Here the correlations between each α_w and ι would be -1 and the standard errors of most, if not all, the alphas would be large making the alphas insignificant.

See the last paragraph of Section 3.11 for a description of a 'similar' varying parameter model that does not suffer from multicollinearity problems.

3.10 INTRODUCTION TO VARYING PARAMETER AND CREDIBILITY MODELS

The technique of exponential smoothing has received widespread use in the context of forecasting a time series. It originated more than 30 years ago without any reference to an underlying model that makes the technique optimal.

We first present heuristic arguments for expcnential smoothing and varying parameter models. The following illustrations and arguments may be viewed from two different perspectives. The data may be regarded as either

(1) sales data over time, or
(2) incremental paid losses for delay 0 across accident years.

(i) Constant mean level (one parameter)

Suppose we have a sequence of time series observations y_1, $y_2 \ldots, y_n$ such that

$$y_t = \alpha + \eta_t, \qquad t = 1, \ldots, n$$

where α is a constant mean level and η_t is a sequence of uncorrelated errors with constant variance. Figure 3.10.1 below depicts such a series.

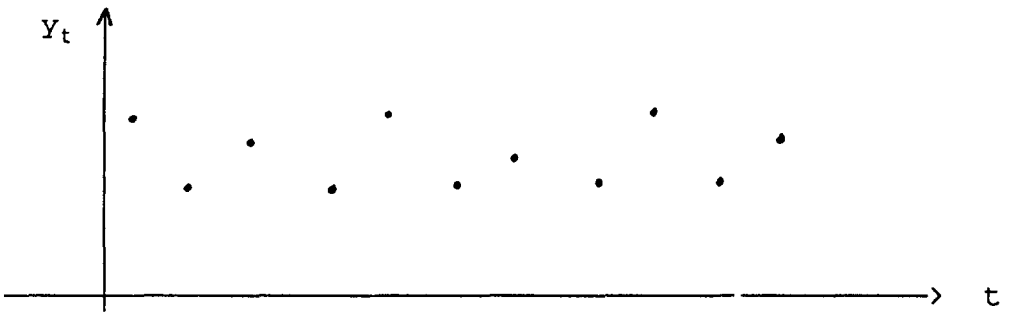


Figure 3.10.1

The model describing the data is our simplest regression model of Section 1.3.

Our model has only one parameter α so that the years are completely homogeneous (stable!).

If α is known, the best forecast of a future observation $y_{(n)+1}$, based on information up to time n, is

$$\hat{y}_{(n)+1} = \alpha \quad .$$

If the parameter α is unknown, we estimate it from the past data $(y_1 \ldots, y_n)$ by its ordinary least squares estimate,

$$\hat{\alpha} = \Sigma\, y_t / n,$$

so that the one-step-ahead forecast of $y_{(n)+1}$ is now

$$\hat{y}_{(n)+1} = \bar{y} .$$

We can now write,

$$\hat{y}_{(n+1)+1} = \hat{y}_{(n)+1} + \frac{(y_{n+1} - \hat{y}_{(n)+1})}{n+1} .$$

The last equation indicates how a forecast from time origin n+1 can be expressed as a linear combination of the forecast from time origin n and the most recent observation. This is the simplest credibility formula, due to Gauss (1795), used when updating sample averages. Since the mean level α is assumed constant, each observation contributes equally to the forecast.

The above formula for updating sample averages is an experience rating (credibility) formula in the context of adjusting a premium, assuming the risk (parameter) does not change.

In computing $\hat{\alpha}$ $(= \bar{y})$ we assign the same weight to each observation. From the loss reserving perspective, we are assuming that the accident years are completely homogeneous. In order to estimate the next years premium, we use all the accident years' data!

We now turn to another example.

(ii) Unstable mean level (each year its own parameter)

Here,

$$y_t = \alpha_t + \eta_t$$

where the mean level α_t changes dramatically in successive time periods. Each year t has its own parameter α_t. Figure 3.10.2 depicts a series of y_t values that may be generated by this model.

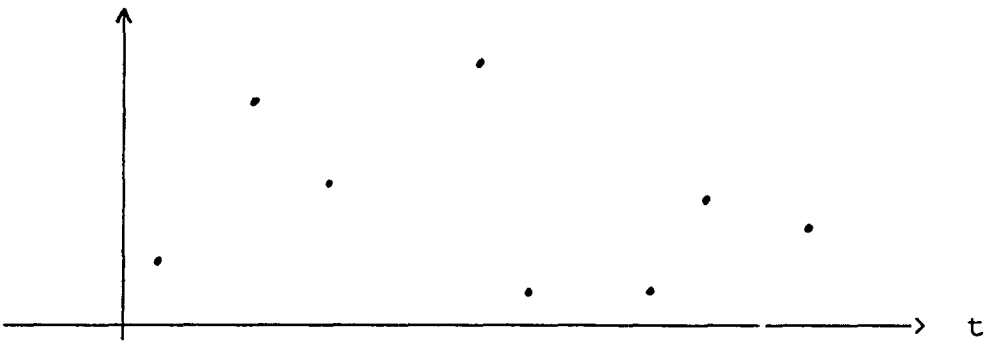


Figure 3.10.2

Here, the best we could do, is forecast $y_{(n)+1}$ by

$$\hat{y}_{(n)+1} = y_n \quad .$$

We are assigning zero weight to the past and all weight to the current observation. From the loss reserving perspective, accident years are completely heterogeneous so that each accident year's individual parameter is estimated by that year's individual experience.

(iii) Locally constant mean level, exponential smoothing and credibility

Often situations present themselves where the mean is approximately constant locally. Assigning equal weights to the past would be too restrictive and assigning zero weight would result in loss of information. It would be more reasonable to choose weights that decrease (geometrically) with the age of the observations.

We could have

$$\hat{y}_{(n)+1} = ay_n + a^2 y_{n-1} + \ldots \quad .$$

For n sufficiently large this may be written

$$\hat{y}_{(n)+1} = \hat{y}_{(n-1)+1} + K(y_n - \hat{y}_{(n-1)+1})$$

$$= (1-K)\hat{y}_{(n-1)+1} + Ky_n \quad , \qquad (3.10.1)$$

where $K = (a-1)^{-1}$. This is also a credibility formula.

Muth (1960) showed that the exponential smoothing formula (3.10.1) is an optimal forecast for the following model:

$$y_t = \alpha_t + \varepsilon_t : \quad \mathrm{Var}[\varepsilon_t] = \sigma_\varepsilon^2$$

$$\alpha_t = \alpha_{t-1} + \eta_t : \quad \mathrm{Var}[\eta_t] = \sigma_\eta^2 \quad .$$

Here the mean level α_t process is a random walk. If $\sigma_\eta^2 = 0$ then we have the constant mean level situation (i) and if σ_η^2 is large we have the unstable mean level situation (ii). The parameter σ_η^2 should be chosen as small as possible at the same time ensuring that the trend in the data is captured.

Figure 3.10.3

The exponential smoothing formula (3.10.1) formally credibility weights all the observations. It is an experience rating formula for a risk (parameter) that changes. If in the situation depicted in Figure 3.10.3, one were to assign zero weight to the past in place of using formula (3.10.1), then much information would be potentially lost.

We illustrate the methodology of formula (3.10.1) in the loss reserving context.

Suppose, for the sake of argument, there are only two accident years (but more than three development years), and the β, γ and ι parameters are zero.

We have,

$$y(1,d) = \alpha_1 + \varepsilon(1,d);\ d=0,1,2,\ldots,n_1-1\text{(say)} \qquad (3.10.2)$$

and

$$y(2,d) = \alpha_2 + \varepsilon(2,d);\ d=0,1,2,\ldots.n_2-1\text{(say)} \qquad (3.10.3)$$

The first accident year has n_1 observations and the second n_2 observations. Denote the sigma-squared assigned to observations by σ^2. Accordingly, $\text{Var}[\varepsilon(1,d)] = \text{Var}[\varepsilon(2,d)] = \sigma^2$.

The relation between α_2 and α_1 is given by

$$\alpha_2 = \alpha_1 + \eta : \text{Variance}(\eta) = \sigma_\eta^2. \qquad (3.10.4)$$

Substituting equation (3.10.4) for α_1 into (3.10.3) yields:

$$y(2,d) = \alpha_1 + \eta + \varepsilon(2,d) \quad . \qquad (3.10.5)$$

Combining the last equation with (3.10.2) we have,

$$\begin{aligned} & y(1,d) = \alpha_1 + \varepsilon(1,d) \\ \text{with} \quad & \\ & y(2,d) = \alpha_1 + \eta + \varepsilon(2,d) \ . \end{aligned} \tag{3.10.6}$$

Since, conditional on α_1 the observations $y(2,0)$, $y(2,1)$, . . . are correlated, we reduce by sufficiency to obtain:

$$\begin{aligned} & \bar{y}_1 = \alpha_1 + \varepsilon_1 \\ \text{and} \quad & \\ & \bar{y}_2 = \alpha_1 + \varepsilon_2 \end{aligned}$$

where $\quad Var[\varepsilon_1] = \sigma^2/n_1 \quad , \quad Var[\varepsilon_2] = \sigma^2/n_2 + \sigma^2_\eta \ ,$

and $\quad \bar{y}_1 = \sum_{d=0}^{n_1-1} y(1,d)/n_1 \quad , \quad \bar{y}_2 = \sum_{d=0}^{n_2-1} y(2,d)/n_2 \quad .$

The estimate of α_1 minimises the weighted error sum of squares

$$W_1 (\bar{y}_1 - \alpha_1)^2 + W_2 (\bar{y}_2 - \alpha_1)^2$$

where

$$\begin{aligned} & W_1^{-1} = Var[\varepsilon_1] = \sigma^2/n_1 \ , \\ \text{and} \quad & \\ & W_2^{-1} = Var[\varepsilon_2] = \sigma^2/n_2 + \sigma^2_\eta \ . \end{aligned}$$

Similarly, the estimate of α_2 is obtained by mirimising,

$$W_1 (\bar{y}_2 - \alpha_2)^2 + W_2 (\bar{y}_1 - \alpha_2)^2 \quad ,$$

where now $W_1^{-1} = \sigma^2/n_2$ and $W_2^{-1} = \sigma^2/n_1 + \sigma^2_\eta$.

The estimates of $\hat{\alpha}_1$ and $\hat{\alpha}_2$ are given by respectively,

$$\begin{aligned} \hat{\alpha}_1 &= (1-Z_1)\bar{y}_2 + Z_1 \bar{y}_1 \\ \text{and} \quad & \\ \hat{\alpha}_2 &= (1-Z_2)\bar{y}_1 + Z_2 \bar{y}_2 \end{aligned}$$

where,

$$Z_1 = \frac{\frac{n_1}{\sigma^2}}{\frac{n_1}{\sigma^2} + \frac{n_2}{\sigma^2 + n_2 \sigma^2_\eta}} \quad , \text{ and } \quad Z_2 = \frac{\frac{n_2}{\sigma^2}}{\frac{n_2}{\sigma^2} + \frac{n_1}{\sigma^2 + n_1 \sigma^2_\eta}}$$

Both $\hat{\alpha}_1$ and $\hat{\alpha}_2$ are credibility estimators. Consider the following situations.

Case (1)

$\alpha_1 = \alpha_2$ (= α, say). This is true if and only if $\sigma_\eta^2 = 0$.

Accordingly,

$$\hat{\alpha} = \frac{n_2}{n_1 + n_2} * \bar{y}_2 + \frac{n_1}{n_1 + n_2} * \bar{y}_1$$

= average of all observations.

Each observation is assigned the same credibility (weight) in estimating α.

Case (2)

$\alpha_1 \neq \alpha_2$, equivalently, $\sigma_\eta^2 \to \infty$ so that $\hat{\alpha}_1 = \bar{y}_1$ and $\hat{\alpha}_2 = \bar{y}_2$.

Here $\hat{\alpha}_1$ is only based on the first year's experience and $\hat{\alpha}_2$ is only based on the second year's experience.

The smaller σ_η^2 is (relative to σ^2), the more information is being pooled across the two years in estimating α_1 and α_2. We are credibility weighting the two years' data.

For a description of general recursive credibility formulae, see Zehnwirth (1985).

3.11 VARYING PARAMETER MODELS

Varying parameter models can deal with many different environments including step-changes and transient situations. They update their parameters in a way that takes account of changes in systematic patterns. Furthermore they can deal with changes in trend better than fixed parameter models - they pool the information, as in credibility analysis. They afford the major advantage of using more of the information in the data resulting in reduced forecast errors, stability of forecasts when updating and avoidance of multicollinearity problems.

Note that if in case (iii) of the preceding section, we were to assign zero weight to all the observations in the past, that is, deal with it as if the data were generated by a large σ_η^2 (as in case (ii)), then much useful information would be lost.

Suppose that as a result of some preliminary analysis and model estimation, it is determined that there exists a trend in levels across accident years as depicted in the Figure below. The Figure would typically display a residual pattern against accident years.

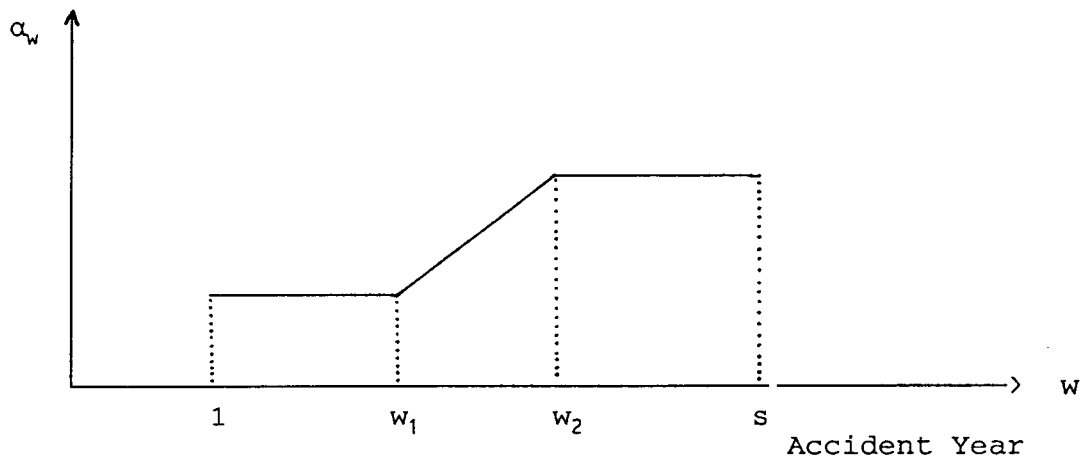


Figure 3.11.1

Observe that from accident years 1 to w_1, the level α_w is constant, increases (approximately linearly) from w_1 to reach a new level at w_2 that continues through to accident year s. The trend in α_w may be modelled as follows:

$$y(w,d) = \begin{cases} \alpha_1 + \beta*\log(1+d) + \gamma*d + \varepsilon ; & 1 \le w \le w_1 \\ \alpha_w + \beta*\log(1+d) + \gamma*d + \varepsilon ; & w_1 < w < w_2 \\ \alpha_2 + \beta*\log(1+d) + \gamma*d + \varepsilon ; & w_2 \le w \le s \end{cases} \quad (3.11.1)$$

This model involves the two parameters β and γ and $w_2 - w_1 + 1$ free α parameters. In order to accommodate the cardinal principle of parsimony, every attempt should be made to reduce the number of free α parameters. This may be achieved by using the notion of varying parameters - in order to capture the trend depicted in Figure 3.11.1 we let the parameter α adapt to the trends in the data.

The basic aim is to capture the trend between accident years w_1 and w_2 with a variance of α, σ^2_η, as small as possible. As it stands, the approach is partly ad hoc, but the user is guided by the parameter estimates, summary statistics (including AIC and SSPE) and residual displays. Incidentally, if the estimates of α_1 and α_2 when σ^2_η = "large" correspond to the estimates of α_1 and α_2 when σ^2_η = "small", then taking the small value is sufficient for α to adapt to the data accurately. Varying parameter models credibility weight the data, as indicated in the preceding section..

The varying parameter capability allows us to model any pattern in the α parameters, including the pattern depicted in the figure below and moreover model any pattern in the ι parameters, β parameters and γ parameters.

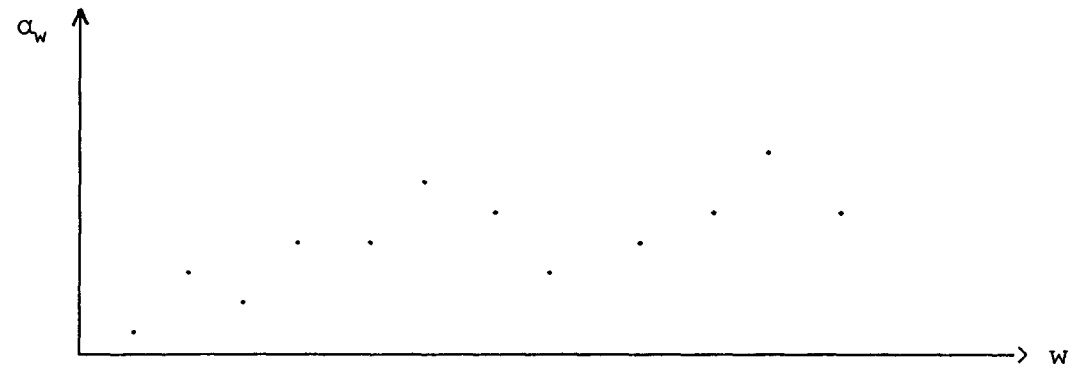


Figure 3.11.2

For readers who are familiar with time series models, if $\beta_w = \gamma_w = 0$ for every accident year w, $\iota_t = 0$ for every payment year and α_w is described by equation (3.10.4), then this model makes exponential smoothing optimal. The model is also equivalent to the Box-Jenkins ARIMA(0,1,1) model.

We now consider the overparametrised fixed parameter model,

$$y(w,d) = \alpha_w + \beta*\log(1+d) + \gamma*d + \iota*(w+d-q) + \varepsilon,$$

discussed in Section 3.9. A corresponding adaptive model would constrain α_w to adapt from accident year to accident year. This would reduce the absolute correlations of α_w with iota and would lead to parameters that are significant. This avoids the problem of multicollinearity associated with the fixed parameter model. Moreover, more of the information in the data will be used with fewer parameters resulting in reduced forecast (standard) error and increased stability. See Section 4.4.

3.12 TRENDS ACROSS ACCIDENT YEARS

Since α_w represents the level in percentage terms of accident year w, we can use the changes in α_w to estimate the trend across accident years.

The estimate of trend from accident year 1 to accident year s is

$$I = \exp[\hat{\alpha}(s) - \hat{\alpha}(1)] - 1 \quad . \qquad (3.12.1)$$

Average annual trend is given by

$$(I+1)^{1/(s-1)} - 1. \qquad (3.12.2)$$

The (continuous) trend between accident year w-1 and w is given by the difference $\alpha_w - \alpha_{w-1}$.

We compute estimates of these differences, corresponding standard errors and T-ratios.

3.13 PAYMENT YEAR INFLATION (TREND)

For any model the parameter ι_t represents the annual (force of) inflation from payment year t-1 to payment year t.

We can identify, test and estimate stability in inflation from payment year to payment year.

Note that if correlations between iotas and alphas are high then payment year trends are confounded by accident year trends (and vice versa) and it is almost impossible to separate them.

Adaptive varying parameter models involve fewer parameters and so credibility weight the data. They are therefore powerful in separating (systematic) accident year trends from (systematic) payment year trends.

The resultant systematic trend from p(w,d) to p(w+1,d) is

$$\alpha_{w+1} - \alpha_w + \iota_{w+1+d} ,$$

provided all the β and γ parameters are the same for each accident year.

4. MODEL SELECTION

4.1 INTRODUCTION

The mechanisms by which claim severities, frequencies and delays are generated are invariably complex. When a model is constructed, it is not intended to be an accurate description of every aspect of the claims processes. The aim is to simplify the underlying processes in such a way that the essential features are brought out. According to Milton Friedman (1953): 'A hypothesis is important if it 'explains' much by little...'. Similar views are expressed by Popper (1959): 'Simple statements.... are to be prized more highly than less simple ones because they tell us more; because their empirical content is greater, and because they are better testable.'

From the statistical point of view, the key feature of a simple model is that it contains a small number of parameters. This is often known as the principle of parsimony. Moreover, a simple model is testable.

The purpose of constructing a model is to systematically account for as much of the variation in the observations with as few parameters as possible. Recall that the systematic movements not captured by the estimated model are termed residuals, and if the model is reasonably adequate, these residuals should be approximately random. Departures from randomness are an indication that the model is failing to pick up a systematic component in the observations, and an attempt should therefore be made to find a better model.

The following issues are critical to identifying a good model:

- parsimony and parametrisation;
- goodness of 'fit';
- predictive power (validation and stability) and theoretical consistency;
- information.

4.2 PARSIMONY AND PARAMETRISATION

Parsimony refers to a small number of 'significant' parameters. The consequences of adopting an inappropriate model will depend on its relationship to the true model.

Underparametrisation - it imposes invalid constraints on the true model.

Overparametrisation - the model is more general than is necessary.

Overparametrisation has different consequences to under-parametrisation. Overparametrisation leads to high errors of prediction. The forecasts are extremely sensitive to the random component (in contrast to the systematic component) in the observations. Indeed, overfitting can be disastrous in certain circumstances. Underparametrisation, on the other hand, tends to lead to bias rather than instability.

The dangers of overparametrisation are illustrated with a simple example. Imagine we have some yearly sales figures, as depicted below in Figure 4.2.1, and generated by

$$y_t = 1 + 2t + 3t^2 + \varepsilon_t ,$$

say, where the ε_t's are random from $N(0,\sigma^2)$, and y_t represents the number of sales in year t.

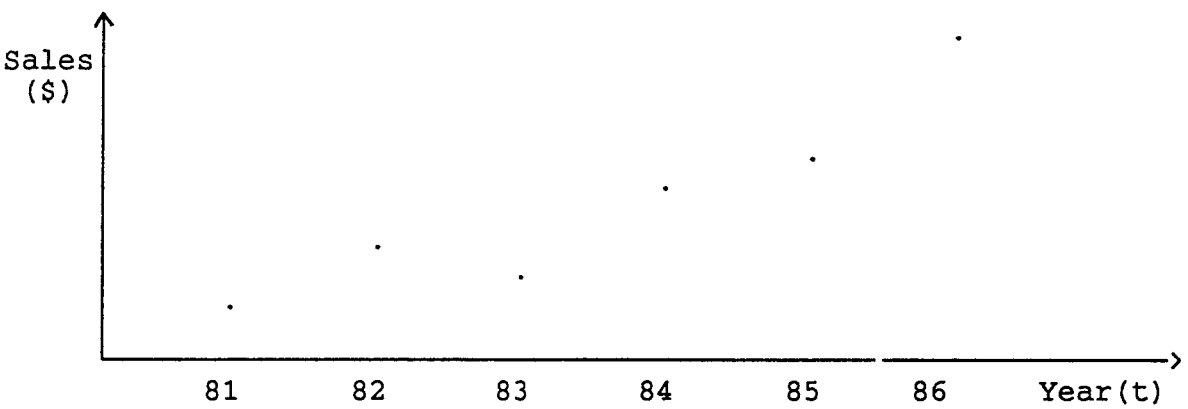


Figure 4.2.1

We wish to forecast sales for 1987. We could estimate a straight line model:

$$y_t = \beta_0 + \beta_1 * t + \varepsilon_t \quad . \qquad (4.2.1)$$

This model produces residuals that are not random and is therefore rejected. The quadratic model,

$$y_t = \beta_0 + \beta_1 * t + \beta_2 * t^2 + \varepsilon_t \qquad (4.2.2)$$

on the other hand, produces residuals that appear random. Moreover, R-squared is higher and parameters are significant.

We could try a fifth degree polynomial, viz.,

$$y_t = \beta_0 + \beta_1 * t + \beta_2 * t^2 + \ldots + \beta_5 * t^5 \quad . \qquad (4.2.3)$$

This model will produce zero residuals, that is, it will go through every data point and the R^2 = 100%. However, it is useless from the point of view of forecasting. Why? If we change only one data point marginally, the forecast will change to a very large degree. Moreover, if we use the model in 1986 to forecast sales in 1988, re-estimate the model in 1987 to update our forecast for 1988, the two forecasts would be completely different. The data are **NOT** unstable. **IT IS THE MODEL THAT IS UNSTABLE.** The model is incredibly sensitive to the random component in the data. It should only be sensitive to the systematic trend! Incidentally, the chain ladder and any technique based on calculation of age-to-age development factors suffers from the same defect.

WE WANT A MODEL THAT DELIVERS STABILITY IN RESERVE CALCULATIONS WHEN UPDATING

The notion of stability is analogous to the notion of limited fluctuation in credibility practice when experience rating a risk - we do not wish to charge premiums that fluctuate violently from year to year!

If your answers change from year to year, you should first question your technique or model. The systematic component in the data may actually be stable!

4.3 GOODNESS OF FIT

Goodness of fit refers to how well the forecasting model is able to reproduce the data that are already known. It is captured by a number of statistics including:

- R-squared, the coefficient of multiple correlation;
- S-squared, the mean squared error;
- Akaike Information Criterion;
- SSPE, the sum of squares of one-step-ahead prediction errors;
- Significance of parameters;
- Residual displays.

R-squared represents the proportion of variation in the data explained by **delay**, **accident year** and **payment year**. It is also the square of the correlation coefficient between observed and predicted.

A parameter is significant if there is sufficient evidence to support the contention that it is non-zero, and accordingly explains a significant proportion of variation in the data. Residuals are used for two purposes. In the first instance, to diagnostically identify systematic trends and structure in the data (that is, the type of heterogeneity) and in the second, to ensure that an estimated model has captured the systematic patterns and trends in the data.

The Akaike Information Criterion (AIC) is a statistic that allows the user to guard against overparametrisation. See Section 4.6.

SSPE is also a statistic that allows the user to guard against overparametrisation. See Section 4.7.

4.4 VALIDATION, STABILITY AND THEORETICAL CONSISTENCY

The important question is whether the estimated model can predict outside the sample. It is therefore important to retain a subset (the most recent one or two payment years) of observations for post-sample predictive testing. This post-sample prediction testing is called **VALIDATION**.

VALIDATION of the last payment year, or any payment year, is also related to the concept of **STABILITY**. If we don't use the last payment years' data to estimate the model, the ultimate losses should not differ from that obtained by using the last years' data by more than one standard error. We would like to identify a model that delivers **STABILITY** of reserves from year to year.

Theoretical consistency is another requirement of a good model. It should be consistent with what is known a priori, and any information outside the historical development array.

The chain ladder technique (age-to-age development factors), produces ultimate losses for accident years that may differ widely, even though the mix of risks and exposures do not change and quite often leads to instability in results when updating (adding another payment year's data).

4.5 INFORMATION

In Section 1.4 we discussed the informational content of a model. For example, normal distribution, constant variance, linearity in means etc. The data also contains information. We use a model to extract the maximum amount of information from the data. The amount of information in a data set is much dependent on the systematic and random components. For example, a sample of size five from a normal distribution with mean 100 and standard deviation 1 contains more information than a sample of size 25

from a normal distribution with mean 100, but standard deviation 5. The less information there is in the data, the more important modelling becomes.

4.6 AKAIKE INFORMATION CRITERION

It has been emphasised that in comparing the goodness of fit of various models, an appropriate allowance should be made for parsimony. This has a good deal of appeal, especially where the model may be based primarily on pragmatic considerations.

Akaike Information Criterion (AIC) is both a function of $S_1(0)$-squared and the number of parameters in the model. It is an information theoretic criterion that can be also used for non-nested models. It originated with the work of Akaike (1971).

In general the AIC is given by

$$AIC = -2*\log(\text{likelihood}) + 2*P \ .$$

For the family of models (3.2.1) it reduces to

$$AIC = N*\log[2\Pi*S_1(0)\text{-squared}] + \Sigma\delta*\log(1+d) + N + 2*P$$

where the sum "Σ" is taken over all observations, N denotes the number of observations and P the number of parameters.

The quantity $S_1(0)$-squared is the maximum likelihood estimator of σ_0^2 given by

$$S_1(0)\text{-squared} = \Sigma\ w(d)(y-\hat{y})^2/N$$

where the 'weight' w(d) is given by

$$w(d) = (1+d)^{-\delta} \ .$$

The aim is to select a model with a small relative AIC.

4.7 RECURSIVE RESIDUALS AND SSPE

Consider a time series $z_1, z_2, \ldots, z_n$ where $\hat{z}_{t+1}(t)$ is a forecast of z_{t+1} based on the data $z_1, z_2, \ldots, z_t$. That is, the forecast is based on the information up to time t only. The one-step-ahead forecast (prediction) error is given by

$$\hat{\varepsilon}_t = z_{t+1} - \hat{z}_{t+1}(t) \ .$$

The quantities $\{\hat{\varepsilon}_t\}$ are also termed recursive residuals. The sum of the squared one-step-ahead prediction errors,

$$SSPE = \sum_{t=1}^{n} \varepsilon_t^2 \ .$$

The letters SSPE stand for "sum of squares of prediction errors".

Readers familiar with exponential smoothing will note that the optimal smoothing constant of exponential smoothing is determined by minimising the SSPE.

By way of summary of quality of 'fit' statistics, consider the quadratic polynomial example of Section 4.2, and suppose there are at least ten data points. The relative magnitudes of R^2, AIC and SSPE as we fit polynomials of order one to six are:

- R^2 increases with more parameters;
- AIC decreases from polynomial of order one to polynomial of order two, subsequently increasing as degree of polynomial increases.
- SSPE behaves in much the same way as AIC.

Accordingly, a polynomial of degree exceeding two would have performed worse in a forecasting context than a polynomial of degree two, had we used them each year.

A relatively 'low' SSPE is preferable to a high SSPE. Naturally, there are other aspects of testing, including significance of parameters, model assumptions, R-squared, residual displays and the number of parameters.

The 'tests' should be seen as complementary rather than competitive.

4.8 OUTLIERS, SYMMETRIC DISTRIBUTIONS AND NORMALITY

Outliers are data points with large standardised residuals. Observations classified as outliers have residuals that are large relative to the residuals for the remainder of the observations.

Estimates of parameters and supporting summary statistics may be sensitive to outliers. Residual displays provide information on outliers. Moreover, if omission of outliers from the regression affects the output, then that provides more evidence that the omitted observations are in fact outliers.

An outlier may be a result of a coding error, in which case it should be assigned zero weight, or it may be a genuine observation that is unusual and accordingly has a large influence on the estimates unless it is assigned reduced weight.

To detect outliers routinely, we need a rule of thumb that can be used to identify them. A **Box plot** is a schematic plot devised by J.W. Tukey. The following steps summarise the general procedure for constructing schematic plots.

. Order the data.

. Find the median (M), lower quartile (LQ), upper quartile (UQ) and mid-spread (MS), where MS = UQ - LQ.

. Find the upper and lower boundaries defined by

LB = LQ - 1.5*MS

UB = LQ + 1.5*MS.

. List all outliers. An outlier is defined as any observation above the upper boundary or below the lower boundary.

. Construct a Box plot as follows:

(a) Draw a horizontal scale;

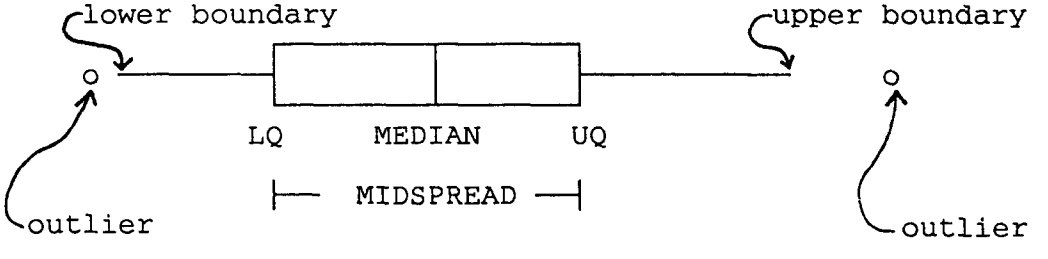
(b) Mark the position of the median using "|";

(c) Draw a rectangular box around the median, with the right side of the box corresponding to the UQ and the left side corresponding to the LQ. The length of the box is equal to the MS. The median divides the box into two boxes;

(d) Find the largest and smallest observations between the boundaries and draw straight horizontal lines from the UQ to the largest observation below the upper boundary and from the LQ to the smallest observation above the lower boundary;

(e) Mark all observations (outliers) outside the boundaries with hollow circles (o). If an outlier is repeated, mark the number of times it is repeated.

Box Plot



We can also conclude (diagnostically) that a distribution is symmetric if the median is approximately half way between the LQ and the UQ.

A model assumes that the weighted standardised residuals come from a normal distribution. Accordingly a normal probability plot should appear approximately linear. That is, the plot of weighted residuals against normal scores should have points that fall close to a straight line. This means that the correlation should be close to unity.

5. REAL LIFE EXAMPLE

5.1 INTRODUCTION

We analyse a Worker's Compensation sub-portfolio of the Government Insurance Office of N.S.W. (Australia). This portfolio is quite volatile despite the fact that the age-to-age development factors are relatively smooth. Appendix A presents the data together with results based on chain ladder technique.

5.2 PLOTS AND PRELIMINARY REGRESSIONS

Appendix B (page 7) presents a plot of the normalised payments against delay for all accident years combined.

Observe that the run-offs for the more recent accident years are at a much higher level than for the earlier accident years. For example, the early part of the run-off curve for 1986 is at a much higher level than that of 1979. There appears to be a 'hole' between accident years. We will discover very soon that the 'hole' is due to something going on in the payment year direction.

The preliminary regression results obtained by fitting the SC model to all accident years 1972 - 1986 combined are presented in Appendix B (pages 7-9). We note:

- The curve explains 81.6% of the variation in the data;
- the T-ratio of the parameter β is 1.504, suggesting that β may be insignificant;
- the percentage error of expected from observed is in excess of 57%;
- the mean is around 17% above the median.

The residual plots indicate that there are systematic patterns in the data left unexplained by the SC model. There is one outlier, accident year 1976, delay 10.

A plot of the residuals against payment years (page 9) suggests a structural change from payment year 1978 to payment year 1979. (This explains the 'hole' detected in the plot of normalised payments.) The display can be broken down into two blocks, 1972 to 1978 and 1979 to 1986. Moreover, the residual patterns are suggestive of payment year inflation (claims escalation).

An examination of the plot of residuals against accident years indicates that changes in accident year trends are minimal from 1972 to 1975, substantial from 1975 to 1979 and minimal again

from 1979 to 1986. The trend across accident years is displayed in the Figure below.

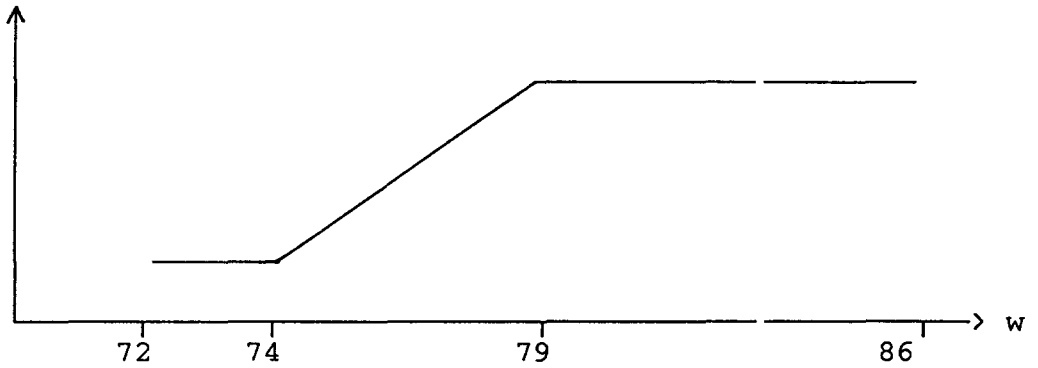


Figure 5.2.1

We now estimate the single curve with inflation parameter model (SCI model). The results also appear in Appendix B (pages 9-11). The average annual inflation is 14% (±1.02%) and is significant. R-squared is very high. The percentage error now is 35% and the mean is about 7% above the median. The residuals against payment years plot (page 11), indicates that inflation from 1981 to 1986 has been stable and higher than in the preceding years. More specifically, inflation from 1981 to 1986 is higher than in the preceding two years and much higher than in the years preceding and including 1978. Residuals against accident years indicate a slight upward trend from 1975 to 1979 and a distinct downward trend from 1980 to 1986.

Inflation from 1972 to 1986 suggested by the residual displays is depicted below:

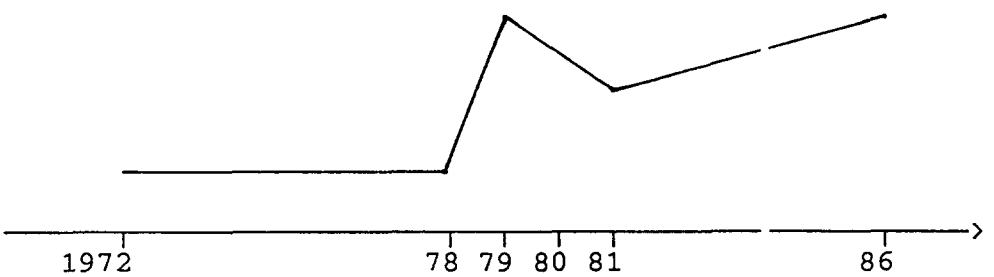


Figure 5.2.2

Note, that so far, we are only <u>diagnostically</u> assessing the structure in the data. All assumptions may be tested formally.

5.3 MODEL IDENTIFICATION AND FORECASTING

There are a number of steps involved in identifying an appropriate model with predictive power.

STEP 1: Preliminary analyses facilitate the diagnostic identification of the structure in the data. Heterogeneity and its nature is also identified.

STEP 2: Based on step 1 a model is specified.

STEP 3: The model is estimated.

STEP 4: The model is checked to ensure that all assumptions are satisfied. If the model is inadequate, it has to be re-specified (step 2), and the iterative cycle of model specification - estimation - checking must be repeated.

STEP 5: The model is used to generate forecasts.

STEP 6: The model is validated and tested for stability. If either criterion is not satisfied, the model has to be re-specified and the identification cycle repeated.

STEP 7: FINISHED

The model identification cycle is displayed in Figure 5.3.1 below.

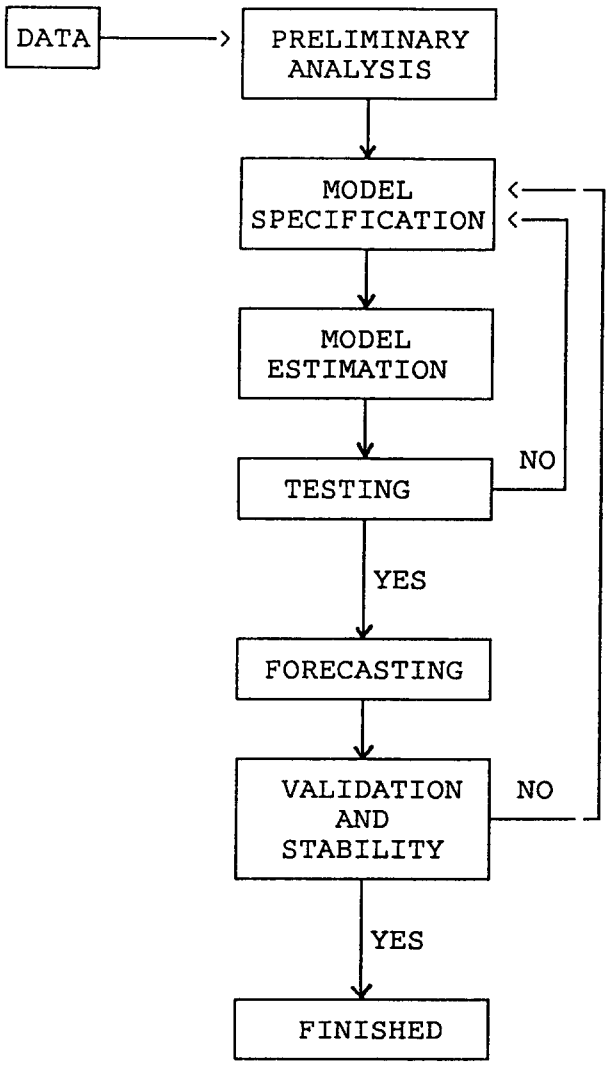


Figure 5.3.1 Model Identification Cycle

Based on the preliminary analyses we have estimated a number of models and identified a varying parameter stochastic model that has a number of different inflation rates and adjusts for changing trends across accident years.

Each accident year has three parameters α (alpha), β (beta) and γ (gamma). Between every two contiguous payment years there is an ι (iota) inflation parameter.

1. The β (beta) and γ (gamma) parameters are the same for each accident year. They represent the smoothed base systematic development factors.

2. Each accident year has a level (α (alpha)) parameter. The α parameters adapt from year to year according to values given in Appendix C1.

3. There are a number of different iota (inflation) parameters described in Appendix C3.

Much of the variability in the normalised payments, viz., 98.2% is explained by the systematic components in the data, viz.,

(i) (changing) payment year inflation rates;
(ii) (changing) trends across accident years, and
(iii) systematic development of the payments over development years.

Indeed, the correlation between the observed (logarithmic normalised) payments and model payments is 0.991 ($\sqrt{.982}$). (See Appendix C4).

The % random (variability) in the payments about the systematic structure is just under 2.9% (2.89%).

Appendix C1

Here is presented the estimates of the base systematic development factors β (beta) and γ (gamma) and also the levels α (alpha) for each accident year. Each accident year has the same base systematic development factors.

Appendix C2

Changes in α (alpha) represent changes in % levels between any two contiguous accident years. For example, the changes in % (force of) level from accident year 1977 to 1978 is 15.2% ± 7.17%. The Table gives all the % changes between any two contiguous accident years. The T-ratios measure the significance of the trends.

Appendix C3

Here we present the different payment year inflation estimates. The T-ratios corresponding to the difference in iotas (inflation rates) measure the significance of the changes. The estimate of superimposed inflation from 1982-86 is 7.92% ± 2.48%.

Appendix C4

Here we present some additional regression output. Note that the *scale* parameter is set to 10000.

Appendices C5, C6 and C7

If the estimated model captures all the structure (systematic components) in the data, then the observed 'payments' should be distributed randomly about the estimated (fitted) surface. We present standardised residuals ((observed - predicted)/S) in the three directions delay, accident year and payment year. The plots are in good shape. There is no diagnostic evidence of heteroscedasticity.

Appendix C8

The Boxplot of weighted residuals suggests symmetry and one outlier. However, since the robust estimate of $\sigma^2(0)$ is essentially identical to the mle of $\sigma^2(0)$, there is no need to remove the outlier.

Appendix C9

Normal probability plot and the corresponding P-value for the squared correlation provide ample evidence of the normality of the weighted residuals and hence of lognormality on the original $ value scale.

Appendix C10

This appendix presents:

(i) each observed inflation adjusted payment (OBS);
(ii) each expected model payment (EXP);
(iii) forecasts for each accident year subdivided according to development year (right side of stair-case corresponding to EXP row);
(iv) standard errors of each individual forecast (below each forecast);
(v) total forecast (outstanding) for each accident year and associated standard error (right hand column);
(vi) total forecast (payment) to be made in each future payment year in respect of all the accident years and associated standard errors (bottom row);
(vii) total outstanding with associated standard error (bottom right hand corner).

An expected model payment is the mean of a lognormal distribution. Similarly, a mean forecast and standard error is the mean and standard deviation respectively of a lognormal distribution.

Forecasts are based on an assumed future (superimposed) inflation rate of 7.92% ± 2.48%. That is, it is assumed that inflation rates will fluctuate in the future with a standard deviation of 2.48% about a mean of 7.92%. Note that the quality of fit is very high and that the variation in the observed payments is mirrored in the forecasts.

We remark that the higher the variability in future inflation (the mean being the same), the higher the forecast of the mean.

For example, a forecast based on inflation of 7.92% ± 3% will be higher than a forecast based on 7.92% ± 1%. Why?

In order to compute the resultant trend from one accident year to the next for the same delay, add the accident year trend (difference in alphas) to the payment year trend. The forecast standard errors are of paramount importance. They incorporate all the uncertainties in the parameter estimates including the standard error associated with future superimposed inflation. (There is no need to produce forecasts based on different future superimposed inflation scenarios.)

Appendix C11

Here we present a quality of fit table comparing the original inflation adjusted payments with the model expected payments. For each accident year and for each payment year, we compute the ratio of the difference in total observed and total expected to the total expected. The quality of fit is high.

5.4 VALIDATION AND STABILITY

We re-estimate our identified model, leaving the last payment year (1986) out, by assigning it zero weight, for two principal reasons:

(i) VALIDATION

and

(ii) STABILITY

We investigate: (i) how well the same model used at year end 1985 forecasts the observed experience of 1986 and (ii) how our forecasts beyond 1986 compare with those produced when including 1986 data in the estimation.

Appendix D1

Now the estimate of 'inflation' from 1982 - 1986 is 7.84% ± 2.75% compared with 7.92% ± 2.48% (when we included the 1986 payment year data in the estimation).

Appendix D2

The residual display against payment years indicates that the 1986 experience is random about the surface (on a logarithmic scale), even though the experience was not used in the estimation. There is one outlier, so that the resolution is not so good.

Appendix D3

Our forecasts of the 1986 experience appear to be quite good, especially considering the standard errors. Total forecast has increased from $196.5M to $204M which is well within one standard error.

Appendix D4

We have overforecast 1986 payment year by 10%, but this is mainly due to the overforecast of the 'small' payment corresponding to accident year 1976.

6. CONCLUSIONS

The major conclusions reached in this paper are as follows:

(i) Parsimony is a cardinal principle that plays a key role in the specification of a loss reserving model.

(ii) The non-orthogonality of the payment year and accident year directions can result in multicollinearity problems in so far as fixed parameter models are concerned.

(iii) Varying parameter models afford the following advantages:

- small(er) prediction errors;
- increased stability;
- avoidance of multicollinearity;
- separation of non-orthogonal systematic components.

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ACCIDENT YEAR	EXPOSURE
1968	12657
1969	13773
1970	13702
1971	13609
1972	13689
1973	15684
1974	15840
1975	16479
1976	16081
1977	14994
1978	15799
1979	16603
1980	17814
1981	19539
1982	19809
1983	18483
1984	19158
1985	19334
1986	16327

APPENDIX A

NON-CUMULATIVE PAID LOSSES
($ 000's)

ACCI YEAR	DELAY 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1972	2549	2675	1693	1918	729	364	350	576	474	233	277	155	176	106	52
1973	2937	3215	2641	1207	1051	827	853	428	426	303	347	164	169	103	
1974	3256	2623	2093	1283	842	1195	801	533	532	416	338	215	190		
1975	3121	2770	2210	1834	1850	1552	1159	751	691	335	271	412			
1976	2828	3150	2477	3459	1910	801	902	784	771	575	38				
1977	3671	4109	6781	3586	2182	1122	1380	1034	1000	474					
1978	5387	9418	6875	3094	2985	2087	1556	1381	1382						
1979	10364	11870	7732	5630	3231	2340	2844	1851							
1980	11342	11513	8104	6398	5694	2479	3028								
1981	12730	11689	8237	6011	4653	4086									
1982	13229	12026	10584	6691	5065										
1983	12175	11486	8663	6851											
1984	12427	14932	8193												
1985	13728	13339													
1986	10615														

APPENDIX A

CUMULATIVE PAID LOSSES
($ 000's)

ACCI YEAR														
1972	2549	5224	6917	8835	9564	9928	10278	10854	11328	11560	11837	11992	12168	12276	12326
1973	2936	6152	8792	9999	11050	11877	12730	13158	13584	13887	14234	14398	14567	14670	
1974	3256	5879	7971	9254	10097	11292	12093	12626	13158	13574	13912	14128	14318		
1975	3121	5891	8100	9934	11784	13335	14494	15245	15936	16270	16541	16953			
1976	2827	5977	8455	11914	13824	14625	15527	16310	17081	17656	17694				
1977	3671	7780	14561	18147	20329	21451	22831	23865	24865	25339					
1978	5386	14804	21680	24773	27759	29846	31401	32782	34165						
1979	10363	22233	29965	35595	38826	41166	44010	45861							
1980	11342	22854	30958	37357	43050	45530	48558								
1981	12729	24419	32656	38667	43321	47406									
1982	13228	25254	35838	42529	47594										
1983	12175	23660	32323	39174											
1984	12427	27359	35552												
1985	13728	27067													
1986	10615														

ACCI YEAR	DEVELOPMENT FACTORS												
1972	2.049	1.324	1.277	1.082	1.038	1.035	1.056	1.044	1.021	1.024	1.013	1.015	1.009	1.004
1973	2.095	1.429	1.137	1.105	1.075	1.072	1.034	1.032	1.022	1.025	1.011	1.012	1.007	
1974	1.805	1.356	1.161	1.091	1.118	1.071	1.044	1.042	1.032	1.025	1.015	1.013		
1975	1.887	1.375	1.226	1.186	1.132	1.087	1.052	1.045	1.021	1.017	1.025			
1976	2.114	1.414	1.409	1.160	1.058	1.062	1.050	1.047	1.034	1.002				
1977	2.119	1.872	1.246	1.120	1.055	1.064	1.045	1.042	1.019					
1978	2.748	1.464	1.143	1.121	1.075	1.052	1.044	1.042						
1979	2.145	1.348	1.188	1.091	1.060	1.069	1.042							
1980	2.015	1.355	1.207	1.152	1.058	1.067								
1981	1.918	1.337	1.184	1.120	1.094									
1982	1.909	1.419	1.187	1.119										
1983	1.943	1.366	1.212											
1984	2.202	1.299												
1985	1.972													
	WEIGHTED AVERAGE DEVELOPMENT FACTORS													
	2.046	1.386	1.201	1.122	1.073	1.065	1.045	1.042	1.024	1.017	1.017	1.013	1.008	1.004

APPENDIX A

ACCI YEAR — PROJECTED ULTIMATE LOSSES

1972	2549	5224	6917	8835	9564	9928	10278	10854	11328	11560	11837	11992	12168	12274	12326
1973	2936	6152	8792	9999	11050	11877	12730	13158	13584	13887	14234	14398	14567	14670	14731
1974	3256	5879	7971	9254	10097	11292	12093	12626	13158	13574	13912	14128	14318	14430	14490
1975	3121	5891	8100	9934	11784	13335	14494	15245	15936	16270	16541	16953	17177	17311	17384
1976	2827	5977	8455	11914	13824	14625	15527	16310	17081	17656	17694	17990	18228	18370	18448
1977	3671	7780	14561	18147	20329	21451	22831	23865	24865	25339	25781	26212	26559	26766	26879
1978	5386	14804	21680	24773	27759	29846	31401	32782	34165	34997	35606	36202	36681	36967	37123
1979	10363	22233	29965	35595	38826	41166	44010	45861	47799	48963	49816	50650	51320	51720	51938
1980	11342	22854	30958	37357	43050	45530	48558	50739	52883	54171	55115	56037	56778	57221	57462
1981	12729	24419	32656	38667	43321	47406	50472	52739	54968	56306	57287	58246	59016	59476	59727
1982	13228	25254	35838	42529	47594	51088	54392	56835	59236	60679	61736	62769	63599	64095	64365
1983	12175	23660	32323	39174	43962	47189	50241	52497	54716	56048	57024	57979	58745	59204	59453
1984	12427	27359	35552	42710	47930	51448	54775	57236	59655	61107	62172	63212	64048	64547	64820
1985	13728	27067	37523	45077	50587	54300	57811	60408	62961	64494	65618	66716	67598	68125	68412
1986	10615	21721	30111	36173	40595	43574	46392	48476	50524	51754	52656	53538	54245	54669	54899

APPENDIX A

APPENDIX A

PROJECTED NON-CUMULATIVE PAID LOSSES

ACCI YEAR																ACC.YR TOTALS
1972	2549	2674	1693	1918	728	363	349	576	473	232	276	155	176	105	51	
1973	2936	3215	2640	1206	1050	827	852	428	426	302	347	163	169	102	62	62
1974	3256	2622	2092	1283	842	1195	801	532	531	416	338	215	190	112	61	173
1975	3121	2769	2209	1834	1849	1551	1158	750	690	334	270	412	224	133	73	431
1976	2827	3150	2477	3458	1910	800	902	783	770	575	38	296	237	142	77	753
1977	3671	4109	6781	3586	2181	1121	1380	1033	1000	474	441	431	346	207	112	1539
1978	5386	9418	6875	3093	2985	2086	1555	1381	1382	831	609	595	478	286	155	2953
1979	10363	11869	7731	5629	3231	2340	2843	1851	1938	1163	853	833	669	400	218	6076
1980	11342	11512	8103	6398	5693	2479	3028	2181	2144	1287	943	922	740	442	241	8904
1981	12729	11689	8237	6011	4653	4085	3065	2266	2228	1338	981	958	770	460	250	12320
1982	13288	12025	10584	6690	5065	3493	3303	2443	2401	1442	1057	1033	829	496	270	16770
1983	12175	11485	8663	6850	4788	3226	3051	2256	2218	1332	976	954	766	458	249	20279
1984	12427	14932	8193	7157	5220	3517	3327	2460	2418	1452	1064	1040	835	499	272	29267
1985	13728	13339	10455	7554	5509	3712	3511	2596	2552	1532	1123	1098	882	527	287	41345
1986	10615	11105	8390	6062	4421	2979	2818	2083	2048	1229	901	881	707	423	231	44284
PMT.YR TOTS:	46152	34744	26111	19999	15584	12478	9529	7132	4907	3564	2512	1507	710	231	185166	

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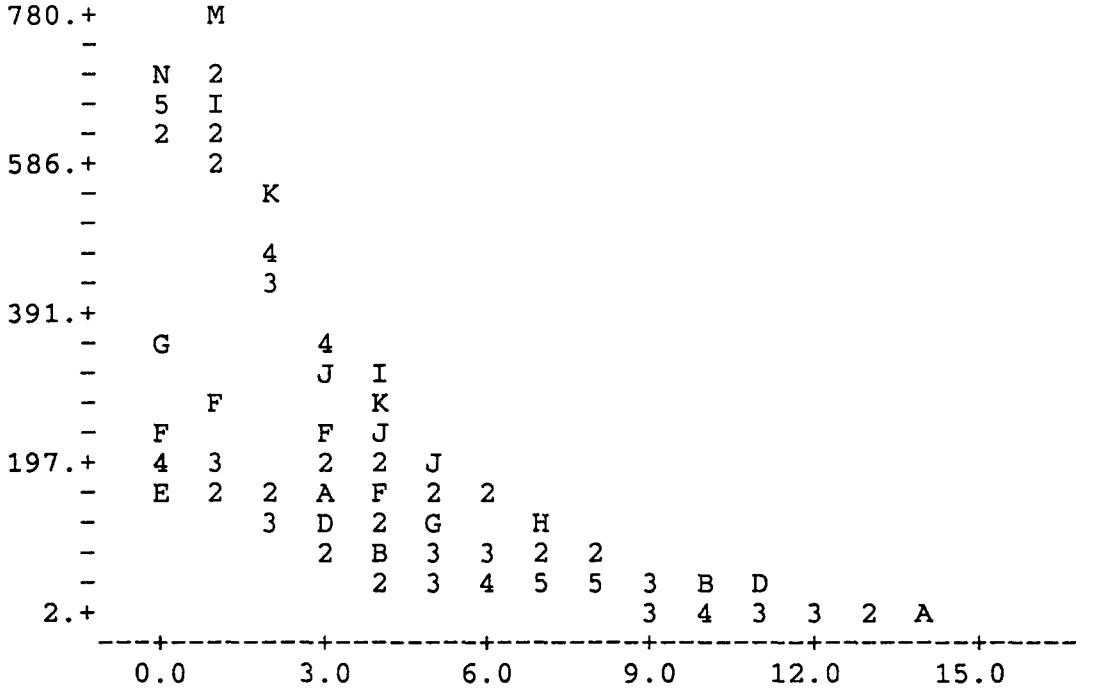
NORMALISED DATA VS. DELAY FOR ACCIDENT YEARS 1972-1986



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REGRESSION FOR ACCIDENT YEARS 1972-1986

PARAMETER	ESTIMATE	ST. ERR OF ESTIM.	T-RATIO
ALPHA	6.040	0.1319	45.78
BETA	0.2828	0.1880	1.504
GAMMA	-0.3816	0.4036E-01	-9.454

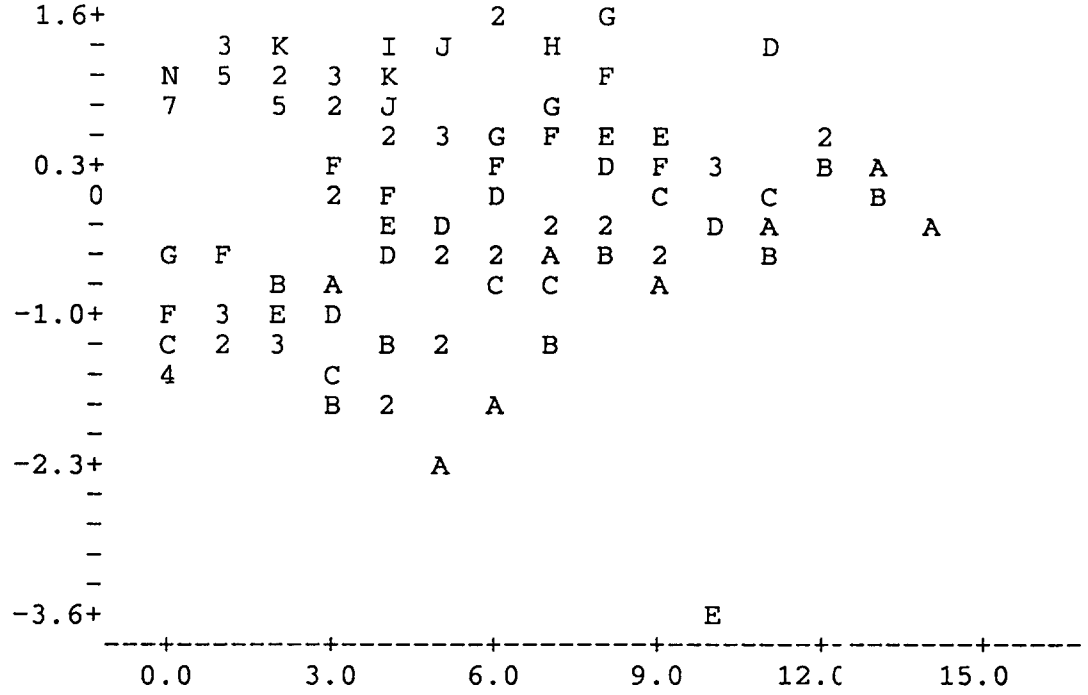
S = 0.5684 S-SQUARED = 0.3231

R-SQUARED = 81.6 PERCENT CONSTANT = 0.0 N = 120

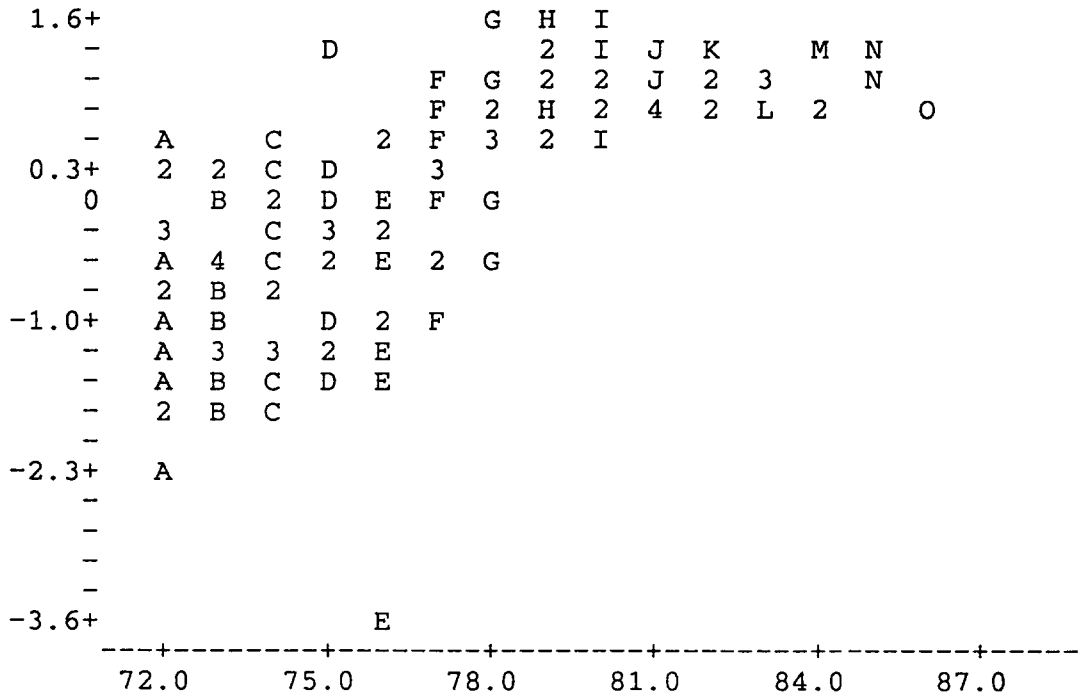
SCALE = 1.00 A = 1.00

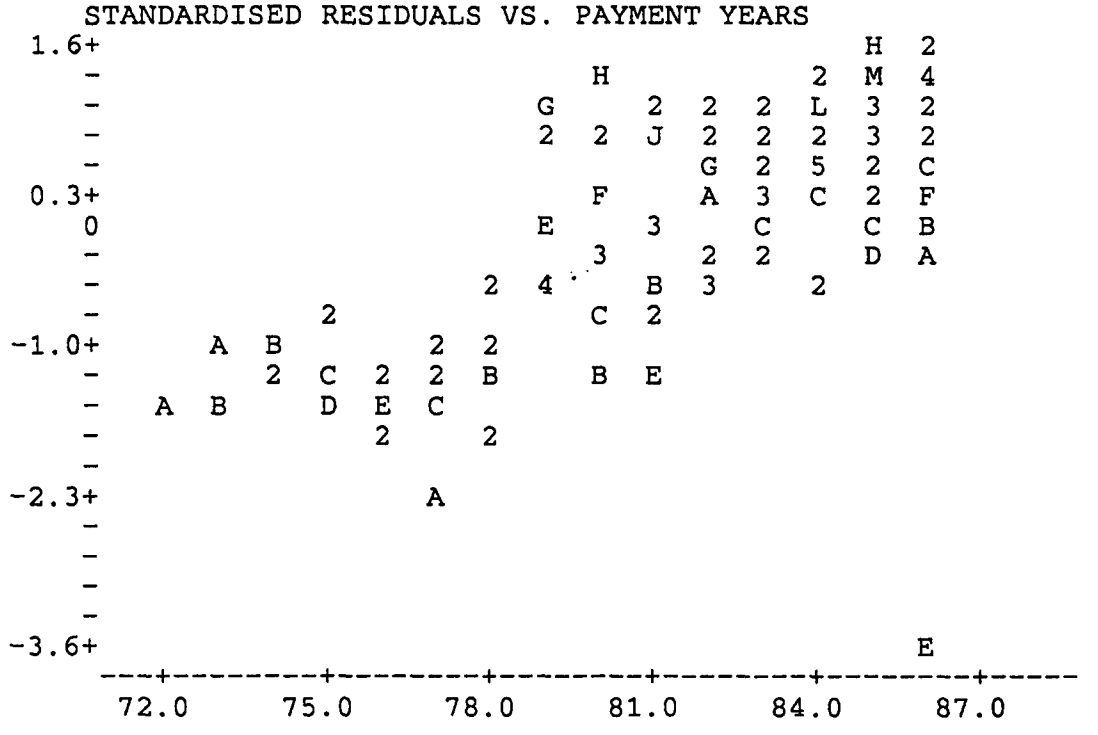
RESIDUAL DISPLAYS

STANDARDISED RESIDUALS VS. DELAY



STANDARDISED RESIDUALS VS. ACCIDENT YEARS





ICRFS VERSION 5.2 PROJECT: WCOM 06/14/89 12:34

REGRESSION FOR ACCIDENT YEARS 1972-1986

PARAMETER	ESTIMATE	ST. ERR OF ESTIM.	T-RATIO
ALPHA	5.058	0.1086	46.58
BETA	0.2828	0.1165	2.428
GAMMA	-0.4517	0.2553E-01	-17.70
IOTA	0.1403	0.1021E-01	13.74

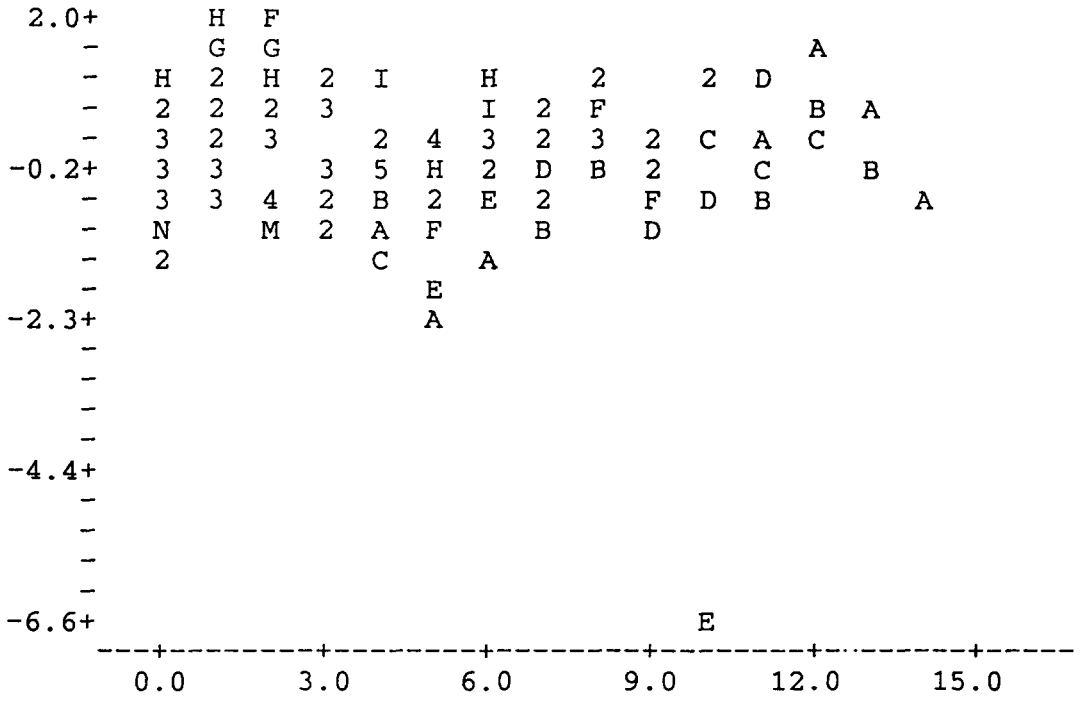
S = 0.3522 S-SQUARED = 0.1241

R-SQUARED = 93.0 PERCENT CONSTANT = 0.0 N = 120

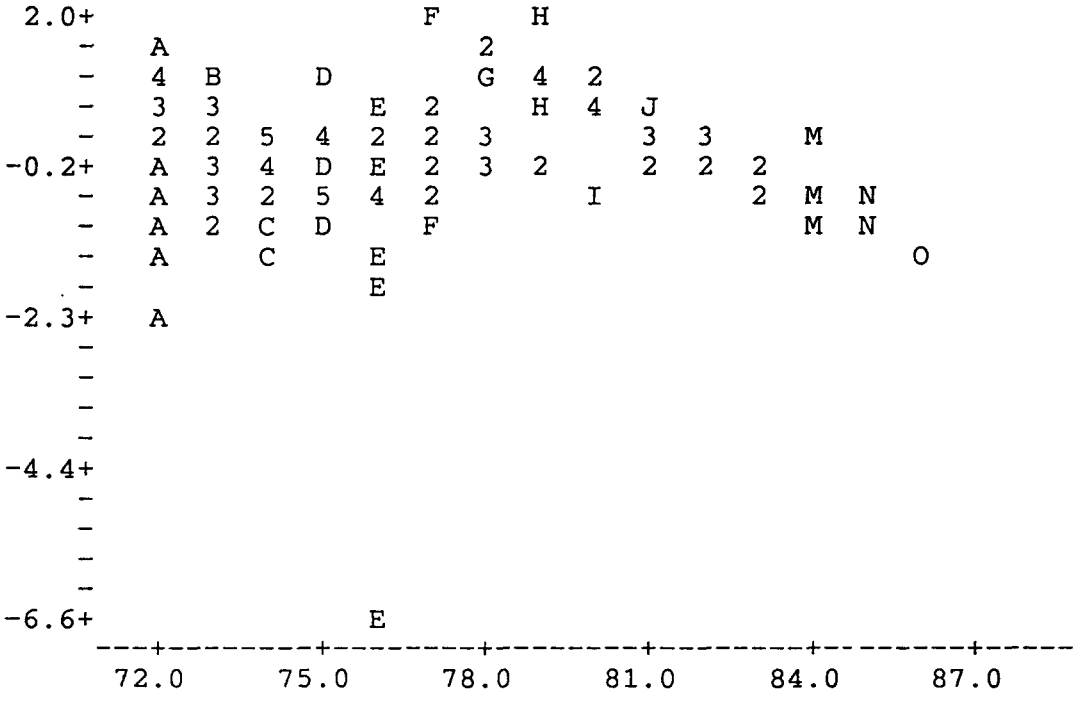
SCALE = 1.00 A = 1.00

RESIDUAL DISPLAYS

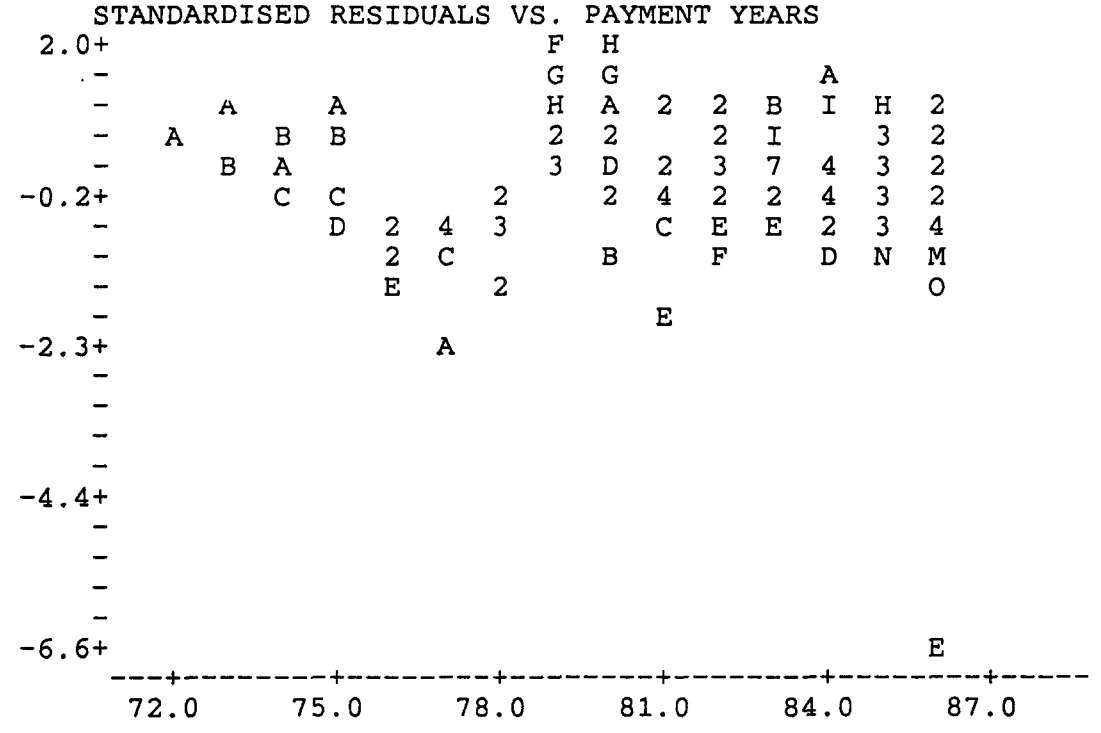
STANDARDISED RESIDUALS VS. DELAY



STANDARDISED RESIDUALS VS. ACCIDENT YEARS



APPENDIX B



APPENDIX C1

R E G R E S S I O N T A B L E

ACCI YEAR	PARAMETER ESTIMATES ALPHA	S.E.	T-RATIO	BETA	S.E.	T-RATIO	GAMMA	S.E.	T-RATIO
1972	5.325	0.0706	75.41	0.031	0.0058	5.37	-0.356	0.0202	-17.60
1973	5.304	0.0648	81.87	0.031	0.0058	5.37	-0.356	0.0202	-17.60
1974	5.304	0.0648	81.87	0.031	0.0058	5.37	-0.356	0.0202	-17.60
1975	5.380	0.0777	69.20	0.031	0.0058	5.37	-0.356	0.0202	-17.60
1976	5.423	0.0914	59.36	0.031	0.0058	5.37	-0.356	0.0202	-17.60
1977	5.616	0.1021	55.00	0.031	0.0058	5.37	-0.356	0.0202	-17.60
1978	5.769	0.1131	50.99	0.031	0.0058	5.37	-0.356	0.0202	-17.60
1979	5.889	0.1286	45.80	0.031	0.0058	5.37	-0.356	0.0202	-17.60
1980	5.892	0.1429	41.23	0.031	0.0058	5.37	-0.356	0.0202	-17.60
1981	5.801	0.1609	36.05	0.031	0.0058	5.37	-0.356	0.0202	-17.60
1982	5.794	0.1673	34.63	0.031	0.0058	5.37	-0.356	0.0202	-17.60
1983	5.715	0.2011	28.43	0.031	0.0058	5.37	-0.356	0.0202	-17.60
1984	5.700	0.2076	27.46	0.031	0.0058	5.37	-0.356	0.0202	-17.60
1985	5.686	0.2155	26.38	0.031	0.0058	5.37	-0.356	0.0202	-17.60
1986	5.686	0.2155	26.38	0.031	0.0058	5.37	-0.356	0.0202	-17.60

ALL PARAMETERS ARE SIGNIFICANT

APPENDIX C2

DIFFERENCES IN PARAMETER ESTIMATES

ACCI YEAR	ALPHA	S.E.	T-RATIO	BETA	S.E.	T-RATIO	GAMMA	S.E.	T-RATIO
1973	-0.020	0.0409	-0.50	0.000	0.0000	0.00	0.000	0.0000	0.00
1974	0.000	0.0000	0.00	0.000	0.0000	0.00	0.000	0.0000	0.00
1975	0.076	0.0618	1.23	0.000	0.0000	0.00	0.000	0.0000	0.00
1976	0.043	0.0707	0.61	0.000	0.0000	0.00	0.000	0.0000	0.00
1977	0.193	0.0777	2.49	0.000	0.0000	0.00	0.000	0.0000	0.00
1978	0.152	0.0717	2.13	0.000	0.0000	0.00	0.000	0.0000	0.00
1979	0.120	0.0742	1.61	0.000	0.0000	0.00	0.000	0.0000	0.00
1980	0.003	0.0766	0.04	0.000	0.0000	0.00	0.000	0.0000	0.00
1981	-0.091	0.0775	-1.18	0.000	0.0000	0.00	0.000	0.0000	0.00
1982	-0.007	0.0473	-0.14	0.000	0.0000	0.00	0.000	0.0000	0.00
1983	-0.078	0.084b	-0.93	0.000	0.0000	0.00	0.000	0.0000	0.00
1984	-0.015	0.0487	-0.31	0.000	0.0000	0.00	0.000	0.0000	0.00
1985	-0.014	0.0496	-0.28	0.000	0.0000	0.00	0.000	0.0000	0.00
1986	0.000	0.0000	0.00	0.000	0.0000	0.00	0.000	0.0000	0.00

NOT ALL PARAMETERS ARE SIGNIFICANT

APPENDIX C3

PARAMETER ESTIMATES

PMNT YEAR	IOTA	S.E.	T-RATIO	DIFFERENCE IN IOTA	S.E.	T-RATIO
1973	0.0000	0.0000	0.00			
1974	0.0000	0.0000	0.00	0.0000	0.0000	0.00
1975	0.0000	0.0000	0.00	0.0000	0.0000	0.00
1976	-0.1475	0.0846	-1.74	-0.1475	0.0846	-1.74
1977	0.0911	0.0907	1.00	0.2386	0.1464	1.63
1978	0.0000	0.0000	0.00	-0.0911	0.0907	-1.00
1979	0.5962	0.0794	7.51	0.5962	0.0794	7.51
1980	0.0000	0.0000	0.00	-0.5962	0.0794	-7.51
1981	0.0000	0.0000	0.00	0.0000	0.0000	0.00
1982	0.0792	0.0248	3.19	0.0792	0.0248	3.19
1983	0.0792	0.0248	3.19	0.0000	0.0000	0.00
1984	0.0792	0.0248	3.19	0.0000	0.0000	0.00
1985	0.0792	0.0248	3.19	0.0000	0.0000	0.00
1986	0.0792	0.0248	3.19	0.0000	0.0000	0.00

NOT ALL PARAMETERS ARE SIGNIFICANT

APPENDIX C4

(REGRESSION OUTPUT CONTINUED)

S = 0.1700 S-SQUARED = 0.0289 S-SQUARED(SCI) = 0.1241

S(0) = 0.1700 S(0)-SQUARED = 0.0289 DELTA = 0.0000

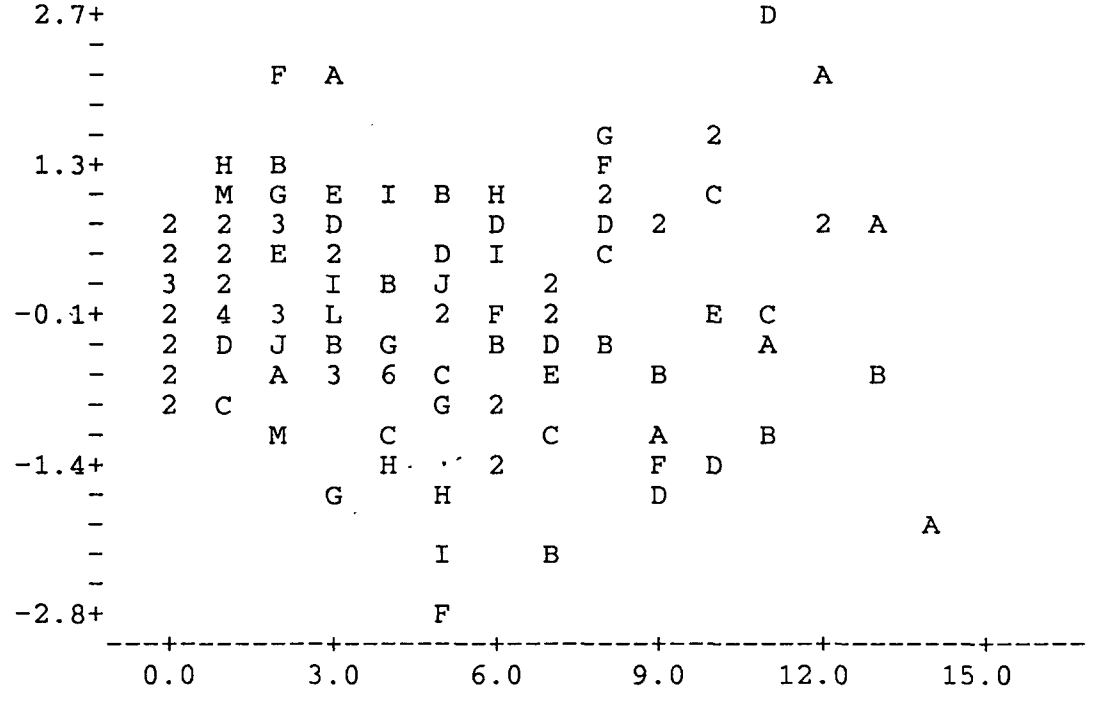
R-SQUARED = 98.2 PERCENT SSPE = 6.508 N = 117 P = 6.6

AIC = -76.19 AIC(SCI) = 94.03 SCALE = 10000.00 A = 1.00

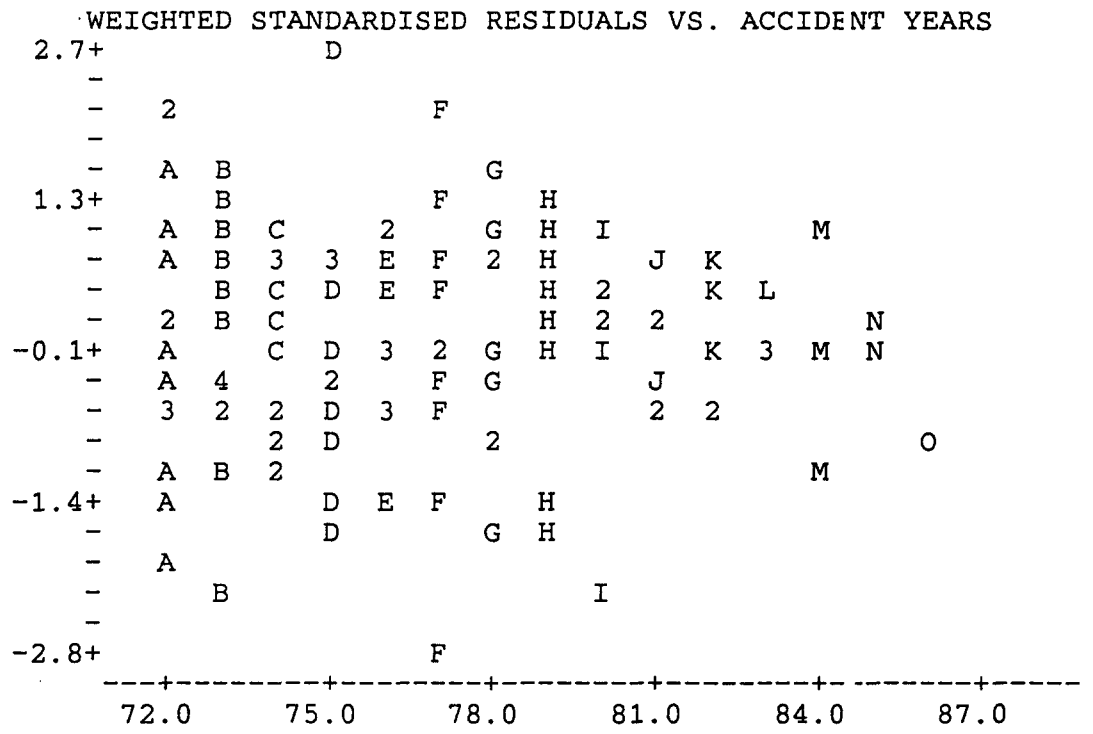
	ESTIMATED PERCENTAGE CHANGE IN LEVEL	STANDARD ERROR
1972-1986	43.57	34.14
ANNUAL	2.62	1.74

APPENDIX C5

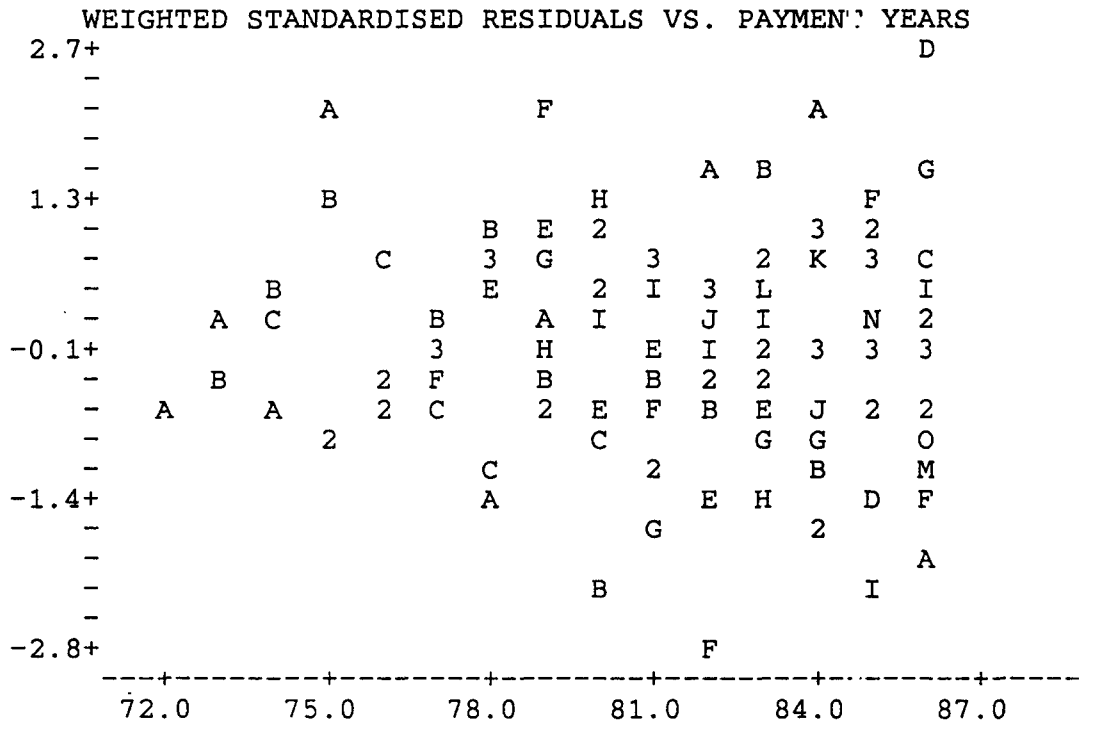
W E I G H T E D R E S I D U A L D I S P L A Y S



APPENDIX C6



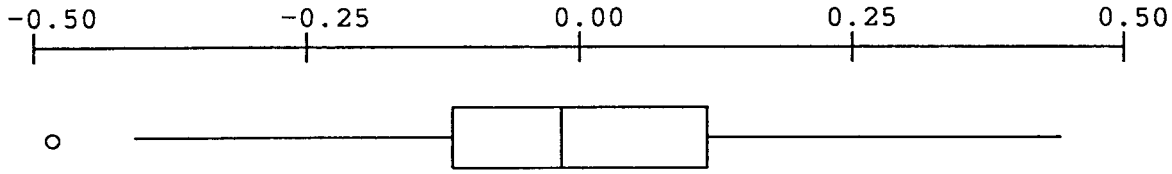
APPENDIX C7



APPENDIX C8

O U T L I E R A N A L Y S I S

BOXPLOT OF WEIGHTED RESIDUALS



N = 117 P = 6.6 DELTA = 0.0000 SIGMA(0)-SQUARED MLE = 0.0273

LOWER QUARTILE = -0.1044 MEDIAN = -0.0017 UPPER QUARTILE = 0.1202

MIDSPREAD = 0.2246 ROBUST SIGMA(0)-SQUARED EST.= 0.0277

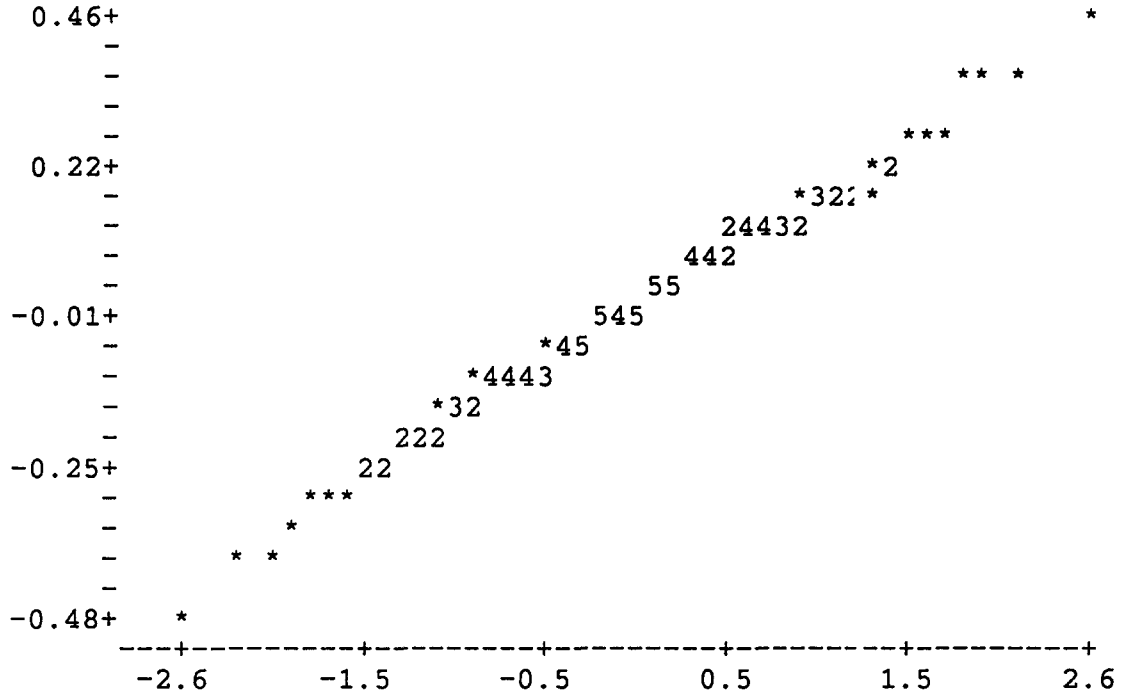
Probable Outliers

Acci Year	Delay	Weighted Residual
1977	5	-0.4803

APPENDIX C9

T E S T I N G N O R M A L I T Y

NORMAL PROBABILITY PLOT



SQUARED CORRELATION OF WEIGHTED RESIDUALS
AND EXPECTED NORMAL SCORES = 0.993

P-VALUE IS LARGER THAN 0.5

APPENDIX C10

F O R E C A S T I N G O U T P U T

ASSUMED FUTURE INFLATION = 0.0792
STANDARD ERROR = 0.0248

ESTIMATED PERCENTAGE CHANGE IN LEVEL = 43.57
STANDARD ERROR = 34.14

MLE SIGMA(0)-SQUARED(FUTURE) = 0.0273

DELTA = 0.0000

THE VALUES OF SIGMA-SQUARED(FUTURE) FOR DEVELOPMENT YEARS ARE:

1	2	3	4	5	6	7
0.0273	0.0273	0.0273	0.0273	0.0273	0.0273	0.0273

8	9	10	11	12	13	14
0.0273	0.0273	0.0273	0.0273	0.0273	0.0273	0.0273

EXPECTED PAYMENTS/OBSERVED PAYMENTS (PAYMENTS IN $1,000S) FORECAST MEAN PAYMENTS/STANDARD ERRORS

YEAR																	
1972	E:	2857	2669	1911	1356	828	639	451	575	405	285	217	165	125	95	72	0
	O:	2549	2675	1693	1918	729	364	350	576	474	233	277	155	176	106	52	0
1973	E:	3206	2996	2145	1315	1017	718	917	646	454	346	263	200	152	116	88	88
	O:	2937	3215	2641	1207	1051	827	853	428	426	303	347	164	169	103	16	16
1974	E:	3238	3026	1871	1453	1027	1315	926	652	496	378	288	219	166	127	96	223
	O:	3256	2623	2093	1283	842	1195	801	533	532	416	338	215	190	22	17	30
1975	E:	3637	2935	2299	1631	2093	1476	1040	792	603	459	350	266	202	154	117	473
	O:	3121	2770	2210	1834	1850	1552	1159	751	691	335	271	412	36	28	22	58
1976	E:	3188	3259	2333	3005	2123	1498	1142	871	663	505	384	292	222	169	129	813
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1977	E:	3962	3701	4808	3411	2411	1841	1404	1070	815	620	472	359	273	208	158	1472
	O:	3671	4109	6781	3586	2182	1122	1380	1034	1000	474	85	66	51	40	31	166
1978	E:	4863	8240	5898	4185	3202	2445	1865	1421	1083	824	628	478	364	277	210	2780
	O:	5387	9418	6875	3094	2985	2087	1556	1381	1382	148	115	89	69	54	42	308
1979	E:	10450	9759	6988	5366	4106	3136	2392	1823	1389	1058	805	613	467	355	270	4957
	O:	10364	11870	7732	5630	3231	2340	2844	1851	251	194	151	117	92	72	56	548
1980	E:	11251	10509	8143	6254	4785	3655	2788	2126	1619	1233	939	715	544	414	315	7906
	O:	11342	11513	8104	6398	5694	2479	3028	385	298	231	180	140	109	86	67	873
1981	E:	11262	11383	8820	6774	5184	3959	3021	2303	1755	1336	1018	775	590	449	342	11587
	O:	12730	11689	8237	6011	4653	4086	538	416	322	250	195	152	119	93	73	1206
1982	E:	12270	12404	9613	7384	5651	4317	3294	2512	1914	1458	1110	845	644	490	373	16957
	O:	13229	12026	10584	6691	5065	773	598	464	361	281	220	172	135	106	83	1797
1983	E:	11460	11588	8981	6898	5279	4033	3077	2346	1788	1362	1037	789	601	457	348	21116
	O:	12175	11486	8663	6851	945	728	563	436	338	263	205	160	126	98	77	2151
1984	E:	12661	12807	9926	7625	5837	4459	3403	2594	1977	1506	1147	874	665	506	385	30979
	O:	12427	14932	8193	1367	1056	817	633	492	383	299	233	183	143	112	88	3175
1985	E:	13642	13805	10702	8222	6294	4809	3670	2799	2133	1625	1238	943	718	547	416	44116
	O:	13728	13339	1961	1522	1179	915	711	554	432	337	264	207	162	127	100	4840
1986	E:	12476	12630	9792	7524	5761	4403	3361	2563	1954	1489	1134	864	658	501	382	53016
	O:	10615	2360	1852	1443	1123	875	682	532	416	325	255	200	157	123	96	6221
TOTALS PAY YRS			49094	37617	28696	21821	16547	12493	9359	6924	5033	3573	2437	1590	917	382	196482
STANDARD ERRS:			4307	3468	2797	2262	1831	1480	1189	945	739	567	419	300	194	96	15141

APPENDIX C11

TABLE OF OBSERVED AND EXPECTED BY YEAR

ACC. YEAR	EXPECTED (PAYMENTS IN $1000'S)	OBSERVED	DIFFERENCE	%ER	PMNT YEAR	EXPECTED (PAYMENTS IN $1000's)	OBSERVED	DIFFERENCE	%ER
72	12649	12327	-322	-2	72	2857	2549	-308	-10
73	14491	14670	179	1	73	5875	5612	-263	-4
74	15056	14318	-738	-4	74	8145	8165	20	0
75	17583	16954	-629	-3	75	10165	10303	138	1
76	18971	17695	-1276	-6	76	10137	9625	-512	-5
77	24044	25340	1296	5	77	12630	11728	-902	-7
78	33201	34165	964	2	78	14724	15827	1103	7
79	44020	45862	1842	4	79	31404	34496	3092	9
80	47385	48559	1174	2	80	35895	38838	2943	8
81	47382	47407	25	0	81	39285	40401	1116	2
82	47323	47595	272	0	82	45198	45523	325	0
83	38927	39174	247	0	83	49173	47928	-1245	-2
84	35394	35553	159	0	84	53227	52916	-311	0
85	27447	27068	-379	-1	85	57601	57709	108	0
86	12476	10615	-1861	-14	86	60036	55681	-4355	-7

APPENDIX C12

TABLE OF OBSERVED AND EXPECTED BY YEAR
(WEIGHTED)

ACC. YEAR	EXPECTED (PAYMENTS IN $1000'S)	OBSERVED	DIFFERENCE	%ER	PMNT YEAR	EXPECTED (PAYMENTS IN $1000's)	OBSERVED	DIFFERENCE	%ER
72	12010	11963	-47	0	72	2857	2549	-308	-10
73	14491	14670	179	1	73	5875	5612	-263	-4
74	15056	14318	-738	-4	74	8145	8165	20	0
75	17583	16954	-629	-3	75	10165	10303	138	1
76	17089	16856	-233	-1	76	10137	9625	-512	-5
77	24044	25340	1296	5	77	11990	11364	-626	-5
78	33201	34165	964	2	78	14724	15827	1103	7
79	44020	45862	1842	4	79	31404	34496	3092	9
80	47385	48559	1174	2	80	35895	38838	2943	8
81	47382	47407	25	0	81	37787	39600	1813	4
82	47323	47595	272	0	82	45198	45523	325	0
83	38927	39174	247	0	83	49173	47928	-1245	-2
84	35394	35553	159	0	84	53227	52916	-311	0
85	27447	27068	-379	-1	85	57601	57709	108	0
86	12476	10615	-1861	-14	86	59652	55643	-4009	-6

APPENDIX D1

PARAMETER ESTIMATES

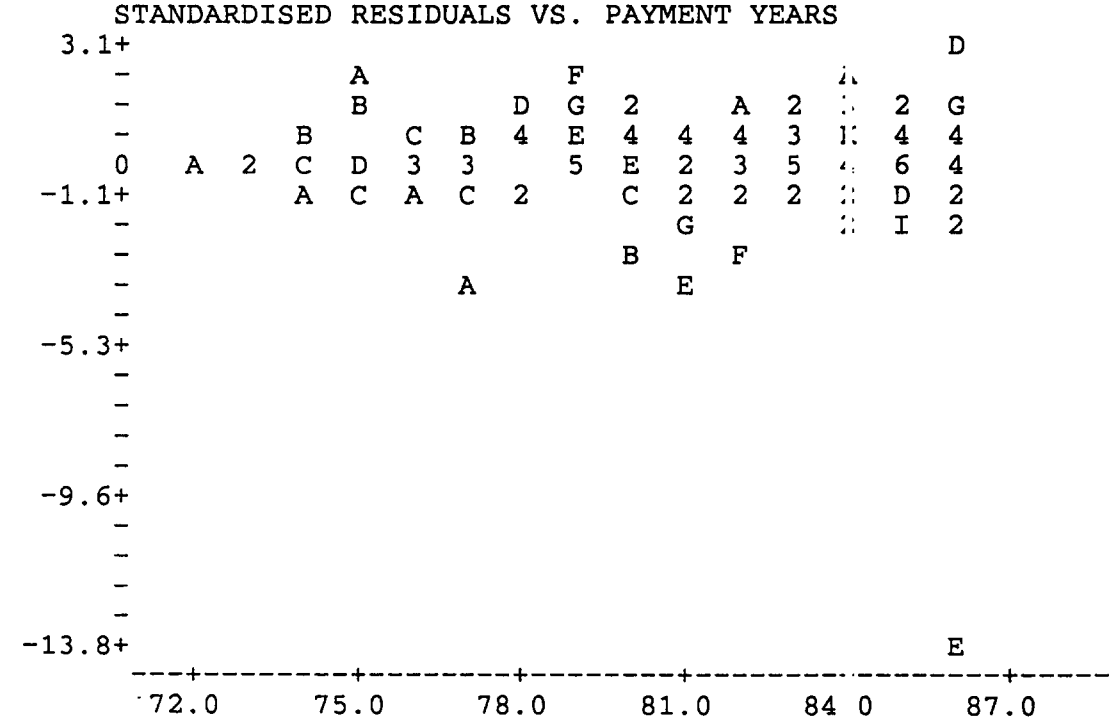
PMNT YEAR	IOTA	S.E.	T-RATIO	DIFFERENCE IN IOTA	S.E	T-RATIO
1973	0.0000	0.0000	0.00			
1974	0.0000	0.0000	0.00	0.0000	0.000	0.00
1975	0.0000	0.0000	0.00	0.0000	0.000	0.00
1976	-0.1400	0.0824	-1.70	-0.1400	0.082	-1.70
1977	0.0940	0.0886	1.06	0.2340	0.141	1.65
1978	0.0000	0.0000	0.00	-0.0940	0.088	-1.06
1979	0.6006	0.0785	7.65	0.6006	0.078	7.65
1980	0.0000	0.0000	0.00	-0.6006	0.078	-7.65
1981	0.0000	0.0000	0.00	0.0000	0.000	0.00
1982	0.0784	0.0275	2.85	0.0784	0.027	2.85
1983	0.0784	0.0275	2.85	0.0000	0.000	0.00
1984	0.0784	0.0275	2.85	0.0000	0.000	0.00
1985	0.0784	0.0275	2.85	0.0000	0.000	0.00
1986	0.0784	0.0275	2.85	0.0000	0.000	0.00

NOT ALL PARAMETERS ARE SIGNIFICANT

APPENDIX D2

RESIDUAL DISPLAYS

STANDARDISED RESIDUALS VS. PAYMENT YEARS



APPENDIX D3

F O R E C A S T I N G O U T P U T

ASSUMED FUTURE INFLATION = 0.0784
STANDARD ERROR = 0.0275

ESTIMATED PERCENTAGE CHANGE IN LEVEL = 49.50
STANDARD ERROR = 35.35

MLE SIGMA(0)-SQUARED(FUTURE) = 0.0253

DELTA = 0.0000

THE VALUES OF SIGMA-SQUARED(FUTURE) FOR DEVELOPMENT YEARS ARE:

1	2	3	4	5	6	7
0.0253	0.0253	0.0253	0.0253	0.0253	0.0253	0.0253

8	9	10	11	12	13	14
0.0253	0.0253	0.0253	0.0253	0.0253	0.0253	0.0253

APPENDIX D3

EXPECTED PAYMENTS/OBSERVED PAYMENTS (PAYMENTS IN $1,000S) FORECAST MEAN PAYMENTS/STANDARD ERRORS

YEAR																	
1972	E:	2894	2702	1932	1369	841	650	458	586	412	289	219	167	126	96	73	0
	O:	2549	2675	1693	1918	729	364	350	576	474	233	277	155	176	106	52	0
1973	E:	3203	2991	2139	1318	1021	720	923	648	456	346	263	199	151	115	87	87
	O:	2937	3215	2641	1207	1051	827	853	428	426	303	347	164	169	103	15	15
1974	E:	3235	3021	1879	1462	1032	1325	932	655	498	378	287	218	165	126	95	221
	O:	3256	2623	2093	1283	842	1195	801	533	532	416	338	215	190	22	17	31
1975	E:	3493	2837	2226	1577	2030	1429	1006	764	581	441	335	254	193	147	111	451
	O:	3121	2770	2210	1834	1850	1552	1159	751	691	335	271	412	35	27	21	58
1976	E:	3179	3256	2328	3007	2122	1495	1137	865	657	499	379	288	219	166	126	799
	O:	[illegible]															
1977	E:	4059	3789	4937	3497	2469	1881	1431	1088	827	628	477	363	275	209	159	1484
	O:	3671	4109	6781	3586	2182	1122	1380	1034	1000	474	86	67	53	41	33	184
1978	E:	4748	8075	5772	4090	3122	2378	1810	1377	1047	795	604	459	349	265	201	2674
	O:	5387	9418	6875	3094	2985	2087	1556	1381	1382	143	112	88	69	55	43	330
1979	E:	10413	9717	6948	5323	4064	3097	2357	1793	1364	1036	788	599	455	346	263	4849
	O:	10364	11870	7732	5630	3231	2340	2844	1851	246	192	151	119	94	74	59	604
1980	E:	11146	10404	8043	6163	4706	3587	2731	2078	1580	1201	913	694	527	401	304	7698
	O:	11342	11513	8104	6398	5694	2479	3028	375	293	230	181	143	113	89	71	962
1981	E:	11332	11436	8841	6775	5174	3944	3003	2285	1738	1321	1004	763	580	441	335	11469
	O:	12730	11689	8237	6011	4653	4086	531	414	325	255	201	159	126	100	79	1357
1982	E:	12431	12550	9705	7439	5682	4332	3299	2511	1910	1452	1104	839	638	485	369	16939
	O:	13229	12026	10584	6691	5065	773	604	473	372	293	232	183	145	115	91	2059
1983	E:	11946	12065	9330	7151	5462	4164	3171	2413	1836	1396	1061	807	613	466	354	21744
	O:	12175	11486	8663	6851	978	760	592	463	364	286	226	178	141	112	88	2576
1984	E:	13403	13543	10475	8031	6135	4678	3564	2713	2064	1570	1194	908	690	525	399	32469
	O:	12427	14932	8193	1459	1136	887	695	546	430	339	268	212	167	133	105	4012
1985	E:	14582	14741	11405	8746	6683	5097	3884	2957	2250	1712	1302	990	753	573	436	46788
	O:	13728	13339	2165	1693	1324	1037	814	640	505	398	314	248	196	155	123	6392
1986	E:	13333	13485	10436	8005	6118	4668	3557	2709	2062	1569	1194	908	691	526	400	56329
	O:	10615	2634	2084	1638	1287	1011	796	627	495	390	308	244	192	152	120	8251
TOTALS PAY YRS		51125	39109	29786	22619	17129	12915	9673	7158	5212	3709	2540	1663	961	400	203999	
STANDARD ERRS:		5228	4287	3513	2877	2353	1915	1548	1235	969	745	552	393	251	120	21631	

APPENDIX D4

TABLE OF OBSERVED AND EXPECTED BY YEAR

ACC. YEAR	EXPECTED (PAYMENTS IN $1000'S)	OBSERVED	DIFFERENCE	%ER	PMNT YEAR	EXPECTED (PAYMENTS IN $1000's)	OBSERVED	DIFFERENCE	%ER
72	12813	12327	-486	-3	72	2894	2549	-345	-11
73	14493	14670	177	1	73	5905	5612	-293	-4
74	15086	14318	-768	-5	74	8158	8165	7	0
75	16974	16954	-20	0	75	10022	10303	281	2
76	18924	17695	-1229	-6	76	10054	9625	-429	-4
77	24605	25340	735	2	77	12675	11728	-947	-7
78	32419	34165	1746	5	78	14651	15827	1176	8
79	43712	45862	2150	4	79	31295	34496	3201	10
80	46778	48559	1781	3	80	35674	38838	3164	8
81	47501	47407	-94	0	81	39142	40401	1259	3
82	47807	47595	-212	0	82	45200	45523	323	0
83	40491	39174	-1317	-3	83	49626	47928	-1698	-3
84	37421	35553	-1868	-4	84	54360	52916	-1444	-2
85	29323	27068	-2255	-7	85	59514	57709	-1805	-3
86	13333	10615	-2718	-20	86	62512	55681	-6831	-10

TABLE OF OBSERVED AND EXPECTED BY YEAR
(WEIGHTED)

ACC. YEAR	EXPECTED (PAYMENTS IN $1000'S)	OBSERVED	DIFFERENCE	%ER	PMNT YEAR	EXPECTED (PAYMENTS IN $1000's)	OBSERVED	DIFFERENCE	%ER
72	12091	11911	-180	-1	72	2894	2549	-345	-11
73	14378	14567	189	1	73	5905	5612	-293	-4
74	14921	14128	-793	-5	74	8158	8165	7	0
75	16719	16542	-177	-1	75	10022	10303	281	2
76	17050	16856	-194	-1	76	10054	9625	-429	-4
77	23976	24866	890	3	77	12025	11364	-661	-5
78	31372	32783	1411	4	78	14651	15827	1176	8
79	41919	44010	2091	4	79	31295	34496	3201	10
80	44048	45530	1482	3	80	35674	38838	3164	8
81	43558	43321	-237	0	81	37647	39600	1953	5
82	42126	42530	404	0	82	45200	45523	323	0
83	33340	32324	-1016	-3	83	49626	47928	-1698	-3
84	26945	27360	415	1	84	54360	52916	-1444	-2
85	14582	13728	-854	-5	85	59514	57709	-1805	-3
86	0	0	0	0	86	0	0	0	0

1989 CASUALTY LOSS RESERVE SEMINAR

5D/6A: COMMON PITFALLS IN RESERVE ANALYSIS

Panel

Larry A. Haefner
American States Insurance Companies

Darlene P. Tom
Fireman's Fund Insurance Companies

MS. TOM: I would like to welcome you to the session "Common Pitfalls in Reserve Analysis."

Most of you are or have been involved in evaluating loss reserves for your company or for another company. Drawing from your personal experiences, you can compile your own mental list of problems you have encountered in your reserving stuides

If we were to compare our various lists, I am sure the problems we each have run across are fairly common. The purpose of this session is to provide a survey of the problems and pitfalls that one may encounter in conducting reserve studies.

We have two panelists this morning. The first is Larry Hafner. He is an actuary at American States. He has been with the industry for eight years and he currently is responsible for setting the loss reserves for his company.

I am Darlene Tom. I am a Vice President at Fireman's Fund Insurance Companies. My responsibilities include the corporate actuarial functions of my department, a major responsibility of which is setting loss reserves.

(Slide)

Our agenda this morning will begin with Larry who will cover several intuitively appealing fallacies: the use of closed claim data in setting open reserves, the use of calendar year data in estimating allocated loss expense and, finally, the use of limited years of experience in developing loss development factors.

I will then follow with a discussion on how we can avoid reserving pitfalls. First, we will cover an implicit assumption that is often assumed in reserve analyses, then we will discuss the sources of common pitfalls, and we will close with how we can avoid or minimize their impact on reserving studies. Finally we will go through upon a case study, and our three players are Ms. Very Optimistic, Mr. Impending Doom, and our saviour of the day is Mr. More Thorough.

With that I will turn it to Larry.

MR. HAEFNER: Thank you, Darlene. As Darlene mentioned, I will be talking today about five intuitively appealing fallacies -- ideas that seem valid, but aren't. There are three that are associated with using closed claims, and one involving the use of calendar year ratios of paid ALAE, to calendar year paid losses to estimate ALAE reserves. Finally I will look at some of the problems that can be encountered if you try to limit how much data you have.

Our first fallacy is that the population of claims still outstanding is similar to the population of recently closed claims. In other words, one can use average paid claim costs on closed claims to estimate the needed average reserve on the remaining open claims.

As I am discussing these fallacies, each of the exhibits that I will present will be included in your handout, so you may want to follow along with that.

(Slide)

Now, Exhibit 1 is a ten-year payout history of workers' comp claims for accident year 1975. These are all claims that occurred in 1975, regardless of when they were reported.

Let's just ignore the last three columns for a moment. The first six columns show payments during given calendar years following the accident year.

Row one, for example, indicates the amount of paid losses made in calendar year 1975 on claims that occurred in 1975. If we looked at the first column we would see that in 1975 we paid $5,504,000.

Row two indicates losses paid in calendar year 1976 for accident year 1975 claims, and so on through calendar year 1984.

Now, column two is looking at closed claims -- how many claims that were closed in the given calendar year that occurred in accident year 1975. Columns four through six are really analogous to columns one through three, although they are looking at the cumulative history from the beginning of the accident year.

So if we looked at row two, column 4 we see that since the inception of the accident year we have paid out $18,378,000 in paid losses.

Columns three and six show the average paid loss per closed claim. Column three is column one divided by column two.

Now, as reserve actuaries what we are generally looking at is a particular point in time -- say we are analyzing reserves in January of 1977. The first two rows of Exhibit 1 is what we would have to look at in that situation.

Now, we notice that so far we have settled almost thirty-five thousand claims since the beginning of the accident period. Suppose we have separately estimated this number represents approximately ninety-two percent of the claims that occurred in 1975. That means there are approximately twenty-nine hundred claims that occurred in 1975, but have not been settled.

Column 6 tells us that for the claims we have settled, which represent about ninety-two percent of the total, we settled them on average for $525.

We could make a simple estimate of our reserves by taking the product of the average paid loss per closed claim and the estimate of the number of claims not yet closed. So far, average paid per closed claim has been $525 and we estimate approximately 2,900 claims yet to be settled. So, simply, the reserve would be $525 times twenty-nine hundred.

Perhaps we have attended some of these other sessions at the Reserve seminar this week and have become more sophisticated than that. We have examined column 3 and noticed the difference in average paid loss for those claims settled in the first calendar year of the accident period, those settled in the second calendar year. In the first calendar year, the average paid was $332 then the next year we settled them for more than double that, almost $700. Does everyone see that?

We want to provide a conservative estimate of needed reserves, so we might think average paid will more than double again. Why couldn't we use $1,500 as the average open reserve? Then our reserve would be $1,500 times the twenty-nine hundred open claims.

Let's look to see how that would have worked. We are now going to examine columns seven through nine which use a hindsight reserving methodology. For those of you who did not attend the Intermediate Session #1 yesterday, what this method indicates is what reserves should have been at a given point in time if we had known then what we know today.

We notice we have data for ten calendar years, so we have data through the end of 1984. Column seven gives us the outstanding reserves at the end of each calendar year. We see that we have approximately $1,400,000, in reserves. Does everybody see that?

We also have one hundred and forty-six claims that are still outstanding. Rows three through ten also show the actual loss payments made in calendar years 1977 through 1984. Knowing this, what should the reserve have been at the end of 1976?

Looking at row two we see that we should have established a reserve of $17,844,000. That is simply the $1,382,000 outstanding at the end of 1984 plus the difference between the payments at the end of ten years and the payments at the end of two years.

We see that we should have 2,914 open claims at the end of 1976, which gives us an average reserve of $6,124,000. (That's $17,544,000 divided by 2,914) That is significantly higher than the $525 that we had paid on average through the end of 1976 and much higher than even our conservative estimate of $1,500 for the average open reserve.

What is going on here? We have paid out ninety-two percent of the open claims by the end of 1976, but for that ninety-two percent of the total claims we have paid $18,378,000 and we still have over $18,000,000 more to pay thus eight percent of the open claims will account for almost fifty percent of the incurred losses.

What we are seeing here is that the generally less severe claims tend to get settled more quickly. Thus the population of closed claims does not really tell us much about the population of open claims.

A related pitfall is that we make the assumption that since most claims settle for less than their case reserve, then the remaining reserves must also be redundant.

The IRS has used this for a number of years. They have revised their method, but it still is based somewhat on this assumption.

Let me give you a simple example that is not in the handout to show you how poorly this assumption can work at times. Suppose we have a block of a thousand claims that settled for a million dollars. That is, the total paid losses associated with those claims is a million dollars.

We note that at the time these claims were settled the case reserves were $1,200,000. this means that when we settled the claims we actually had positive equity of $200,000. That is just the difference between the reserves of $1,200,000 and the paid losses of $1,000,000. The $200,000 in equity is 17% of the reserves at the time the claims were closed.

Can we then correctly assume that the remaining case reserves must also be seventeen percent redundant? That would not be a very good assumption.

To give a little more information, suppose I had told you that the initial reserves for these claims that were settled for a million dollars had initial reserves of $800,000. Then, using initial reserves, we see that the initial reserves they were $200,000 less than the ultimate cost. It would be equally bad to then assume that the remaining case reserves must also be twenty-five percent redundant.

Let's look at this idea in another example to understand what is happening. This example is located on Exhibit 1.4.

(Exhibit)

We are looking at three blocks of claims. We have a hundred and fifty claims in total. A hundred and thirty-five of that total each had an initial case reserve of $1,000. On twelve of the remaining fifteen, each had case reserves of $10,000 and the remaining three each had case reserves of $100,000. Does everybody see that?

We had total case reserves at the end of the accident year of 555,000. Let's look at what happened when we settled those claims.

Of the hundred and thirty-five that were initially reserved for $1,000 each, we ended up paying out $95,000 in losses. For the twelve claims that were initially reserved for $10,000 we ended up settling those for $160,000. The three claims that were each initially reserved for $100,000 cost ended $400,000 at time of settlement.

If we look at the total paid losses on those hundred and fifty claims we see that we paid out $655,000 in losses, which is $100,000 more than the initial reserves. The $655,000 is just the sum of $400,000, $160,000 and $95,000. Again, that gives us $655,000 in paid losses, which exceeds the initial reserves of $555,000 by $100,000.

In addition, we also had another twenty-five IBNR claims that also resulted in paid losses of $100,000.

What is going on here? We see that most of the claims that we settled -- actually, a hundred and forty-five of the original hundred and fifty claims -- settled for either the initial reserves or for less. Only five of the hundred and fifty claims actually settled for more than the initial reserves.

However, the amount by which their ultimate cost exceeded their initial reserves more than offset the savings we realized from those claims that settled for less than their initial reserves.

This situation is one that frequently occurs. There is a small number of claims whose adverse deterioration is so great that they drive the bottom line results.

As a result, even though most claims settle for less than or equal to their initial case reserves, that does not mean that your remaining reserves will be redundant. Remember that the less difficult claims tend to be settled more quickly. These are the claims that settle for less than or equal to their initial reserves.

Well, about this time you might be thinking that, since I can't really trust closed claims, perhaps I should have a claims auditor do a thorough examination of the case reserves. He can tell me whether or not those are sufficiently reserved.

I think that is a good idea. However, you have to limit what you can conclude from his review. A claims auditor can tell you a lot of things about how well your company handles case reserving compared to the industry. He can tell you whether or not your company reviews claims in a timely manner; whether or not when claims are reviewed the reserves are adjusted to reflect the additional knowledge you now have; he can tell how aggressively you are settling claims; and he can indicate how well you are recording claims that are reported to you.

If the auditor gives his final report and indicates that case reserves are short, then there is probably a lot of believability in that. It means you are not handling case reserves quite as well as the industry.

However, if he tells you that they are adequate, what can you conclude from that?

Well, you probably can conclude that if you settled all the claims tomorrow that, yes, your case reserves probably would be sufficient to pay those claims.

However, that is the problem. They won't all be settled tomorrow. There are a lot of forces that act on open claims. There is economic inflation. There is social inflation. There is increasing claim litigation. All of these will tend to adversely impact case reserves.

It is very hard for any auditor, no matter how good he is, to really come in and try to predict what will happen in the future. That is what actuaries do.

Let's briefly review the first three fallacies. That is, what can closed claims and what can an independent claims auditor tell you about your open claims?

Well, they can tell you some things, but you still have to do your own evaluations and you still have to use additional actuarial and statistical techniques to get additional insight into reserve adequacy.

Let's look at a fallacy in estimating that deals with allocated loss adjustment expense, or ALAE reserves. Certainly these are very topical these days.

A method that a lot of companies have used in the past to set ALAE reserves involves the use of the calendar year ratio of paid ALAE to paid losses. They use this ratio to estimate their total required ALAE reserves.

For those of you who don't know, ALAE is simply the allocated loss adjustment expense; that is the claims expense you incur in settling claims that can be directly attributed to a particular claim. Legal fees is perhaps the best example.

Let's look at the "Boring Insurance Company," to illustrate this method. This is Exhibit 1.6. Boring Insurance Company has really been blessed by the gods. They have no inflation, no change in mix of business, no change in settlement patterns, no change in reporting patterns. In a sense, almost anyone could do their reserve analysis.

We see that in the first twelve months of the accident period they always pay out $1,000,000 in losses. In the thirteen through twenty-four month interval they pay out $2,000,000. They pay out $500,000 in the twenty-five through thirty-six period, and they always pay out $300,000 in the thirty-seven to forty-eight month period.

Another nice thing about the Boring Insurance Company is that all losses are final after four years.

Their paid ALAE is very similar. They always pay out $15,000 the first twelve months, $70,000 in the thirteen to twenty-four month period, $35,000 in the twenty-five to thirty-six, and $30,000 in the thirty-seven to forty-eight month period.

What would the calendar year ratio of paid ALAE to paid losses be? We know that they pay out $3,800,000 in losses each calendar year; this is simply adding up the diagonal -- $1,000,000, $2,000,000, $500,000 and then $300,000.

Similarly, they pay out $150,000 in ALAE each calendar year. That is simply $15,000 plus $70,000 plus $35,000 plus $30,000. Does everybody see that?

What is the ratio? We simply divide the $150,000 by the $3,800,000 and that is approximately four percent. The assumption of this method is that this ratio can be used to estimate ALAE reserves by taking four percent of loss reserves. That its, multiply 0.4 by outstanding loss reserves to get ALAE reserves. Many companies use this technique to set ALAE reserves.

It is easy to calculate the Boring Company's needed loss reserves, simply by adding up the projected payments in future years, these are the payments below the stairstep in the Exhibit 1.4. If we sum each of these six numbers we come up with an outstanding case reserve of $3,900,000. Our ALAE reserve under this method would simply be actually the 3.9 percent times the $3,900,000 in case reserves, which gives us an ALAE reserve of $154,000.

Let's see how that would have worked by looking at Exhibit 1.8, then.

(Exhibit)

Now, we can also project ALAE payments because they are so consistent. We notice that in the future, for accident year 1988 and 1989, we will pay out $70,000. We will pay out $35,000 in 1990 and $30,000 in 1991.

Similarly, for 1987 we have an additional $65,000 that will be paid out in the future and $30,000 yet to pay for accident year 1986. If we sum these numbers, and again we are just summing below the diagonal, we see the required ALAE reserve is $230,000. That compares to the $154,000 we estimated using the calendar year paid ALAE to paid losses ratio. If we used this method, we would have a deficiency of $76,000, which is nearly fifty percent of the required reserve.

What is wrong with this method that this shortage occurs? Many people say this method doesn't work because of inflation and other changes, but here is a company that has no inflation; yet the method still results in a deficiency of almost fifty percent.

Let's look at the ratios by accident year. We are just looking at the ratios across the bottom of the paid ALAE column. If we take the ratios by development or settlement interval, of ALAE to paid losses, we see that in the first year paid ALAE is about 1.5 percent of paid losses. Notice how this ratio increases during each subsequent settlement period. By the time we are at the thirty-seven to forty-eight month interval, paid ALAE is ten percent of paid losses.

The reserves need to reflect a greater portion of this ten percent ratio than any of the others and that there will be no representation of the 1.5 percent. That is the problem with the calendar year paid-to-paid method. It doesn't reflect that.

Obviously, this example is contrived. However, it does illustrate the way paid ALAE works. The larger, more difficult claims tend to take longer to settle. Associated with these claims, there is a greater percentage of paid ALAE. Any method used to project ALAE reserves must reflect this fact. Using a calendar year paid ALAE to paid losses ratio does not.

Let's move on to the last fallacy I will be talking about today. This fallacy states that it is safe to assume that there is no further development beyond your last data point. This would mean that if you had four years of data you can assume that all losses are final after four years. That is kind of the situation that Boring Insurance Company has. I don't think anybody here has ever looked at reserves that looked quite like that.

If you have seven years you might assume that after seven years there is no additional development. This is still a poor assumption. Some kind of factor is needed that will provide some estimate of the settlement tail.

You can do some simple things. You can use perhaps the last factor that you have in your accident year development table or you can use some methods that have been discussed at other sessions at this year's loss reserve seminar.

Here is an example that Rick Sherman, of Berquist and Sherman fame, developed several years ago. He used an inverse power function to fit loss development factors.

Let's look at Exhibit 1.9.

Now, this is extreme data for most of us. This is compiled from the Reinsurance Association of America, so we are looking at excess business -- but look at some of these factors. These factors are really an actuary's nightmare.

If we look at automobile liability we see that even after ten years we are still seeing additional adverse development. Note that these factors are incurred loss development factors. They are not paid loss development factors.

For something like general liability we see we have continued adverse development beyond twenty years. For workers' comp even at twenty-five years we are still incurring significant adverse development.

What would happen if you tried to limit data at ten years or fifteen years? You will miss a lot of additional adverse development and your reserves will be significantly short as a result.

What Rick did was to use an inverse power function to -- he fit a curve to the particular factors. What this method ends up doing is developing tail factors that provide some estimate of future adverse development beyond the last data point.

Now, this is one of several methods that you can use but it is an excellent one. Again, this is reinsurance data so it is somewhat worse -- the developments are worse than what a lot of us would see. However, the point still remains that, assuming that there is no additional development beyond this last data point, it is usually a mistake.

Let's review some of the key points that I tried to discuss today. Small, easy claims tend to settle quickly. Larger claims take longer to settle. Generally, closed claim populations contain a larger number of these small, easy-to-settle claims than does the open claims population.

Most claims settle for less than the case reserve. However, there is a small number -- and the example we looked at was about three percent -- for which the adverse development is significant enough to drive the bottom line results. These claims offset the favorable development obtained from the smaller, more easily settled claims.

Let me emphasize the point again, the book of closed claims has a much larger percentage of those faster settling, less difficult claims than does the open claims population.

With that, I will turn the microphone back over to Darlene.

MS. TOM: Most of you are involved in examining loss reserves in some form or another. Some of you have developed reserve indications. Others of you have estimated ultimate losses for use in pricing. A few of you may have been involved in evaluating the reserve position for a peer group of companies to make recommendations on whether or not one should buy or sell their stocks.

Generally, when conducting a reserve analysis we rely upon traditional techniques which are based off of historical loss experience. You would develop a set of loss development factors which represent your expectations as to how losses should develop in the future.

Basically, your starting premise is that history is your proxy for the future and will repeat itself. Consequently, the integrity of the reserve indications depends upon the consistency of the operating practices underlying your experience.

(Exhibit II.1)

These operating practices would include, first of all, underwriting -- that the way in which risks are underwritten and the coverages and level of protection that are afforded on the policy contracts are stable over time. Your starting assumption is you have a stable book of business throughout your entire experience period.

Another important operating practice about which you are making an assumption is the claims adjusting process -- that your claims adjusting is consistent over time and case reserve adequacy is stable.

Case reserve adequacy is the difference between a claims adjustor's estimate and the ultimate settlement value of the claim. It is not so much important that the case adjustor's estimate is above or below the ultimate settlement value. What is important is the relative change in this gap over time.

If case adjustors are consistently understating the value of the claim by fifty percent, that will show up in your loss development factors. You will consistently develop a loss development factor of two. But if the adjusters start doing a poor job in evaluating the claims and case reserve adequacy deteriorates, that will not be reflected in your historical development patterns. Consequently the loss development factors that you come up with may actually understate future emergence patterns.

A third important area is the way in which information is processed and reported in your company. Loss reserving methods assume that you have a stable information environment, that any change in your development pattern is because of a change in the underlying experience and not because of a change in the way in which you are reporting and capturing your information.

Performance measurements are also very important because they drive day-to-day operating practice. If your company is measuring performance in one year based on profit but on profit and expenses the next year, there can be subtle changes in operating practices that may ultimately change the quality of your book as well as the case reserving practices.

Finally, there are external changes, an example of which would be changes in contract interpretation. In recent years we have seen several court rulings that have changed contracts interpretion, the definition of liability, and the determination of damages. Of course, your loss development factors are not going to reflect the these changes.

(Exhibit II.2)

So, unless you make an explicit adjustment in your reserving methods, by default you are assuming that things have not changed, that history will repeat itself and rarely is this the case. Pitfalls, inaccuracies and biases often enter into the reserve analyses when there has been an operational or an environmental change, and the assumption of stability no longer applies.

Problems commonly arise when subtle changes occur and these changes are missed by the reserving specialist. You may have a gradual erosion in case reserve adequacy. Perhaps, the way in which the claims adjustors are reserving and settling their cases is becoming weaker and weaker over time.

Another problem is when the reserving specialist knows about a change but has not explicitly tried to quantify its impact. This often happens when there is blind adherence to a single reserving methodology regardless of changes in the operating environment.

(Exhibit II.3)

Now I would like to talk about sources of change that have often misled the reserving specialist.

One of the most common sources of change is in the exposure base or in the book of business. Very often a reorientation in marketing programs or reunderwriting efforts can cause a shift toward an entirely different book of business, with different loss development characteristics. A company may reorient or refine their list of target markets. They may focus on certain markets during the soft part of the cycle and different markets at the hard part of the cycle, so you can have a lot of turnover in the classes of business.

You can also have a shift geographically. Because of differences in litigiousness or differences in benefit levels, some states can have dramatically different tail development and loss development patterns compared to other states. It is very important that you look at your mix shift by state, and isolate the larger volume states and look at their patterns separately.

New versus renewal business can have a significant impact on your loss development. Many companies have found this out the hard way. New business tends to have a higher loss ratio than your more seasoned book of business and this can cause a serious problem if you are using expected loss ratios to set your indicated reserve levels.

You can also have shifts in coverage. For example, your company could be writing higher policy limits which may result in increasing and lengthening your loss development patterns because you now have a higher threshold under which losses can develop.

Your company may be shifting the mix of primary versus excess business. For excess business, changes in attachment points and layer of coverage can significantly extend the reporting lag of claims and the subsequent development: the higher the attachment point, the longer it will take for a claim to be reported; also the larger the layer of protection, the longer the development period under which claims will develop through that layer of protection.

Many times companies will combine their primary versus their excess business for reserving purposes and at different parts of the cycle they may actually enter or withdraw in the excess market, causing a mix shift in their business. Consequently the loss development patterns at any point may not be indicative of what the future loss development patterns will be on their book of business.

What they should be doing is first segmenting out their primary versus their excess business to get a sense for how their exposures are shifting. Then one needs to select the best reserving method to apply to each piece. They may want to apply traditional methods to set the primary reserves and use a modeling technique or perhaps the Bornhuetter-Ferguson method to set the reserves for the excess portion.

Reinsurance can also cause a lot of disruption in loss development patterns. Reinsurance influences net retention levels, and consequently can have a major distortion on your net loss development factors. Typically reinsurance protection varies at different parts of the underwriting cycle. During the soft part of the cycle, when reinsurance is readily available, attachment points are lower and consequently, a lot of companies will feed a lot of business to their reinsurers. That, in essence, acts as a cap on your net loss development factors. Whereas in the hard part of the cycle the attachment points for reinsurance coverage increases resulting in companies retaining more of their primary book. That will extend the loss development patterns on a net basis.

Lastly there are reinsurance commutations where the reinsurance agreement is terminated and the primary company has assumed back the ceded liabilities. This can extend the development patterns for the primary carrier.

(Exhibit II.4)

Another area where you can have significant change is changes in your claims handling practices which will result in changes in case reserve adequacy.

Management turnover in the claims department can wreak havoc on your loss development patterns. New management may impose a different reserving philosophy than the prior management. They may instill a "let's get tough on claims" attitude and that may cause claims to stay open longer. Or they may want to improve on case reserve adequacy and make sure that the case reserves are up to snuff." That, in turn, may cause an acceleration in your incurred loss development factors.

You need to be aware of changes in claims management, whether it is at the very top executive level or at the field office levels. What is the new philosophy and what the new management practices are going to be?

Many times it is very difficult to assess how a management change is going to impact your loss development patterns. What you can do is develop a series of statistical indicators, which we will talk about in a couple of minutes.

You also need to consider the balance between staffing versus work load in the claims department. The work load of a claims adjustor can have a significant impact on the quality of his or her case estimates. A claims adjustor with a very heavy workload will not have much time to review each case. Consequently you might have a weakening of the case reserve adequacy if the work load is very high. Conversely, if the claim adjuter has a very light work load, case reserve estimates may actually improve.

This trade-off between staffing levels and work load does cycle with the underwriting cycle. In periods where the prices are softening, companies may choose to withdraw from the market rather than compete, and consequently their volume goes down. With less volume the claims adjustors actually have more time to settle each case. But as the company starts seeing a higher expense ratio and begins trimming back on staff, the claims department is often caught up in the staff cuts and their staffing levels are reduced. Then when the market turns, companies start writing more volume which in turn drives the claim counts back up. Oftentimes claims departments are not able to respond as quickly to the rebound in volume and so you have a temporary understaffing situation where there might be some case reserve weakening.

You can also have revised work load procedures in the claims function. For example, in some companies there may be requirements on providing good service to claimants. A change in those requirements could change your development patterns In some cases, it could accelerate the payments. A company may impose a requirement that the initial payment on a claim be made, say, within ten days upon notification. That will tend to accelerate your payment but it may not have any impact on your incurred developments.

You can also have changes in field authority levels. In my company back in the early 1980s we increased field authority levels fourfold. This had a dramatic impact on the case run-off. Prior to the 1980s we had very stable development. The loss development factors were close to unity in many lines. But once we expanded the field authority levels, we saw a ramping up, almost a stairstep effect, on the loss development factors.

Changes in the use of average values can affect development patterns. For example, your company may have a procedure in place where for certain types of claims a standard amount is used for the case estimate. The implementation of a new system or a broadening of the use of average values could accelerate the reporting of claims. Also, the use of average values could be different than if the claims adjustors were estimating the individual values on each case.

Lastly, you can have special claims handling practices. These can be particularly problematic for a number of reasons. One is that these cases are typically the very old claims and so they affect your tail development. Secondly, special handling practices can result in very large reserving changes causing a lot of blips and distortions in your development patterns. Some examples are the use of structured settlements. On very severe auto liability or liability cases the company with the agreement of the claimant may decide to purchase an annuity instead of continuing litigation and settling the claim

at a later date. A change in the use of structured settlements can significantly impact your paid development factors.

Special file reviews -- there is a lot of pressure on the claims department in many companies to get the case estimates up to snuff, so a special file review will be conducted targeting certain types of cases which the Claims Department may feel are not being handled or reserved properly. I am not talking about the usual reviews that accompany an ongoing field audit. I am talking about the one-shot type of review where they may either pull all back injury cases or all cases that have been stagnating for the last couple of years and they will go through and review the case reserve adequacy on each one of these cases. Very often they will result in very significant changes in reserve amounts or a very significant number of these claims will be closed. The problem that it poses for the reserving specialist is that often it is difficult to determine what portion of the activity would have been expected as the normal course of events versus what portion is truly unusual. So you have to make this decision -- is it truly exceptional activity or is it part of the normal development pattern?

Lastly, one area that has caused a lot of problems for the industry is environmental claims. These tend to be claims associated with asbestosis, toxic waste, hazardous waste clean-up and toxic substances. These claims generally have very long and latent emerging liabilities. The date of loss is very often difficult to establish because the injury or the damage arises out of an accumulated exposure to some toxic substances. Also, there are lots of legal issues that are related to environmental claims, either in terms of who is liable and/or what are the damages.

The problem with environmental claims is they tend to be on very old accident years. If your claims department is changing the way in which they are handling environmental claims or if you see a rush of this activity being reported to your company, it can significantly impact your tail development factors. So you really need to understand what types of environmental claims your company has, how they are being handled, and whether or not you need to include a special consideration or special method to supplement your usual development reserving methodology.

(Exhibit II.5)

There is a whole host of other types of changes besides underwriting and changes in the claims department. These would include changes in your information flow, whether or not you are implementing a new EDP system. When you implement a new EDP system there usually is an initial learning curve. Consequently, you may experience a backlog in processing as people get used to the new system. Then once the new system is up you may actually see a speedup in the reporting of your activity.

There is a whole host of external factors that also need to be considered. Involuntary pools and associations often vary with the cycle and their impact can be significant for a particular company.

There are also various legal factors that can impact your development factors -- the litigious of certain states, various court rulings as well as legislative changes.

The problems with court rulings and legislative changes are that they vary by state, are often inconsistent, and it often takes a number of similar actions before a precedent is established. Meanwhile, you have got a lot of uncertainty in the loss development factors.

You can also have changes in performance measures and, as I mentioned before, that can motivate behavior in different ways. There may be no change in your stated company's objectives, but if there is a change in the standards by which people are being measured, there is going to be change in the way in which people approach their jobs.

The important point is you have to know the operational changes that have transpired. It is not sufficient to simply know the operating practices of today and how they are going to change tomorrow. You have to understand what was the operating environment like for the entire experience period of your loss development triangle.

(Exhibit II.6)

Simply knowing what changes have occurred is not sufficient. You have to understand what the implications are on the data and on the various reserving methodologies.

One problem that can arise is that your data is not as homogeneous as you may think. A segmentation scheme that worked a couple of years ago may have been fine, but because of book shifts, that segmentation scheme no longer yields homogeneous groups of data. What you really need to do is group claims according to similar loss development characteristics. You can do that by looking at different variables that affect your exposure: state, subline, excess versus primary coverages, or you can look at characteristics that are tied to claims -- settlement patterns, size of loss.

Another problem that commonly arises is the treatment of data exclusions, throwing out data because you think it is no longer relevant.

There are really two types of exclusions. One is dealing with large losses. Very often people will temper the impact of large losses or exclude large losses because they are perceived to be unusual events. Large losses do occur, although infrequently. Instead of excluding the data, segment your data. Develop a reserve indication on the other than large losses and then include a provision for large loss development You can either average large losses over a longer period of time or develop an explicit model that to predict the large loss impact.

The other type of exclusion that is fairly common results from, "We don't write that business anymore, so you should exclude it from your loss development triangles." You should try to verify that with objective information, either sampling policies or through underwriting audits.

Another type of problem that arises is when the reserving specialist knows about a change but has not transformed the data. This can happen when there is a lot of change in your claims department but you have not reoriented your data to try and isolate its impact. Often, by simply looking at report year run-offs you can see whether or not a change in claims handling practices has impacted your accident year loss development factors. Or, if you have had a significant change in your policy contracts, you can look at loss development on a policy year basis.

Lastly, a problem that is more common than people realize is dealing with inaccurate data. You should always try to reconcile your data with other sources. This is a problem in my company. The pricing actuaries will develop their own expectation of loss development factors. The reserving actuaries will develop their indications for the reserve analysis and there is a difference. Weeks will transpire trying to reconcile the difference, when in fact the difference is because the two data sources do not

reconcile. So it is very important that you try and compare your data either with other data sources within the company or with other information that is publicly filed.

(Exhibit II.7)

We have talked a lot about change. Now let's discuss what we can do to handle change and the impact of change.

First, you have got to be in touch with your operating areas. You have to know what is going on with the underwriting and claims departments. Know what their operating practices have been in the past and know how they are going to change in the future. And how do these practices affect the book of business and the evaluation of associated liabilities.

You should also develop a series of statistical indicators that help you monitor case reserve adequacy over time. Also, try and map the trends in the statistical indicators with the operational changes that have transpired.

Some examples of these indicators are closing ratios. Closing ratios help you determine whether or not there has been a speedup or a slow-down in your payment patterns, the assumption being that most of the claim is paid when it is closed. So if there is a slow-down in your closing ratios by accident year and by age of development, this may suggest a slow-down in your payment patterns and consequently your paid development factors based on history may understate future payments to be made.

Another type of statistical indicator is the paid-to-incurred ratio by accident year and by age of development. This helps you get a sense for whether or not there has been any change in case reserve adequacy. If you have consistent case reserve adequacy over time, these ratios would be stable. If the ratio is trending up what that means is a larger proportion of your case amounts are being paid at any point in time which may be due to weaker overall case reserves.

You can also look at the report year run-off. In addition, you can compare the change in paid severities with the change in incurred severities. This allows you to determine whether or not the changes in case reserves are keeping up with the changes in payments.

You should also examine different methods and adjust for change. No single method is going to provide the best answers, or the best estimate in all situations. Also, each method has its own implicit assumptions, which may not hold up under your given situation.

You should perform reasonableness checks. You can do a retrospective test. If you have enough data you can test whether or not each method would have predicted the actual activity that you saw. Then, if there is a consistent bias in your estimates, you can adjust for that bias in the method.

You can also do sensitivity analyses on the key assumptions underlying your reserve analysis. If I, say, average these factors over ten years instead of five years, what is the impact on my reserve selection?

You should also compare the loss ratio that is implicit in your reserve analysis with the expected loss ratio based on pricing and pure premium trend levels. Are they consistent and, if they are not consistent, why? Is there an assumption that you are making which is

inconsistent with the way in which you are measuring the pricing and pure premium trend levels?

You should also compare your loss ratios with industry loss ratios. You do have to be careful with industry loss ratios, because you don't know how well other companies are reporting their results, but it is a good checkpoint to see whether or not your reserve indications make sense.

Finally, you should project out your ultimate claims and look at what is implied in terms of frequency and severity trends. Do those make sense or are you implicitly assuming that severity is going to decrease at ten percent a year?

So, in summary, you need to understand what is going on within your company. You should listen to the other departments but be objective. Oftentimes people will overstate the benefits to be derived from corrective management action, and also they know what the consequences are of your reserve indications.

So you should listen, be objective. They may raise a point of view or provide some insights that you would not have otherwise known.

You should also try to explicitly account for change and not rely upon intuitive judgment. Very often, unless you go through the discipline of actually trying to either model a change or account for a change explicitly in your methodology, there is a tendency to overstate what the perceived benefit is.

Lastly, after you have reviewed all of the facts and there are no more facts to be gathered, you should form your position and stand your ground. Very often the pitfall is not so much that your reserve analysis is faulty, but that you have internally compromised on your assumptions. So it is very important that you stick to your guns.

Now I would like to go through our case study. Our case study is really the tale of two reserving specialists, Mr. Impending Doom and Ms. Very Optimistic. It takes place at year end 1988. We are a company with $20,000,000 in surplus, about $100,000,000 in loss reserves, and the CEO wants an estimate on what the reserve position is before he closes the books.

So he has asked these two reserving specialists to come up with a reserve indication for the company. Each of them go off and develop their own indications.

(Exhibit III.1)

Let's take a look at Ms. Very Optimistic. She uses the paid development method. You see here that she has accumulated five years of payment history. That is shown in the top part of the chart. She determines the age-to-age factors. That is the middle part of the chart. She then computes the straight average of her age-to-age factors as well as the weighted average. She has also included a tail provision. She sees that even though she has got five years of history there are some claims that are still open, meaning that they haven't been fully paid.

So as her tail provision she takes the accumulated paid amounts and divides it into the accumulated case incurred amounts, believing that the case estimates are probably accurate. After all, the claims have been open for five years' time. How much more information is there to be known?

So she comes up with a tail provision of 1.139. She selects the straight average for developing her indications. She determines what the cumulative age-to-ultimate factors are and then she develops her reserve indication.

(Exhibit III.2)

She takes her cumulative paid losses, applies her paid loss development factors to get ultimate losses, subtracts out the paid-to-date and comes out with a reserve indication for each year.

She sums the indicated reserves by year to come up with the total indicated reserve of $63,000,000.

My goodness! The company has a reserve redundancy of $37,000,000. The company has a lot more surplus than what they initially thought.

(Exhibit III.3)

Let's take a look at Mr. Impending Doom. Mr. Impending Doom uses the case incurred reserving approach. He gets his case incurred development triangle, which is on the top part of the chart. He computes his age-to-age factors. He determines the straight average of the age-to-age factors as well as the weighted average, weighting against losses. He then selects the straight average, accumulates the age-to-age factors to get his age-to-ultimate loss development factors and determines his indicated reserve.

His indicated reserve is for a reserve deficiency; the reserve indication is $144,000,000. The company is $44,000,000 short on the balance sheet. With only $20,000,000 of surplus, the company is technically insolvent. The CEO is not going to like this.

So they both go and present their findings to the CEO, Ms. Very Optimistic, with her reserve redundancy of $37,000,000, and Mr. Impending Doom with his reserve deficiency of $44,000,000. The CEO thinks how can this be? He says, "I am going to get a second opinion."

He hires Mr. More Thorough. Mr. More Thorough comes to the company and he does two things. The first thing he does is he schedules a series of interviews with the various departments to find out what changes have transpired over the last several years. He learns that the company has instilled "let's get tough on claims."

He also develops a series of statistical indicators much like the ones we talked about. With those statistical indicators he turns to Ms. Very Optimistic's reserve analysis.

She had used the paid development approach. The basic assumption about that approach is that you have consistent pay-out patterns over time.

(Exhibit III.4)

To test that assumption he looks at closing ratios by accident year and by age of development. He sees that for a given age of development the ratios actually decline. That kind of makes sense, because with a "let's get tough on claims" philosophy that would correspond to cases staying open longer, because the claims adjusters are spending more time investigating the claims. And a slow-down in closing ratios by age of development means there is a slow-down in payment levels. Consequently the paid loss

development factors that Ms. Very Optimistic had determined based on historical experience would have understated future payment patterns.

He then tries to adjust for the change in closing ratios. He simply looks at the historical closing ratios, divides it into the most recent level of closing ratios and applies that adjustment to the historical payments.

So he takes, for example, the ratio for accident year 1984 at twelve months of development, 0.42, divides it into the most recent accident year's closing ratio of 0.31; that factor is then applied to the historical paid level. He does that throughout the diagonal. He comes up with an adjusted cumulative paid triangle and recomputes what the age-to-age factors are. (Exhibit III.5)

He comes up instead with a reserve indication of $82,000,000 instead of the $63,000,000 that Ms. Very Optimistic came up with.

By adjusting for changes in closing ratios he has improved the underlying assumption of the reserve indications and he has come up with quite a different view as to what the reserves should be by simply using the same information but making an explicit adjustment to the method.

He then turns to Mr. Impending Doom's reserve analysis. Mr. Impending Doom has used the case incurred methodology. The implicit assumption is that you have consistency in case reserving over time.

(Exhibit III.6)

To test that assumption he looks at the open average case reserve per claim. He sees that corresponding to calendar year 1987 there appears to be a significant jump in the average values for all accident years.

You can see that at twelve months of development the average value for 1986 more than doubled from 560 to 1,300 for 1987. If you go along the diagonal you can see that it has doubled pretty consistently.

That kind of makes sense, too, because when they implemented the "let's get tough on claims" philosophy they also beefed up the claims department. They improved the training and they increased the caliber of the claims adjusters, so the claims adjusters are now setting better case reserves. Whereas, with stable case reserve adequacy over time, the average values would simply increase by some inflationary rate.

After reviewing the types of coverages and lines of business this company writes, he makes an assumption that a fifteen percent inflationary rate seems appropriate. So he goes back and historically restates the average values, assuming a fifteen percent severity trend.

He then multiplies the recomputed average severities by the number of outstanding claims to come up with adjusted case reserves.

(Exhibit III.7)

To come up with the total incurred values he then adds in the actual payments he recomputes the new age-to-age factors, as well as the straight average.

(Exhibit III.8)

His new indication, using the incurred approach, is now $100,000,000 instead of $144,000,000.

By making adjustments for changes in closing ratios as well as changes in case reserve adequacy the two methods have actually converged. You no longer have an $80,000,000 gap between the two estimates. You now have a $20,000,000 gap.

So by making explicit adjustments to the reserving methodology you have actually improved the validity of the underlying assumption as well as the estimate of the indicated reserve need.

That concludes our discussion. Are there any questions? Yes?

QUESTION: On the discussion of fallacies, number four, regarding the use of calendar year paid ALAE to paid loss, there is a distortion. The question is whether or not you would see a similar distortion on accident year if you use accident year incurred?

MR. HAEFNER: Well, that depends. A lot of people will use a historic -- they look at an accident year that fully developed and they look at the total ratio of paid ALAE for that entire development period, divide it by paid losses for the fully developed accident year, and then they will use that ratio to establish their ALAE reserve.

That still has a similar problem, though, because you still have a lot of claims that get settled very quickly and that require less ALAE reserves.

So what you really have to look at is, given a point in time, suppose at the end of twenty-four months, you then look at how much paid losses you have from twenty-four months out through being fully developed, when all claims are settled. You look at the ALAE that was paid out after twenty-four months through the end of the settlement.

If you use ratios like that at each age of development, then that is a pretty good method, but if you are going to look at from the beginning of an accident period through the end of it and use that ratio you still come up with a reserve deficiency.

It is the same problem. You have a lot of claims that get settled very quickly that require less ALAE reserve.

QUESTION: Exhibit 1.5 -- is there a word or a book about (inaudible) If I understood what you said about this particular item, it is that it would probably be okay if you were able to settle the claims (inaudible)

MR. HAEFNER: That is right.

QUESTION: Okay, so I would assume that you would suggest, then, to the claims people that they settle their claims right away, because wouldn't that be the best way to do it, because the longer they stay open, the more these claims (inaudible) Wouldn't you suggest that they settle their claims immediately?

ANSWER: Well, that is a good question.

QUESTION: I don't mean to be facetious, because I realize that in the claims department there are two, mainly two ways of working to settle claims. There is always this balancing act, whether we should settle them right away or let --

ANSWER: That's right. The company that I work at, American States, our basic philosophy is that the only good claim is a closed claim, so we do try to settle very quickly, just because there is a lot more uncertainty associated with the open claims and you are susceptible to a lot more types of changes in how insurance contracts are interpreted, changes in increased inflation, increased social inflation, things like that.

So, yes, we do tend to -- our management does put a lot of pressure on our claims people to get claims closed quickly. So that is definitely my recommendation. However, settling them all tomorrow, that is not possible unless you want to just totally give away the store, so you are right. There is a balancing act there.

QUESTION: That is the point I am trying to make, that it is a balancing act, a difficult one. There is no real -- in my opinion there is no real answer. There is probably an optimal point at which you can settle claims, but what the optimal point is --

MR. HAEFNER: That is one I do not know, either. Really, my main point is that if you have an auditor that tells you that the case reserves are adequate, take that with a grain of salt. You know, you really have to do a lot of independent verification yourself, by yourself, use a lot of statistical techniques to see if you agree with that, because they cannot really predict what is going to happen in the future.

MS. TOM: I think the point is that claims departments should focus on their objectives, and if their objective is to settle cases fairly or to settle cases to minimize the financial impact or whatever it is, that they should focus on that and not worry about the impact on the overall reserves of the company.

The actuary is concerned about total reserve. The last thing that should happen is for the actuary or the reserving specialist to tell the claims department that they are not doing a good job on their case reserving practices because case reserves develop upward.

The claims department should manage their function according to how they best know how and the reserving specialist should try to anticipate what the future development expectations should be.

I see it happen in my company where the claims managers or the claims executive will very often misinterpret that an increase in reserve indication is an indictment on his or her operation. That is not true.

They should -- if anything, they should just continue doing what they think is best for the company. If it is extending the settlement out ten years, if they think that is best for the operating function of the company, then they should continue doing that.

Yes?

QUESTION: In the last case study, there is still a $18,000,000 difference in the two reserving methods. What should the next steps be in making the final selection?

ANSWER: You can perform a reasonableness check. What I routinely do is determine the implied loss ratio by year and the implied frequency and severity. Do they make sense with what we know about pricing and our expectation of loss ratios.

I think most consultants will probably do that when they review loss reserves. They will try and see what do the reserve conclusions imply in terms of pure premium and pricing changes?

You probably need to get a better handle as to the types of business underlying the experience and whether or not there's been mix shift. But simply having the two estimates is not sufficient in making a selection. That is probably just as naive as not making any adjustment at all, but it narrows the range. It brackets your reserve indications.

Well, thank you very much. Please fill out the evaluation form.

1989 CASUALTY LOSS RESERVE SEMINAR

COMMON PITFALLS IN RESERVE ANALYSES

OUTLINE

I. Intuitively Appealing Fallacies

   A. Using Closed Claims

   B. Calendar Year Data for ALAE

   C. Limiting Years of Experience

II. Avoiding Pitfalls

   A. Implicit Assumption

   B. Sources of Common Pitfalls

   C. How to Avoid or Minimize the Impact

III. Case Study

   A. Ms. Vari Opta Mystik

   B. Mr. M. Penn Dingdoom

   C. Mr. Moore Thoreau

EXHIBIT I.1

COMMON PITFALLS IN RESERVE ANALYSIS

FALLACY #1

THE POPULATION OF CLAIMS STILL OUTSTANDING IS SIMILAR TO THE POPULATION OF RECENTLY CLOSED CLAIMS.

COMMON PITFALLS IN RESERVE ANALYSIS EXHIBIT 1.2

COMPARISON OF PAID AND OUTSTANDING CLAIMS

WORKERS' COMPENSATION ACCIDENT YEAR 1975

	INCREMENTAL			CUMULATIVE			HINDSIGHT		
YR. OF DEV.	PAID LOSSES (000's)	CLAIMS CLOSED	AVERAGE PAID LOSS	PAID LOSSES (000's)	CLAIMS CLOSED	AVERAGE PAID LOSS	OUTSTANDING RESERVE (000's)	# OF OPEN & IBNR CLAIMS	AVERAGE RESERVE
1	$ 5,504	16,568	$ 332	$ 5,504	16,568	$ 332	$ 30,71	21,330	$ 1,440
2	12,874	18,416	699	18,378	34,984	525	17,84	2,914	6,124
3	6,938	1,393	4,981	25,316	36,377	696	10,90	1,521	7,170
4	4,155	504	8,244	29,471	36,881	799	6,75	1,017	6,638
5	2,171	286	7,591	31,642	37,167	851	4,58	731	6,265
6	1,270	184	6,902	32,912	37,351	881	3,31	547	6,051
7	818	128	6,391	33,730	37,479	900	2,49	419	5,947
8	453	85	5,329	34,183	37,564	910	2,03	334	6,105
9	345	135	2,556	34,528	37,699	916	1,69	199	8,513
10	312	53	5,887	34,840	37,752	923	1,38	146	9,466

EXHIBIT I.3

COMMON PITFALLS IN RESERVE ANALYSIS

FALLACY #2

SINCE MOST CLAIMS SETTLE FOR LESS THAN THEIR CASE RESERVE, THE REMAINING RESERVES ARE ALSO REDUNDANT.

COMMON PITFALLS IN RESERVE ANALYSIS — EXHIBIT 1.4

TYPICAL DEVELOPMENT ON CASE RESERVES

	ACCIDENT YEAR AT DEC. 31			ACCIDENT YEAR ON AN ULTIMATE BASIS		
	NUMBER OF CLAIMS OUTSTANDING	INITIAL INDIVIDUAL CASE RESERVE	TOTAL CASE RESERVE	NUMBER OF CLAIMS	INDIVIDUAL FINAL SETTLEMENT	TOTAL LOSSES
	135	$ 1,000	$ 135,000	3	$ 10,000	$ 30,000
				65	1,000	65,000
				67	0	0
				135		$ 95,000
	12	$10,000	$ 120,000	1	$ 100,000	$ 100,000
				6	10,000	60,000
				5	0	0
				12		$ 160,000
	3	$100,000	$ 300,000	1	$ 300,000	$ 300,000
				1	100,000	100,000
				1	0	0
				3		$ 400,000
				25 (Later Reports)	-	$ 100,000
AY TOTAL	150	-	$ 555,000	175	-	$ 755,000

NUMBER OF SETTLEMENTS ≤ INITIAL RESERVE	146
AMOUNT OF SAVINGS ON CLOSURE	$217,000
AGGREGATE DEFICIENCY	$200,000

EXHIBIT I.5

COMMON PITFALLS IN RESERVE ANALYSIS

FALLACY #3

A THOROUGH AUDIT OF YOUR BOOK OF OUTSTANDING CLAIMS WILL TELL YOU IF YOUR AGGREGATE CASE RESERVES ARE ADEQUATE.

EXHIBIT I.6

COMMON PITFALLS IN RESERVE ANALYSIS

FALLACY #4

THE CALENDAR YEAR RATIO OF PAID ALAE TO PAID LOSSES REPRESENTS THE RELATIONSHIP OF THE REQUIRED ALAE RESERVE TO THE LOSS RESERVE.

1989 CASUALTY LOSS RESERVE SEMINAR EXHIBIT I.7

USING CALENDAR YEAR RATIOS TO ESTIMATE ALAE RESERVES

BORING INSURANCE COMPANY

ACCIDENT YEAR	Incremental Paid Losses (000's) 12	24	36	48
1984	$ 1,000	$ 2,000	$ 500	$ 300
1985	1,000	2,000	500	300
1986	1,000	2,000	500	300
1987	1,000	2,000	500	300
1988	1,000	2,000	500	300

Required Loss Reserve = $3,900

CALENDAR YR. PAID LOSSES = 1,000 + 2,000 + 500 + 300 = $ 3,800

	Incremental Paid Allocated Loss Expense (000's)			
1984	$ 15	$ 70	$ 35	$ 30
1985	15	70	35	30
1986	15	70	35	
1987	15	70		
1988	15			

CALENDAR YR. PAID ALAE = 15 + 70 + 35 + 30 = $150

$$\frac{\text{CY Paid ALAE}}{\text{CY Paid Losses}} = \frac{150}{3,800} = 3.95\%$$

$$\text{ALAE Reserve Based on CY Ratio} = \left(\frac{\text{CY}}{\text{Ratio}}\right) \times \left(\frac{\text{Loss}}{\text{Reserve}}\right) = 3.95\% \times \$3,900 = \$154$$

COMMON PITFALLS IN RESERVE ANALYSIS EXHIBIT 1.8

USING CALENDAR YEAR RATIOS TO ESTIMATE ALAE RESERVES

BORING INSURANCE COMPANY

ACCIDENT YEAR	Paid Losses (000's) 12	24	36	48	
1984	$ 1,000	$ 2,000	$ 500	$ 300	
1985	1,000	2,000	500	300	
1986	1,000	2,000	500	300	Required Loss Reserve = $3,900
1987	1,000	2,000	500	300	
1988	1,000	2,000	500	300	
CALENDAR YR. PAID LOSSES =	1,000 +	2,000 +	500 +	300 =	$ 3,801

	Paid Allocated Loss Expense (000's)				
1984	$ 15	$ 70	$ 35	$ 30	
1985	15	70	35	30	
1986	15	70	35	30	Required ALAE Reserve = $230
1987	15	70	35	30	
1988	15	70	35	30	
AY Ratio of Paid ALAE to Paid Loss	1.5%	3.5%	7.0%	10.0%	

Actual Required ALAE Reserve = $230

ALAE Reserve Based on CY Ratio = $154

Amount of Deficiency = $ 76

COMMON PITFALLS IN RESERVE ANALYSIS EXHIBIT I.9

FALLACY #5

IT IS SAFE TO ASSUME THAT THERE IS NO FURTHER DEVELOPMENT BEYOND YOUR LAST DATA POINT.

COMMON PITFALLS IN RESERVE ANALYSIS EXHIBIT I.10

REINSURANCE ASSOCIATION OF AMERICA EXPERIENCE

INCURRED LOSS DEVELOPMENT FACTORS*

YEARS OF DEVELOPMENT	AUTOMOBILE LIABILITY	GENERAL LIABILITY	MEDICAL MALPRACTICE	WORKERS' COMPENSATION
2:1	1.760	2.300	7.876	1.634
3:2	1.227	1.541	2.172	1.285
4:3	1.100	1.295	1.654	1.169
5:4	1.061	1.171	1.394	1.134
6:5	1.031	1.109	1.150	1.092
7:6	1.015	1.083	1.156	1.053
8:7	1.015	1.060	1.163	1.055
9:8	1.008	1.046	1.120	1.048
10:9	1.006	1.045	1.133	1.039
11:10	1.000	1.039	1.023	1.036
12:11	1.001	1.022	1.058	1.014
13:12	1.001	1.024	1.090	1.017
14:13	1.001	1.004	1.063	1.030
15:14	1.000	1.019	1.089	1.023
16:15	1.000	1.008		1.016
17:16	1.001	1.010		1.032
18:17	.999	1.008		1.005
19:18	1.000	1.018		1.021
20:19	1.000	1.004		1.015
21:20	.999	1.005		1.037
22:21	1.000	1.017		.996
23:22	1.000	1.000		1.038
24:23	1.000	.997		1.026
25:24	1.000	1.000		1.018

* THESE FACTORS ARE THE AVERAGE OF THE LATEST 10 ACCIDENT YEARS FOR EACH GIVEN YEAR OF DEVELOPMENT FROM THE 1983 EDITION OF THE RAA'S LOSS DEVELOPMENT STUDY.

REINSURANCE ASSOCIATION OF AMERICA EXPERIENCE
1 2
COMPARISON OF ACTUAL AND FITTED INCURRED LOSS DEVELOPMENT FACTORS

YEARS OF DEVELOPMENT	AUTOMOBILE LIABILITY		GENERAL LIABILITY		MEDICAL MALPRACTICE		WORKERS' COMPENSATION	
	ACTUAL	FITTED	ACTUAL	FITTED	ACTUAL	FITTED	ACTUAL	FITTED
2:1	1.760	1.619	2.300	2.290	7.876	6.104	1.634	1.630
3:2	1.227	1.264	1.541	1.536	2.172	2.480	1.285	1.287
4:3	1.100	1.123	1.295	1.287	1.654	1.717	1.169	1.172
5:4	1.061	1.062	1.171	1.177	1.394	1.429	1.134	1.118
6:5	1.031	1.033	1.109	1.119	1.150	1.288	1.092	1.088
7:6	1.015	1.018	1.093	1.085	1.156	1.208	1.053	1.058
8:7	1.015	1.011	1.060	1.064	1.153	1.158	1.055	1.055
9:8	1.008	1.007	1.046	1.050	1.120	1.124	1.048	1.046
10:9	1.006	1.004	1.045	1.039	1.133	1.101	1.039	1.039
11:10	1.000	1.003	1.039	1.032	1.023	1.084	1.036	1.034
12:11	1.001	1.002	1.022	1.027	1.058	1.070	1.014	1.029
13:12	1.001	1.001	1.024	1.022	1.090	1.060	1.017	1.026
14:13	1.001	1.001	1.004	1.019	1.063	1.052	1.030	1.023
15:14	1.000	1.001	1.019	1.016	1.089	1.046	1.023	1.021
16:15	1.000	1.000	1.008	1.014		1.040	1.016	1.019
17:16	1.001	1.000	1.010	1.012		1.036	1.032	1.017
18:17	.999	1.000	1.008	1.011		1.032	1.005	1.016
19:18	1.000	1.000	1.018	1.010		1.029	1.021	1.015
20:19	1.000	1.000	1.004	1.009		1.027	1.015	1.014
21:20	.999	1.000	1.006	1.008		1.024	1.037	1.013
22:21	1.000	1.000	1.017	1.007		1.022	.996	1.012
23:22	1.000	1.000	1.000	1.006		1.020	1.038	1.011
24:23	1.000	1.000	.997	1.006		1.019	1.026	1.010
25:24	1.000	1.000	1.000	1.005		1.017	1.018	1.010

1
THESE FACTORS ARE THE AVERAGE OF THE LATEST 10 ACCIDENT YEARS FOR EACH GIVEN YEAR OF DEVELOPMENT FROM THE 1983 EDITION OF THE RAA'S LOSS DEVELOPMENT STUDY.

2
FITTED USING AN INVERSE POWER FUNCTION.

EXHIBIT I.12

COMMON PITFALLS IN RESERVE ANALYSIS

KEY AXIOMS OF CLAIMS SETTLEMENT

1. SMALL, EASY CLAIMS TEND TO SETTLE QUICKLY; LARGER CLAIMS SETTLE MORE SLOWLY.

2. MOST CLAIMS SETTLE FOR LESS THAN THE CASE RESERVE, BUT THE FEW ADVERSE LARGE ONES MORE THAN OFFSET THE FAVORABLE DEVELOPMENT OF THE OTHERS.

3. THE BOOK OF CLOSED CLAIMS CONTAINS A MUCH LARGER PROPORTION OF SMALL, FAST-SETTLING CLAIMS THAN THE BOOK OF OUTSTANDING CLAIMS.

Exhibit II.1

INTEGRITY OF RESERVE INDICATIONS

Depends on consistency in:		Implications on Reserving:
Underwriting & Coverage Provided	☛	Stable Book of Business
Claims Adjusting	☛	No Change in Case Reserving
Information Processing & Reporting	☛	Stable Tracking of Claim Life Cycle
Performance Measurements	☛	No Change in Operational Behavior
Contract Interpretation	☛	Well Defined Liabilities

RESERVING PITFALLS

Reserve analyses implicitly assume things have **not changed.**

Pitfalls commonly arise from a **breakdown** in this asssumption.

- Failure to identify internal or external changes

- Improper assessment of the impact of change on the data or reserving methodology

COMMON PITFALLS IN RESERVE ANALYSES

CHANGES IN EXPOSURE

- Marketing and Underwriting Programs
    - Class
    - Geographic
    - New versus Renewal Business
- Coverage Shifts
    - Policy Limits
    - Primary versus Excess
        - Attachment Points & Layer of Coverage
- Reinsurance Protection impacting Net Retentions
    - Moving Retentions in a Hard/Soft Market
    - Commutations

COMMON PITFALLS IN RESERVE ANALYSES

CHANGES IN CASE RESERVING

- Management Changes
- Staffing vs Workloads throughout the Cycle
- Revised Workflow Standards and Procedures
    - Service Standards
    - Field Authority Levels
    - Use of Average Values
- Special Claims Handling Practices
    - Structured Settlements
    - Workers' Comp. - Lump Sum Settlements
    - Special File Reviews
    - Environmental Claims

COMMON PITFALLS IN RESERVE ANALYSES

OTHER CHANGES

- Information Flow
    - EDP Changes
    - Accounting or Coding Changes
- External
    - Involuntary Pools and Associations
    - Litigiousness, Benefit Levels
    - Judicial Rewriting of Contracts
    - Legislative Changes
    - Economy/Inflation
- Performance Measures - Behavior Motivators
    - Productivity Measures
    - Quality Measures

Recognizing change is not sufficient.

- Must consider the implications on Data Selection!

Common Pitfalls are:

- Data Groups are not Homogeneous
    - Group data based on loss characteristics
    - Balance Homogeneity with Credibility
- Exclusions - Assuming "It'll never happen again!"
- Not transforming data to minimize changes in case reserve adequacy
    - Report or Policy Year
    - Supplemental Data
- Inaccurate Data - not reconciled with other data

AVOIDING OR MINIMIZING PITFALLS

- Know your Claims and Underwriting Departments!
- Develop Statistical Indicators
  - Closing Ratios
  - Paid - to - Incurred Ratios
  - Report Year Run-off
  - Paid vs Incurred Severities
- Examine Different Methods and Adjust for Changes
- Perform Reasonableness Checks
  - Retrospective Tests and Sensitivity Analyses
  - Compare loss ratios to
    - Expected loss ratios based on pricing & pure premium
    - Industry Accident Year Loss Ratios
  - Frequency and Severity Trends

EXHIBIT III.1

COMMON PITFALLS IN RESERVE ANALYSIS
CASE STUDY

ANALYSIS BY VARI OPTA MYSTIK

ACCIDENT YEAR	CUMULATIVE PAID LOSSES (000s) 12	24	36	48	60
1984	$ 5,000	$ 9,000	$12,600	$13,100	$15,100
1985	5,800	10,300	14,500	19,200	
1986	6,700	11,800	18,800		
1987	7,700	13,600			
1988	8,900				

	PAID DEVELOPMENT FACTORS 12/24	24/36	36/48	48/60	
1984	1.800	1.400	1.040	1.153	
1985	1.776	1.408	1.324		
1986	1.761	1.593			
1987	1.766				
AVERAGE	1.776	1.467	1.182	1.153	
WTD. AVG.	1.770	1.499	1.229	1.153	
SELECTED	1.776	1.467	1.182	1.153	1.139*
CUMULATIVE	4.044	2.277	1.552	1.313	1.139

*TAIL FACTOR = INCRD LOSS / PAID LOSS = $17,200 / $15,100 = 1.139

EXHIBIT III.2

COMMON PITFALLS IN RESERVE ANALYSIS
CASE STUDY

ANALYSIS BY VARI OPTA MYSTIK

ACCIDENT YEAR	CUMULATIVE PD. LOSS (000's)	CUMULATIVE PD LDF	ULTIMATE LOSS (000's)	INDICATED RESERVE (000's)
1984	$15,100	1.139	$ 17,200	$ 2,100
1985	19,200	1.313	25,210	6,010
1986	18,800	1.552	29,178	10,378
1987	13,600	2.277	30,967	17,367
1988	8,900	4.044	35,992	27,092

TOTAL INDICATED RESERVE = $ 63 MILLION

CARRIED RESERVE = $100 MILLION

INDICATED REDUNDANCY = $ 37 MILLION

= 37%

EXHIBIT III.3

COMMON PITFALLS IN RESERVE ANALYSIS
CASE STUDY

ANALYSIS BY M. PENN DINGDOOM

ACCIDENT YEAR	CUMULATIVE INCURRED LOSSES ('000s) 12	24	36	48	60
1984	$ 8,100	$15,500	$16,700	$17,200	$17,200
1985	10,000	19,300	27,100	25,700	
1986	12,400	38,100	37,400		
1987	23,700	51,102			
1988	31,400				

	INCURRED DEVELOPMENT FACTORS 12/24	24/36	36/48	48/60
1984	1.914	1.077	1.030	1.000
1985	1.930	1.404	.948	
1986	3.073	.982		
1987	2.152			
AVERAGE	2.267	1.154	.989	1.000	1.000
WTD. AVG.	2.360	1.138	.976	1.000	1.000
SELECTED	2.267	1.154	.989	1.000	1.000
CUMULATIVE	2.587	1.141	.989	1.000	1.000

36RAE-D-3

EXHIBIT III.4

COMMON PITFALLS IN RESERVE ANALYSIS
CASE STUDY

ANALYSIS BY M. PENN DINGDOOM

ACCIDENT YEAR	CUMULATIVE INCRD LOSS (000's)	CUMULATIVE INCRD LDF	ULTIMATE LOSS (000's)	PAID TO DATE (000's)	INDICATED RESERVE (000's)
1984	$17,200	1.000	$ 17,200	$15,100	$ 2,100
1985	25,700	1.000	25,700	19,200	6,500
1986	37,400	.989	36,989	18,800	18,189
1987	51,000	1.141	58,207	13,600	44,607
1988	31,400	2.587	81,242	8,900	72,342

TOTAL INDICATED RESERVE = $144 MILLION

CARRIED RESERVE = $100 MILLION

INDICATED DEFICIENCY = $ 44 MILLION

= 44%

EXHIBIT III.5

COMMON PITFALLS IN RESERVE ANALYSIS
CASE STUDY
ANALYSIS BY MOORE THOREAU:
REVISING PAID LOSS PROJECTIONS FOR CHANGES IN SETTLEMENT RATES

ACCIDENT YEAR	CLOSE RATIO = CUMULATIVE CLSD CLMS / CUMULATIVE RPTD CLMS				
	12	24	36	48	60
1984	.420	.670	.852	.913	.993
1985	.395	.653	.831	.932	
1986	.372	.621	.814		
1987	.344	.599			
1988	.313				

ACCIDENT YEAR	ADJUSTED CUMULATIVE PAID LOSSES (000s)				
	12	24	36	48	60
1984	$ 3,300	$ 7,900	$12,000	$12,300	$14,900
1985	4,200	9,300	14,200	19,200	
1986	5,200	11,300	18,800		
1987	6,700	13,600			
1988	8,900				

ACCIDENT YEAR	ADJUSTED PAID DEVELOPMENT FACTORS			
	12/24	22/36	36/48	48/60
1984	2.394	1.519	1.075	1.155
1985	2.214	1.527	1.362	
1986	2.173	1.664		
1987	2.030			

EXHIBIT III.7

COMMON PITFALLS IN RESERVE ANALYSIS
CASE STUDY
ANALYSIS BY MOORE THOREAU:
REVISING INCRD LOSS PROJECTIONS FOR CHANGES IN CASE ADEQUACY

ACCIDENT YEAR	ADJUSTED CUMULATIVE INCURRED LOSSES (000's) 12	24	36	48	60
1984	$10,900	$21,800	$20,800	$17,200	$17,200
1985	14,100	28,300	27,100	25,700	
1986	18,300	38,100	37,400		
1987	23,700	51,000			
1988	31,400				

ACCIDENT YEAR	ADJUSTED INCRD DEVELOPMENT FACTORS 12/24	14/36	36/48	48/60
1984	2.000	.954	.827	1.000
1985	2.007	.958	.948	
1986	2.082	.982		
1987	2.152			
AVERAGE	2.060	.964	.888	1.000
CUMULATIVE	1.763	.856	.888	1.000

EXHIBIT III.6

COMMON PITFALLS IN RESERVE ANALYSIS
CASE STUDY
ANALYSIS BY MOORE THOREAU:
REVISING INCRD LOSS PROJECTIONS FOR CHANGES IN CASE ADEQUACY

ACCIDENT YEAR	AVERAGE CASE RESERVE PER OPEN CLAIM				
	12	24	36	48	60
1984	$ 450	$1,500	$2,000	$ 4,501	$19,626
1985	500	1,700	4,600	5,200	
1986	560	3,900	5,301		
1987	1,300	4,500			
1988	1,500				

ACCIDENT YEAR	ACTUAL CASE RESERVES (000'S)				
	12	24	36	48	60
1984	$ 3,100	$ 6,500	$ 4,100	$ 4,100	$ 2,100
1985	4,200	9,000	12,600	6,500	
1986	5,700	26,300	18,600		
1987	16,000	37,400			
1988	22,500				

ACCIDENT YEAR	ADJUSTED CASE RESERVES				
	12	24	36	48	60
1984	$ 5,900	$12,800	$ 8,200	$ 4,100	$ 2,100
1985	8,300	18,000	12,600	6,500	
1986	11,600	26,300	18,600		
1987	16,000	37,400			
1988	22,500				

EXHIBIT III.8

COMMON PITFALLS IN RESERVE ANALYSIS
CASE STUDY

ANALYSIS BY MOORE THOREAU

INDICATIONS BASED ON ADJUSTING FOR CHANGES IN SETTLEMENT RATES

ACCIDENT YEAR	ADJ. CUM. PAID LOSS	ADJUSTED PD LDF	ULTIMATE LOSS	PAID TO DATE	INDICATED RESERVE
1984	$14,900	1.154	$17,200	$15,100	$ 2,100
1985	19,200	1.333	25,594	19,200	6,394
1986	18,800	1.618	30,418	18,800	11,618
1987	13,600	2.540	34,544	13,600	20,944
1988	8,900	5.597	49,813	8,900	40,913

TOTAL INDICATED RESERVE = $82 MILLION

INDICATIONS BASED ON ADJUSTING FOR CHANGES IN CASE ADEQUACY

ACCIDENT YEAR	CUMULATIVE INCRD LOSS	ADJUSTED INCRD LDF	ULTIMATE LOSS	PAID TO DATE	INDICATED RESERVE
1984	$17,200	1.000	$17,200	$15,100	$ 2,100
1985	25,700	1.000	25,700	19,200	6,500
1986	37,400	.888	33,211	18,800	14,411
1987	51,000	.856	43,658	13,600	30,058
1988	31,400	1.763	55,372	8,900	46,472

TOTAL INDICATED RESERVE = $100 MILLION

1989 ENROLLED ACTUARIES MEETING

5E: REINSURANCE COMMUTATIONS

Moderator

Heidi E. Hutter
Atrium Corporation

Panel

Jeffrey H. Mayer
Milliman & Robertson, Inc.

Scott D. Moore
Coopers & Lybrand

Dale F. Ogden
Dale F. Ogden & Associates

MS. HUTTER: Welcome to Session No. 5E on Reinsurance Commutations. There are plenty of seats here in the front of the room. I would like to ask everyone else to just pick up the handouts at the back of the room and try and get seated, so we can get started this morning.

My name is Heidi Hutter, and I am the moderator for this panel. I'd like to first make a few announcements. Please be aware that this entire session will be recorded. We plan to allow time for questions and answers at the conclusion of this session.

When we do get to the question and answer session, we would like each person asking a question to step to the microphone located in the center of the room and speak directly into the microphone when you are asking your questions so that everyone can hear that.

Also, at the conclusion of the session, we would ask that you complete your evaluation forms for this session. The feedback from this year's sessions will certainly assist next year's planning committee.

In defining a reinsurance commutation, the College of Insurance textbook on reinsurance described it as "the estimation, payment and complete discharge of all obligations, including the future obligations between the parties for reinsurance losses incurred." In other words, it is a buy out of a reinsurance contract that had already been in place.

Much of the reinsurance commutation activity in the marketplace involves an insolvent company, an insolvent reinsurer or both insolvent parties. Commutations are not restricted to insolvencies. In fact, in my experience in the last few years, I have seen an increasing number of situations where commutations are used to wind up an insurance relationship where, in fact, both parties are still solvent.

This morning, our first speaker is Dale Ogden. He will survey the types of situations that give rise to a commutation. Dale is president of Dale F. Ogden and Associates. Prior to forming his own firm, Dale was executive vice president and chief operating officer of Kramer Capital Consultants and a manager at Peak, Marwick and Mitchell. Dale?

Solvency Considerations in Negotiating Reinsurance Commutations

An important part of the insurance business is to help bring financial stability to its customers by mitigating certain types of risk. This has always been difficult; but in constantly changing legal, social, economic, and political climates, it becomes virtually impossible. Liberalization of the tort system, judicial fiat, and changes in federal and state regulation have created an unstable environment in which to conduct the business of insurance.

This is obvious not only because of the number of recognized insolvent companies, but also the unprecedented size of the insolvencies and the number of officially unrecognized insolvencies. In this author's opinion, for example, there is at least one multi-billion dollar, publicly-traded international insurer, the darling of Wall Street, that is marginally solvent at best, yet continues to operate with a favorable rating. Much of its asset for ceded reinsurance recoverable (an amount that exceeds its stated surplus) is questionable. That insurer has been actively trying to commute its questionable reinsurance treaties for years. There is a price to pay for underwriting virtually anything and then "burning the reinsurer!"

PURPOSE OF REINSURANCE

The purpose of reinsurance is much like the purpose of insurance. Reinsurance should help bring financial stability to its customers (ceding insurers) by mitigating certain types of risk. Unfortunately, much reinsurance has caused the opposite effect. Insolvencies, uncertainties about collection, contract disputes, and abusive contract terms have, for many insurers, magnified their financial problems, not solved them. Many insurers and reinsurers gambled with their surplus; many failed. This situation has resulted in many more companies wishing to commute reinsurance treaties to resolve disputes and eliminate the uncertainty of collection.

A "reinsurance commutation" is a contract or an amendment to an existing contract in which a reinsurer buys out of its liabilities to a ceding insurer (the "cedant"). In exchange for an agreed payment or series of payments, the cedant absolves the reinsurer of all obligations that were created by the original reinsurance contract. A reinsurance commutation is much like a loss portfolio transfer. The reinsurer transfers its liabilities back to the original insurer. However, the insolvency of one or both of the parties materially affects the parties' motivations and bargaining power. It creates a situation in which it likely will be necessary to obtain both regulatory and court approvals in order to avoid a "voidable preference" under insurance company liquidation law.

INSOLVENCIES AND LIQUIDATIONS

As with any corporation, once an insurance company is recognized as being insolvent, it becomes necessary either to recapitalize it or to liquidate it. In the seventies, recapitalization worked. Most insolvencies were small personal lines carriers with inadequate rates. However, despite efforts by many insurance departments to rescue insolvent insurers, liquidation seems to be the only prudent course of action for most impaired and insolvent insurers.

The liquidation of a property-casualty insurer involves the unraveling of complicated contractual relationships, often built up over decades. Assets must be converted into cash and distributed to creditors (e.g., claimants, policyholders, and guaranty funds). All creditors of equal priorities must be treated equally. The liquidator must determine the total assets and liabilities and then pay each creditor the same proportion of its claim against the company's estate. Unfortunately, most of the principal assets and liabilities of an insurer, solvent or otherwise, can only be estimated.

One of the principal assets of most insurers is ceded reinsurance recoverable on paid and unpaid losses. Companies often don't even know the magnitude of their reinsurance recoverable on unpaid losses (including IBNR). This information has not historically been shown on the statutory balance sheet of insurers. Schedule P of the 1989 statutory annual statement will provide a partial remedy. The new schedules will contain information on both gross and net (of reinsurance) incurred, paid, and reserved losses.

Insolvent Cedants

For many insurers, particularly insolvent insurers, ceded reinsurance recoverable on unpaid losses is their single largest asset. It often is larger than the total of cash and invested assets. To liquidate the insurer, it may be necessary to convert reinsurance recoverable into cash to pay claims, particularly when there is no guaranty fund involvement. To accomplish that conversion, the liquidator commutes the reinsurance contract, absolving the reinsurer of any further liability.

Insolvent Reinsurers

For an impaired or insolvent reinsurer, assumed reinsurance payable usually is its largest liability. By commuting its liabilities, the assets of the reinsurer can be equitably distributed to its creditors. Thus, a program to commute all or a major portion of a reinsurer's assumed reinsurance liabilities is equivalent, respectively, to a total or partial liquidation. Here are several examples.

- Several syndicates on the New York Insurance Exchange, who wrote mostly assumed reinsurance, have successfully eliminated their insolvencies through voluntary commutation programs.

- Universal Reinsurance Corporation, in 1985, began to liquidate through commutations. This program has also been successful.

- Mentor Insurance Company, Ltd., Bermuda, according to the trade press, is attempting to liquidate through mass commutations. Unfortunately, the liabilities exceed the assets by such a multiple (perhaps five or six times) that agreement among the creditors may not be feasible.

Each of these programs has as its goal the fair and timely distribution of the reinsurer's assets to its creditors. If successful, the commutation programs are quicker and less costly. They also produce less disruption in the marketplace and in the cedants' operations.

To respond to this situation, the New York Superintendent of Insurance has proposed legislation that would permit impaired or insolvent reinsurers to enter into commutation agreements. Commutations by impaired or insolvent reinsurers would be subject to regulations promulgated by the Department and to final approval by the Superintendent. The New York Insurance Laws currently provide that any transfer of or lien created upon the property of an insurer within four months of an order to show cause why the company should not be liquidated constitutes a preference and is voidable. Under the proposed legislation, commutations approved by the Superintendent could not be challenged later.

REASONS FOR COMMUTATION

One of the principal reasons for reinsurance commutations is to assist with the liquidation process of an insurer or a reinsurer. The liquidation process often is further complicated because the company is both insurer and reinsurer. Some other reasons for commuting reinsurance contracts follow.

- The reasons for which a company purchased reinsurance (surplus enhancement, underwriting capacity, income stabilization, etc.) may no longer be valid.

- Older reinsurance contracts often involve amounts that are no longer material to either party. Commuting the contract may save significant administration costs (both time and expense) to both parties.

- The original contract may have been retrospectively rated so that every claim the cedant makes to the reinsurer is magnified and reimbursed by the cedant in the form of additional premium. By commuting the treaty the ceding company saves more in additional premiums than it would collect in losses.

- After several years, most of the remaining liabilities under workers' compensation treaties are lifetime or annuity-type claims. To save the cost of making periodic payments for several decades, the parties may commute the entire contract or perhaps, only individual claims. The cedant then either establishes an annuity reserve or purchases an annuity from a life insurance company.

- Disputes over coverage and the meanings of contract terms may be compromised and settled through a negotiated commutation, rather than through expensive and time-consuming claim-by-claim litigation.

These and other reasons also apply in the case of insolvencies. My discussion of reinsurance commutations will focus mainly on situations where either the primary insurance company (the "cedant"), the reinsurer, or both, are impaired or insolvent and in the process of liquidation. Many of the same concepts will apply to solvent, ongoing insurers and reinsurers.

INSOLVENT CEDANT
SOLVENT REINSURER

Our first situation involves an insolvent cedant and a solvent, credit worthy, reinsurer. The first question that should be asked is, "Why should either the cedant or the reinsurer commute?" If the cedant doesn't benefit from the commutation, the liquidator (court-supervised or otherwise) would be irresponsible to accept a commutation. Conversely, the reinsurer wouldn't want to relinquish its cash flow and settle the contract early unless it could also benefit in some way. A little background is necessary before we answer this question. Most reinsurance treaties contain an insolvency clause similar to the following:

> Notwithstanding any other provisions to the contrary, in the event of the insolvency of the Company, the reinsurance provided hereunder shall be payable by the reinsurer directly to the Company or its liquidator, receiver or statutory successor, on the basis of the liability for the business reinsured hereunder, without diminution either because (x) of such insolvency or (y) the liquidator, receiver or statutory successor of the Company has failed to pay all or a portion of any of a claim, except as provided by Section 315 of the New York Insurance Law or except (i) where an agreement specifically provides for another payee of such reinsurance in the event of insolvency

> of the Company, and (ii) where the reinsurer with the consent of the direct insureds has assumed such policy obligations of the Company as direct obligations of the reinsurer to the payees under such policies.

This means that the reinsurer cannot avoid liability merely because the cedant is insolvent. The reinsurer still pays. The question now is, "What does the reinsurer still pay?" The language sounds as though the reinsurer pays the same amount as if the cedant were still in business. While I am certain that is the intent, it probably is not the outcome.

Why the Reinsurer Commutes

In an ongoing solvent insurer, there is presumably a diligent, trained claims staff handling each claim. There is motivation to protect the company's surplus and maintain the relationship with the reinsurer by not "burning the treaty!" Claims are investigated, negotiated, compromised and settled, where possible. Some claims go to trial when deemed prudent by the claims staff. Defense counsel are managed and controlled, to whatever extent possible, to maximize the benefit and minimize the cost. In addition, the reinsurer has the potential for recovery of losses on future contracts with the cedant.

Once the primary company is recognized as being insolvent, many of the incentives to protect the reinsurer disappear. Although most receivers and liquidators try valiantly to hold the organization together (some with more success than others), many problems still occur. Claims are often handled by many different guaranty funds, each with its own priorities (and politics). Where guaranty funds are not involved, many individual insureds will be handling their own claims. Some of those insureds are judgement-solvent; others are incapable of paying even small judgments. Priorities and incentives now change dramatically.

- Under guaranty funds, there likely is a per claim limit that varies from state to state and, in many cases, is less than the policy limit. In my experience, guaranty funds often are not concerned with amounts in excess of their per claim limit. Defense costs may escalate as the responsibility for claims handling is abdicated to defense counsel. There no longer are any business incentives to protect the reinsurer.

- If the claims are handled by the individual insureds, then the situation may be worse. The insureds likely are ignorant of the law and inexperienced in handling claims. Therefore, they rely more heavily on defense counsel, driving up the cost of the claim and the size of legal fees.

- To avoid personal liability, the insured may assign its rights under the policy to the plaintiff in exchange for a release. Since the plaintiff now expects to receive only a portion of any settlement amount, the plaintiff may demand and the insured may agree to a larger settlement than might otherwise be warranted. Review procedures by the liquidator try to minimize this, but it still happens. Larger than normal settlements will affect the reinsurer's liabilities more than the insurer's liabilities.

There always will be the risk that reinsurance liabilities increase significantly under a liquidation. While a responsible liquidator will use every means to minimize these effects, there are no guarantees that it will not happen. Therefore, the reinsurer might be willing to pay extra to avoid this risk. Since the reinsurer's liability under the contract is more uncertain than usual, the reinsurer may wish to commute the contract to:

- eliminate qualified audit opinions and adverse footnotes to its financial statements;

- further other business plans, such as a corporate reorganization, stock offering, merger or acquisition; or

- mitigate the administrative cost of managing a "run-off" treaty, conducting audits, investigating every claim, and disputing questionable claims.

A commutation payment equal to the present value of a somewhat inflated loss amount probably will still be less than the ultimate losses ordinarily incurred under the contract. By commuting, the reinsurer actually enhances its surplus, but at the loss of future investment earnings. This is another way that a commutation resembles a loss portfolio transfer.

Why the Cedant Commutes

Given the protection of the insolvency clause and the inherent risk of increased liabilities, why then would the cedant commute? There are several reasons. Most insolvencies are caused by poor management; poor management usually manifests itself in virtually every operation of the company. Failure to follow the terms of the treaty is common. Examples are:

- delegating underwriting authority to managing general agents in violation of contract terms;

- failing to report losses to the reinsurer when they exceed a threshold amount or when injuries fall within certain prescribed categories; and

- ceding classes of business that are specifically excluded from the contract.

There usually are valid arguments that the reinsurer should provide coverage of all claims, but those arguments are not all foolproof. Furthermore, the cost of claim-by-claim arbitrations would waste the assets of the company's estate. A commutation can settle all disputes in one negotiation, without expensive litigation, and may allow the cedant to recover at least some of the claims that otherwise might not have been covered under the contract.

The cedant may also need to convert its asset for reinsurance recoverable into cash so that it can pay as much as possible as soon as possible to its creditors. It can thus avoid a prolonged and expensive liquidation. It may also give the company the funds it needs to pursue other uncertain assets (such as agents' balances, subrogation recoveries, and legal claims against management, auditors, agents and brokers, owners and others who have negligently contributed to the insolvency).

SOLVENT CEDANT
INSOLVENT REINSURER

This situation is my personal favorite. It has been the practice of many companies to purchase reinsurance from the "cheapest guy in town!" The results of this practice were exactly what one should have expected — "You get exactly what you pay for!" I know of several situations where primary companies, caught up in irresponsible price competition, purchased a lot of reinsurance for a small fraction of the expected claims. They later found out that they have to pay for their own irresponsible (or total lack of) underwriting. Consider this (far from complete) list of liquidating reinsurers:

- American Centennial Insurance Company,
- American Independent Reinsurance Company,
- Constellation Reinsurance Company,
- Dominion Insurance Company,
- Fremont Reinsurance Corporation,
- Mead Reinsurance Corporation,
- Mentor Insurance Company, Limited,
- Mission Insurance Company,
- Northeastern Insurance Company of Hartford,
- Omaha Indemnity Company,

- Resolute Reinsurance Company,
- Transit Casualty Company,
- Union Indemnity Insurance Company,
- Universal Reinsurance Corporation, and
- various syndicates of the New York Insurance Exchange and the Insurance Exchange of the Americas.

Some of these companies are not insolvent, or at least they haven't yet admitted their insolvency. Those that allegedly are not insolvent have ceased writing new business and continue "to fulfill their responsibilities to their existing clients." This does not necessarily mean they are paying claims; rather, it usually means that they are actively pursuing commutations to avoid recognizing and to eliminate their insolvencies. Commutations are a rational reaction to an irrational market.

How many companies were not affected at all by the impairment or insolvency of at least one of those reinsurers, or perhaps one I have omitted. In the case of companies like Transit and Mission, who wrote both direct business and reinsurance, their ceding companies are out in the cold, reduced to the status of a lower priority creditor. There are no bargains when buying reinsurance.

> As an aside, in September, 1985, I spoke in Kansas City at the Casualty Loss Reserve Seminar about Reinsurance Security. I made the comment that as a consequence of the economics of the reinsurance business, small reinsurers have no place in the market. A senior officer of one of the smaller companies listed above strongly disagreed with my position, citing the success of his own company to refute my comment. They stopped writing business in 1987. My comment stands.

Why the Reinsurer Commutes

The motivations of both parties are much clearer in this instance. The insolvent reinsurer must commute on favorable terms, below the true economic value of its liabilities in order to survive or at least come to a "soft landing.' In addition, the reinsurer saves the cost of administering its business. If it commutes, it no longer needs to audit cedants or verify claims. It settles all its liabilities with one check instead of perhaps thousands of checks. The cedants all benefit because they get more money sooner and the assets of the estate are not wasted on administration costs and lawyers' fees.

Why the Cedant Commutes

On the other hand, the cedant who refuses to commute faces all kinds of horrible consequences. If everyone else commutes first, there may be no assets left for the cedant. Conversely, there are those who hope that everyone else commutes, that the

reinsurer regains solvency, and their claims are paid in full. Naive optimism got them into this mess; why change now? Furthermore:

- The financial statements of the cedant (and perhaps its non-insurance parent) may be qualified (or at least footnoted) by its independent auditors. This may interfere with many corporate activities, cause a significant drop in stock price, and possibly lead to adverse takeover activities.

- All amounts due from the reinsurer are non-admitted assets; therefore, the cedant experiences loss, perhaps material loss, of statutory surplus. This often causes a reduction in or loss of its rating; its capacity to write business is reduced; and it often results in adverse selection.

Finally, if the amounts are significant, failure to commute may result in the impairment or insolvency of the cedant, and ultimately, its liquidation. In some cases, it doesn't matter. Either way, the cedant is destroyed. In my experience, some ceding companies, particularly those with large recoverables, take a while to realize that they must commute, but eventually they do.

Individual versus Group Commutations

In the above discussion, I have assumed that the liquidation of the reinsurer is negotiated with individual cedants. This need not always be the case. It is possible with regulatory support and court approval to:

- estimate the amounts due each cedant,

- compare the total of these amounts with the known assets of the reinsurer, and

- distribute to each cedant an equal proportion of its estimated recoverable amount.

Such an approach is being tried in at least one situation. The only result I see thus far is a competition for the highest fees between the court-appointed liquidators, the actuaries, and the lawyers.

In the commutation legislation being proposed in New York, this issue remains open and presumably will be addressed either by regulations or on a case by case basis. Will the commutation formula have to be the same for all cedants or will the Superintendent approve separately negotiated arms-length commutations with each

commuting party? My experience seems to indicate that individually negotiated commutations are more likely to succeed. There should, however, be a target discount (percentage of ultimate losses, case reserves, etc.) for each commutation that allows the reinsurer to reach a "soft landing." If the commutation does not reduce the insolvency of the reinsurer at least proportionately, then it should not be approved. Capital infusion plans by parent companies or potential investors can change this requirement.

INSOLVENT CEDANT
INSOLVENT REINSURER

My first comment is, "Good Luck!" Hopefully, this scenario will remain rare. A big difference in the two situations described above is in who has an advantage in negotiating a commutation. If one party is solvent and the other is insolvent, then the insolvent party usually has an advantage. Furthermore, as a wise old lawyer once told me, "If you have the money, they have the problem!" Therefore, since the reinsurer has the money, the reinsurer has an advantage. When both parties are insolvent, the reinsurer has a clear advantage.

The double insolvency case therefore resembles the case with an insolvent reinsurer and a solvent cedant. There is, however, at least one difference. Since both parties are insolvent, it likely will be necessary to obtain the approvals of courts and regulators in two jurisdictions. The commutation should not favor the insolvent cedant more than any other cedant of the insolvent reinsurer; otherwise, a voidable preference may exist. A possible solution is for both parties to retain an independent actuary or reinsurance expert jointly to calculate the commutation value.

Alternatively, both parties could retain their own actuaries. Let the actuaries calculate commutation values independently. Ground rules, based on the size of the reinsurer's insolvency and any disputed coverage items, should be established. The actuaries compare assumptions and results and resolve as many differences as possible. Finally, they agree about the remaining areas where their results differ. Others then negotiate the commutation and resolve those remaining differences, subject to the final approval by the liquidators, the regulators, and the courts.

If the actuaries cannot agree, then a third actuary, chosen by the two actuaries, can be retained as an umpire, similar to an arbitration procedure, but with less formality. Rather than allowing the umpire to compromise the two results (by picking a number in between the two results), the umpire must pick the commutation value as calculated by one or the other. This keeps the actuaries more realistic in their calculations. The size of the difference between the two results usually is smaller under this system.

SOLVENT CEDANT
SOLVENT REINSURER

When both parties are solvent, neither has an unfair advantage. There needs to be a commonality of interest to save administration costs on a run-off treaty or to resolve disputes. When a valid business purpose exists, a mutually acceptable commutation usually can be negotiated. Some contracts even contain special commutation clauses. Commutation procedures could be added as an addition to the arbitration clauses of many reinsurance treaties. It always is easier to agree on an approach before a dispute exists.

SUMMARY OF NEGOTIATIONS

Most of you probably are in the position of the solvent party, a position of disadvantage. However, you never know when you might be on the other side of the table. When faced with negotiating a commutation of any reinsurance contract, you should know where you stand. One should follow these rules:

- Understand the contracts thoroughly, not just the written words, but also the way the contract has been handled by both parties.
- Understand the situations and motivations of all parties, including the liquidators, the regulators, and the courts.
- If possible, resolve underwriting and coverage disputes before calculating ultimate losses or commutation values.
- Calculate ultimate losses, the present value of ultimate losses, and commutation values based on the agreed coverages. Also calculate the magnitude of any remaining disputed items.
- Be realistic (and be sure your actuaries are realistic) about quantifying liabilities and the potential for recovery, recognizing the solvency of the parties.
- If necessary, use a modified arbitration procedure to resolve any remaining differences.

Avoid reinsurance security problems. Buy only the reinsurance you need. Do not be lured by cheap reinsurance. Buy reinsurance only from "top quality" reinsurers. Use smaller reinsurers only with extreme caution. Ratings mean virtually nothing. You should evaluate reinsurers for yourself or hire someone competent to do so. As we learned in Economics 101, "There is no such thing as a free lunch!"

MS. HUTTER: Thank you, Dale. Our next speaker this morning is Jeffrey Mayer. Jeffrey is a consulting actuary with the New York office of Milliman & Robertson. Prior to joining M&R, Jeffrey was a vice president with Kramer Capital and, prior to that, spent five years with Peat Marwick.

Jeffrey is a Fellow of the Casualty Actuarial Society and a member of the American Academy of Actuaries. He is a frequent speaker at the CAS and other actuarial forums. Jeffrey has authored a paper for the CAS 1988 Call Paper Program, has served on the CAS Examination Committee and currently serves on the American Academy Committee on Property and Liability Issues.

Jeffrey will now discuss the considerations in establishing a commutation price.

MR. MAYER: Good morning. Thanks, Heidi. Firstly, Dale, you were not nearly as controversial as we thought you would be over dinner last night.

The following is the situation that I will discuss: A company, commonly referred to in these situations as the ceding company, has decided that it is in their best interest to cancel their contract with their troubled reinsurer. Dale told them that it made sense to do that.

The ceding company now must calculate, with accuracy, its excess losses, a portion of the distribution that in the past it may not have paid significant attention to. I say "with accuracy", because they are going to get only one shot to do this calculation. Once the losses are transferred and consideration is paid, for the most part, business is done.

This is the scenario we will use in going through the exhibits. The five major pricing issues that we consider are: The amount of the future payments, what we refer to as the reserves, the population of losses being commuted. That includes case reserves, the case development, reserves that have been reported but have not been reported in the excess layer and reserves that have not been reported altogether -- total population of losses.

Number two is the timing of payments. For the most part, when loss reserving is done, consideration to the timing of payments is not a top priority. We are more concerned with the ultimate losses; when the payments are made is not quite as important. In this case, timing of payments is at least as important as what the ultimate value will be.

Thirdly, the interest rate. Once we have determined the ultimate population of losses, the reserves, once we have determined the timing of payments, we need to take the time value of money into account using a particular rate of interest. Is eight percent right? Is 35 percent right, as Dale suggested might be the case?

Fourth, the economic value of risk. Once we've done the calculations, have put pencil to paper, we have a number. Depending on whether I'm the primary company or the ceding company, I must determine the amount of risk I can tolerate. Do I want to assume an excess layer, a layer that I've never in the past had to really consider, or would I rather take the risk of waiting to see whether my troubled reinsurer can make it. One's risk aversion, or lack thereof, will certainly influence the price.

Finally, the financial implications of how these numbers get booked on the financial statements must be considered. I'm going to probably spend no more than five seconds on that at the end, enabling Scott Moore to do justice to this issue.

Let's talk about the IBNR valuation. As I started to say, the sources of IBNR are as follows: case development, normal case reserve developing up or down. Primary companies have that; reinsurers have that; it needs to be taken into account.

Number two are the truly unreported claims -- those claims that are external to the company; they have not been sent to the mailroom; they are not on the computer yet; they truly are external to the process, one, two, three, five, fifteen, twenty years away from being reported.

Third, those claims which have been reported to the primary company. They are below their retention, say, in an excess situation; they just have not gotten up to the excess layer. So, they are IBNR to the reinsurance layer but certainly need to be taken into account. In effect, that could be considered a subset of case development on the smaller claims actually developing up to the excess layer.

From the individual ceding company's perspective, the excess layer data presents a whole host of problems, some of which they didn't have to deal with when they were working with the net layer. One is the aberration of data. In all likelihood, the excess layer will be more erratic and more difficult to predict than losses limited to $50,000 or $100,000 or $200,000 or whatever the layer may be.

Instability -- possibly, the number one reason why you bought the reinsurance in the first place, in order to avoid that instability, and that is something that the ceding company needs to deal with. Do we perform a treaty by treaty analysis? Is that valid? It may or may not be.

From the industry perspective, we won't talk about the proverbial RAA studies and making use of the information in those studies. That's not altogether wrong and there is a lot of logic to that, but there are a couple of caveats that need to be made.

One is that the ceding company, in doing the evaluation, needs to be -- what's the right term? -- intellectually honest with themselves in recognizing that their business -- because, after all, it is their underlying business that's being ceded or now reassumed -- may very well be worse than the average RAA. Stated another way, not everybody can be better than the RAA.

Just a couple of observations. The RAA, over the last couple of years, seems to have been developing trends higher than might have been the case in years past, and that certainly should be reflected.

(Slide)

I will discuss a couple of techniques and some methodology and thoughts that one should have when evaluating the excess layer for purposes of the commutation and the reassumption of those excess losses. Firstly, data that one wants to look at is the typical data that one would have in a reserve study.

At this point, what we are doing is really no different than a very rigorous loss reserve study; one which has not only paper consequences in terms of does it go up on the balance sheet on line one or is it below the line in the surplus account but actually translates into economics in real dollars.

Some of the information that you want to have is the paid losses, outstanding losses, the paid allocated expenses, the claim counts, gross, net, ceded, policy limit profiles, exposures, and basic qualitative knowledge of the business. This is not necessarily exhaustive. Whatever one might think they'd like to have in a loss reserve study, they should try to get as part of the commutation analysis.

The advantages that the ceding company has over, say, somebody else who might be trying to assume these excess losses would be supposedly a better knowledge of the underlying book of business. After all, they wrote the underlying policy. The pitfall is that the data may be too unstable to project with any sort of confidence.

The ceding company, again, is doing this type of analysis possibly for the first time. The data history may be too short to measure the tail. Again, projecting the tail is a problem that comes up in all reserve studies. The ceding company probably has their way around that when doing a net analysis, with the ceding layer and the excess layer. Probably the leveraged part of the excess layer is more significant than it is on the net data.

The company may very well not have a proper appreciation for how large that tail is, what the relationship of IBNR to case reserves is and might be. The ceding company must be very careful to not allow its intuition, which in all likelihood may be woefully too short, get in the way of doing a proper analysis.

Some possible approaches, one of which we will discuss with a particular example in a few minutes, is doing a net development and a gross development, subtracting the two, producing an estimate of the ceded losses; doing an actual ceded development analysis, the type which we'll get to in a little while, just taking a look at incurred losses and paid losses for the excess portion only.

We are looking at ceded losses and using industry development factors if we feel the internal factors to this particular contract are too unstable. Another way of doing a net loss projection and one which has probably been done many times by the company is applying industry increased limited factors in order to gross it up and then the difference becomes the ceded excess losses under the contract.

I'm sure there are other approaches. These were the three to four approaches that probably would be most common.

The advantages for the assuming company, who is now transferring these losses back to the ceding company is that, in theory, they should have a greater familiarity with the excess business, with excess development, what the pitfalls and problems are and so on.

In all likelihood, they have a larger data base with this type of information. It is their bread and butter, and they probably have factors external to the company for that type of analysis. A longer data history may be available; better appreciation for the tail, as we discussed a minute ago, about how the ceding company may not have the proper appreciation. In fact, the assuming company or the reinsurer may have a better appreciation for that tail.

The pitfalls are that if a reinsurance company had a proper appreciation, they wouldn't be in the mess that they're in right now.

The payment pattern -- a dollar paid today costs a heck of a lot more than a dollar paid five years from now, and that needs to be properly taken into account.

The RAA does not publish the payment data as they have for the incurred losses. There is some school of thought that says that, for the excess layer, the payment pattern is not that much longer than the reporting pattern at the excess layer. Once that excess layer is reported to the company, payment is not too far behind. Conservatism probably has a place for the ceding company who is now reassuming.

The interest rate. I'm not in any better position to discuss what interest rate is proper. I think all of you would have a good feel for what that would be. Probably using a no risk rate makes sense. The length of the security of the vehicle used to finance the commutation should be compared to the pay-out pattern, probably conservative, on the short side.

A lower rate would make sense for negotiating purposes. If eight percent is the right Treasury note risk rate or eight and a quarter or whatever the number might be right now, and if the investment department of the company feels they can get nine or ten percent, that's something they can consider for themselves. But, for starters, probably a no risk rate makes the most sense.

The economic value of risk. We do the analysis, we put pencil to paper, we come up with a nice, "expected type" number, an actuarial number, a certifiable number, one that makes a whole lot of sense, but now the question is: How much risk do we want to assume?

Does the ceding company feel comfortable assuming these estimated, ultimate losses? If not -- but if they feel they really have to because the reinsurer is not likely to pay them a hundred cents on the dollar, that needs to be factored in.

On the other hand, do they want to possibly wait and see whether they'll get a hundred cents on the dollar, or is the likelihood of getting eighty cents on the dollar better than assuming the risk of taking this excess layer, one that they don't feel particularly comfortable with?

I'm going to skip over the financial effects for a minute and get back to that at the end. We'll go right into the example now. Just the typical triangle of incurred ceded losses. There is nothing particularly fancy, nothing erratic about this example. I'm just trying to demonstrate how one might project the ultimate losses.

I will assume a familiarity with the triangle and development factors. Using this analysis, the data goes out 72 months. A judgment needs to be made about the tail factor. In this case, we selected four percent. That may or may not be right, but certainly -- again, as I mentioned earlier -- one must be sensitive to how long that tail on the excess business might be.

Certainly significantly higher than the net tail factor, and higher than the gross factor; the excess tail should be the highest if you were trying to rank those three.

Making use of these factors, we project the ultimate ceded losses on the far right corner. We can do this using incurred losses or, as the next exhibit shows, we can do that using paid losses. Obviously, we can use a whole host of other methods, but now I am only using incurred and paid.

The importance of the paid development is not only in the fact that it can lead to an independent estimate of the ultimate ceded reserves but that, in fact, it is the paid development which will determine the payout pattern.

As you can see on the bottom line, what is implied by our paid selections are that these excess ceded losses, will pay out approximately 18 percent in the first 12 months from the beginning of the year. By the end of 24 months, we've paid out roughly 45 percent; that grows to 69 percent and so on.

It is that pay-out pattern that can independently be used to project the ultimate ceded losses but, at least as importantly, it is what is used to project the payment pattern, the timing of the payments, that we discussed just a minute ago.

Once that is done, and we now have our ultimate losses, our ultimate reserves, and our pay-out pattern, we spread these by future calendar year. We start with our ultimate losses. We subtract the paid losses through 12/88, if that's the evaluation date, and the difference gives us the reserve, the population of losses that are now being reassumed by the ceding company.

Using the payment pattern on the bottom line of the pattern exhibit in distributing over the years, produces payments in calendar year '89, calendar year '90, 91 and so on. The $8.4 million of reserves of December '88 pay out, in this particular example, fairly quickly, approximately $3.2 million in the first calendar year subsequent to the reserve analysis, another 2.2 million in the second year and so on.

For this example I've used a discount rate of seven percent; that may or may not be the right thing to do if we were doing an analysis at this point. We present value back, taking into account the time value of money of these losses, assuming that all losses are paid midway through the year.

The 1989 losses of $3.2 million will earn seven percent for approximately half a year; the $2.2 million for about a year and a half and so on. The discounted value of the $8.4 million is approximately $7.4 million.

Forgetting expenses for a minute, we're done. We stop right now if no negotiating was taking place, no concern of risk aversion and so on. We would say that for purposes of reassuming the $8.4 million, the ceding company needs to receive a check for $7,418,000. That $7,418,000 would be the proper number to fully pay off the liabilities of $8.4 million over the appropriate eight or ten years.

For the purposes of conservatism, what I call massaging the pay-out pattern might be a reasonable way to temper some of the risk. If the 17.8 percent, 44.6 percent and so on; the pay-out pattern that we consider to be the best, the expected, proper pay-out pattern, in effect, the ceding company who is now reassuming these losses may very well want to calculate the present value using a skewed, shorter pay-out pattern, one that would be more conservative.

An alternative pay-out pattern was picked, in no particular scientific way; this pay-out pattern is faster than the one previously used. That alternate pay-out pattern used and applied the same way as the original pay-out pattern, produces a present value of $7.6 million.

The example is not that sensitive to the differences; instead of getting the $7.4 million as with the prior pay-out value, we now get $7.6 million. Again, we are done, if there were no other expenses to be considered, no other risk factors, no other negotiating factors; consideration of $7,630,000 would be transferred from the reinsurer to the ceding company for purposes of commuting the $8.4 million of liabilities.

This is the example; that's the process. Obviously, there are other issues. Firstly, there would be accounting issues which I will touch upon in just one second and then turn it over to Scott. There are negotiating issues. Is $7.6 million the number that the reinsurer had in mind?

In all likelihood, he probably believes that the undiscounted reserve number is less than $8.4 million. He probably has lower reserves on his books than the $8,447,000. What ultimately gets settled for is not going to be solely a function of what the actuaries calculated by putting pencil to paper; that's the starting point.

The final number will be the result of a whole host of factors, including, again, the risk aversion of the ceding company to either taking on this business versus waiting for a potentially insolvent reinsurer.

I will just go back to the fourth exhibit in the narrative and talk about the financial effects.

(Exhibit)

The actual long-term effect -- by long term, I mean the actual economic value effect, forgetting statutory accounting. The actual long-term economic businessman's effect is the difference between the settlement and the ultimate discounted value of the losses.

If we have done it correctly and, in fact, they received $7,418,000 and we were correct that's what the ultimate loss on a discounted basis settled out for, then, in fact, the economic effect is zero; it was a wash.

The short-term effect, which might be referred to as the reporting effect, the statutory accounting effect, is the difference between settlement, which is discounted losses and the corresponding carried reserves that the ceding company now needs to put up.

They may have received discounted consideration for the losses, but they are responsible and required to put up undiscounted losses. The short-term effect in our example would have been the difference between the $8,447,000 of undiscounted reserves and the roughly $7.4 million of premium or the effect of $1 million hitting the surplus.

Hopefully, on an economic basis, at worst, it's a wash and if they are lucky, maybe they've broken enough conservatism to carry it.

I'm going to turn it over to Scott.

(Applause)

MS. HUTTER: Thank you, Jeffrey. Our last speaker this morning is Scott Moore, who will discuss the accounting treatment of commutations. Although Scott is speaking last in the lineup this morning, the financial impact of a commutation usually is an integral part of the negotiation process for each party.

Scott is a partner in the firm of Coopers & Lybrand in New York. He has been with Coopers & Lybrand for eleven years, where he specializes in the insurance and reinsurance industry. Scott?

PRICING AND COST CONSIDERATIONS OF LOSS COMMUTATIONS

Jeffrey H. Mayer, FCAS, MAAA
Consulting Actuary

I. Major Pricing Issues

A. The Amount of Future Payments (IBNR Evaluation)
B. The Timing of Payments
C. The Interest Rate
D. The Economic Value of Risk
E. The Financial Effects

II. IBNR Evaluation for Casualty Excess of Loss

A. Sources of IBNR

1. Case development
2. Unreported claims
3. Reported claims which are unreported to the excess layer.

B. Individual Ceding Company Perspective

1. "Aberrations" in the data.
2. Instability - or - that's why you bought reinsurance in the first place.
3. Is "Treaty by Treaty" analysis helpful?

C. Industry Perspective - The R.A.A. Data

1. Everyone is not better than average.
2. It is not necessarily dominated by hazardous risks and high layers; it really can be representative.
3. There is a great deal of variation between companies in the data base.
4. The development pattern has been worsening over time.

III. Evaluation by the Ceding Company

A. Information

1. The ground-up data base
   a. Paid losses
   b. Outstanding losses
   c. Paid A.L.A.E.
   d. Claim Counts

2. Gross, net, and ceded data triangles

3. Policy limits profiles

4. Knowledge of the book, changes in the book

5. Premiums, other exposure information

B. Advantages

1. Better knowledge of the business

2. Better information about the underlying (net) business

C. Pitfalls

1. Data may be too unstable for analyzing higher layers.

2. Data history may be too short for measuring the tail.

3. Company may have inadequate appreciation of the extent of the excess development tail.

4. The IBNR/Case Ratio: A "reasonable" value may be a lot higher than you think. Your intuition may fall woefully short.

D. Possible Approaches

1. Net Development vs. Gross Development

2. Ceded Development or Ceded Losses times Industry Development Factors

3. Ultimate Net Losses times Increased Limits Factors

IV. Evaluation by the Assuming Company

A. Advantages

1. Greater familiarity with excess business, excess development

2. Larger data base, possible including other similar books of business

3. Longer data history may be available

B. Pitfalls

If I understood this business so well, I wouldn't be in this mess.

V. The Payment Pattern

-The R.A.A. does not publish payment data.

-The lag from report to payment may be shorter than you think.

-A lagged reporting pattern may be a reasonable approximation.

-Faster than the reporting pattern is not reasonable.

VI. The Interest Rate

-Use a "no-risk" rate.

-Length should correspond to the payment pattern, on the short side.

-Using higher rates may be a means for arriving at an amount less than full value.

VII The Economic Value of Risk

-The discounted value of projected payments is less than a "fair" value for a commutation.

-Financial distress of the reinsurer changes the risk characteristics of the transaction.

VIII. Financial Effects

-Actual (long term) effect is the difference between the settlement and the ultimate discounted value.

-Short term effect is the difference between the settlement and the corresponding carried reserves.

CEDED INSURANCE COMPANY

INCURRED LOSSES CEDED TO ASSUMED REINSURANCE BY YEAR

DECEMBER 31, 1988 - 000'S OMITTED

ACCIDENT YEAR	12	24	36	48	60	72	ULTIMATE CEDED LOSSES
1983	1,100	1,650	2,145	2,381	2,500	2,550	2,652
1984	1,250	1,938	2,480	2,802	2,937		3,115
1985	1,450	2,088	2,652	2,890			3,216
1986	1,600	2,432	3,186				3,935
1987	1,770	2,673					4,259
1988	1.900						4.553

LOSS DEVELOPMENT FACTORS

ACCIDENT YEAR	12 24	24 36	36 48	48 60	60 72
1983	1.500	1.300	1.110	1.050	1.020
1984	1.550	1.280	1.130	1.048	
1985	1.440	1.270	1.090		
1986	1.520	1.310			
1987	1.510				
SELECTED	1.504	1.290	1.110	1.049	1.020
CUM SEL	2.396	1.593	1.235	1.113	1.061

TAIL FACTOR: 1.040

CEDED INSURANCE COMPANY

PAID LOSSES CEDED TO ASSUMED REINSURANCE BY YEAR

DECEMBER 31, 1988 - 000'S OMITTED

ACCIDENT YEAR	12	24	36	48	60	72
1983	469	1,173	1,818	2,182	2,357	2,451
1984	598	1,471	2,206	2,559	2,769	
1985	534	1,363	2,167	2,643		
1986	717	1,771	2,710			
1987	737	1,901				
1988	809					

LOSS DEVELOPMENT FACTORS

ACCIDENT YEAR	12 24	24 36	36 48	48 60	60 72
1983	2.500	1.550	1.200	1.080	1.040
1984	2.458	1.500	1.160	1.082	
1985	2.550	1.590	1.220		
1986	2.470	1.530			
1987	2.580				

SELECTED	2.512	1.543	1.193	1.081	1.040	1.030	1.020	1.010	
CUM SEL	5.625	2.240	1.452	1.217	1.126	1.082	1.051	1.030	1.020
% PAID	17.8%	44.6%	68.9%	82.2%	88.8%	92.4%	95.2%	97.1%	98.0% 100.0%

CEDED INSURANCE COMPANY

EXPECTED PAYOUT OF RESERVES

ACCIDENT YEAR	EXPECTED ULTIMATE LOSS	PAID AS OF 12/31/88	RESERVE AS OF 12/31/88	FUTURE PAYOUT OF RESERVES: 1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
1983	2,652	2,451	201	73	50	26	52	0	0	0	0	0	0
1984	3,115	2,769	347	110	86	59	30	61	0	0	0	0	0
1985	3,216	2,643	573	214	114	89	61	31	63	0	0	0	0
1986	3,935	2,710	1,225	524	262	140	109	75	38	77	0	0	0
1987	4,259	1,901	2,357	1,031	567	283	151	118	81	41	84	0	0
1988	4,553	809	3,744	1,224	1,103	606	302	162	126	87	44	89	0
TOTAL	21,731	13,284	8,447	3,177	2,183	1,204	707	447	309	205	128	89	0

CALCULATION OF DISCOUNTED RESERVES

DISCOUNT RATE: 7.0%

DISCOUNT FACTORS:	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
	0.967	0.903	0.844	0.789	0.738	0.689	0.644	0.602	0.563	0.526
DISCOUNTED FUTURE PAYMENTS:	3,071	1,972	1,016	558	330	213	132	77	50	0

DISCOUNTED VALUE OF RESERVES: 7,418

994

EFFECT ON DISCOUNTED RESERVES OF PAYOUT PATTERN

ORIGINAL PAYOUT PATTERN:

	NUMBER OF MONTHS:									
	12	24	36	48	60	72	84	96	108	120
% PAID	17.8%	44.6%	68.9%	82.2%	88.8%	92.4%	95.2%	97.1%	98.0%	100.0%

ALTERNATE PAYOUT PATTERN:

	NUMBER OF MONTHS:									
	12	24	36	48	60	72	84	96	108	120
% PAID	36.0%	64.7%	80.9%	90.6%	94.2%	97.1%	99.0%	100.0%	100.0%	100.0%

CEDED INSURANCE COMPANY

EXPECTED PAYOUT OF RESERVES USING ALTERNATE PAYOUT PATTERN

ACCIDENT YEAR	EXPECTED ULTIMATE LOSS	PAID AS OF 12/31/88	RESERVE AS OF 12/31/88	FUTURE PAYOUT OF RESERVES: 1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
1983	2,652	2,451	201	133	68	0	0	0	0	0	0	0	0
1984	3,115	2,769	347	170	117	60	0	0	0	0	0	0	0
1985	3,216	2,643	573	221	173	119	60	0	0	0	0	0	0
1986	3,935	2,710	1,225	623	233	181	125	64	0	0	0	0	0
1987	4,259	1,901	2,357	1,081	649	242	189	130	66	0	0	0	0
1988	4,553	809	3,744	1,682	946	568	312	165	113	58	0	0	0
TOTAL	21,731	13,284	8,447	3,911	2,185	1,169	586	359	180	58	0	0	0

CALCULATION OF DISCOUNTED RESERVES

DISCOUNT RATE: 7.0%

DISCOUNT FACTORS:	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
	0.967	0.903	0.844	0.789	0.738	0.689	0.644	0.602	0.563	0.526
DISCOUNTED FUTURE PAYMENTS:	3,781	1,974	987	462	264	124	37	0	0	0

DISCOUNTED VALUE OF RESERVES: 7,630

MR. MOORE: Good morning. Heidi, thank you.

As evidenced from Jeffrey and Dale's discussion on pricing and negotiating commutation agreements, there is a considerable amount of data that has to be gathered and evaluated to structure the agreement on terms that are agreeable to both parties.

A significant level of professional judgment is involved, because there is considerable business risk and uncertainty. As you can imagine, this presents some interesting challenges in determining the accounting treatment.

Before we engage in a discussion of the accounting treatment for commutations, I'd like to spend a couple of minutes reflecting on the significance of reinsurance recoverable to the insurance industry.

This first graph (Slide 1) presents reinsurance recoverable as a percentage of policyholders' surplus, the bar to the right repreents the industry in total and the bar to the left, represents the reinsurance industry. As you can see from the graph, the industry has reported reinsurance recoverables equal to approximately two hundred percent of reported policyholder surplus.

Similarly, the reinsurance industry has reported about one hundred percent. Clearly, the significance of reinsurance recoverables is evident. This graph is based on reported information as contained in Best's Aggregates and Averages. The accuracy of these graphs is contingent on the accuracy of the ceded IBNR number that is reported in the annual statements.

The next graph (Slide 2) focuses on reinsurance companies. The first bar on the graph represents reinsurers who operate through the broker market and the second bar on the graph represents reinsurers who operate directly with ceding companies. The source for this is a study prepared by Nac Re for the 25 largest reinsurance companies who are members of the Reinsurance Association of America.

The graph indicates that for the broker market, the reinsurance recoverable amount is considerably more significant. While the percentages are very large, I don't view them in and of themselves as being alarming, providing that the ceding companies and the reinsurers have the proper mechanisms in place to track those recoverables and monitor the ability of the reinsurers to fulfill on the obligations assumed under the reinsurance agreements.

However, to the extent that these balances become questionable in terms of their collectibility or if they are going to have to be settled at some amount less than the full credit that's been taken in the financial statements, such as in the case of commutation agreements, the impact could clearly be significant.

This (Slide 3) will probably be your third or fourth definition of a reinsurance commutation. Just to review, a commutation is the reversal of an existing reinsurance agreement whereby the original ceding company reassumes the losses ceded to the reinsurer in exchange for consideration.

Jeff commented that the consideration is generally a discounted value, with the view that if properly invested, the original ceding company would be able to build a fund to cover the full extent of the liability being reassumed.

In (Slide 4) determining the accounting treatment for reinsurance commutations, there were several factors which had to be addressed. Some of the questions which had to be answered were: Could there be different treatment for the ceding company and the reinsurer or is symmetry in the accounting model necessary?

What is the effect, if any, of the gain or loss on the commutation? Should the gain or loss be reflected in the results of operations or reflected directly as an adjustment to surplus? If the gain or loss is reflected in the income statement, should it be reflected in underwriting income or in some other income or expense category?

There are questions about which balance sheet accounts would be impacted; questions about the impact on supporting exhibits and schedules in the annual statement; and the type of disclosure that will be needed in the annual statement.

If (Slide 5) the gain or loss on the commutation is reflected in underwriting results, it is potentially distortive with respect to the underwriting results that are being reported in the annual statement. That's not unique to the industry. Reserve strengthening and adverse development have distorted the current results over the years.

With respect to the impact on Schedule P many look to Schedule P to provide a view loss development and reserve adequacy. That will be potentially distorted by the effect of a commutation agreement if the Schedule P detail is to support the amounts reflected in the annual statement.

The value of the five-year historical data, in terms of utility for analysis, could be lessened by virtue of the fact that some of the key trade ratios would be distorted.

One of the arguments in favor of treating the gain or loss as a component of other income or expense would be that it is consistent with the treatment for writing off agent's balances receivable. An argument could be made that there is a similarity here; there is credit risk involved; and, it might be appropriate to eliminate the gain or loss from the pure underwriting results.

There (Slide 6) are a number of balance sheet accounts that have to be considered. I'd emphasize that these considerations have to be identified on the front end, as part of structuring and pricing the agreement.

There are a number of balance sheet captions that need to be analyzed. Obviously, the net result would be that some cash or investments would have to be transferred to satisfy the consideration required under the agreement.

Other accounts that need to be analyzed are the ultimate value of the reserves that are to be reassumed. The reinsurance recoverable balances that have been reflected on the ceding company's financials, and that includes not only the reinsurance recoverable on paid losses, the case reserves, and the IBNR, but also any allowances for uncollectible reinsurance that may have been established and, to the extent that the reinsurer is an unauthorized company, any reserve that's been charged to surplus for the Schedule F penalty.

The other category of balance sheet captions that need to be identified and analyzed would include any reinsurance balances due which would include not only the net balances due as of the date of the commutation through normal reporting and processing under the original contract terms, but it would also include any funds that might be withheld under the terms of the treaty.

Any balances due as a result of retrospective rate credits or any additional commission or contingent commission allowances that have been reflected in the ceding company's or the reinsurer's financial statements must also be analyzed.

To demonstrate (Slide 7) some of the accounting considerations, by way of illustration, let's consider the following assumptions: the outstanding reserves ceded at the time of the negotiation are $100 million. Those are the remaining outstanding reserves ceded by the original ceding company. The discounted value of those reserves is approximately $65 million.

After performing pricing studies and considering all other factors the negotiated settlement price is $55 million. I'll take a couple of minutes now to talk about some of the possible accounting scenarios.

In the first scenario (Slide 8), the reinsurer might argue, that the $100 million obligation has been satisfied by making the $55 million payment. Since there is no further commitment to pay any monies to the original ceding company the reinsurer should recognize a $45 million gain.

The original ceding company might take the position that it would not have entered into this agreement if it had intended to lose $45 million and that the essence of this agreement is to invest the $55 million over time to fund the $100 million. The original ceding company might suggest it should record a liability for $55 million and cash for $55 million, and not recognize any profit or loss on this transaction.

I think this first scenario raises a couple of issues. Both the statutory accounting model and the GAAP accounting model, require that reserves be carried at full ultimate value. Recording the value of these reserves at $55 million would be prohibited; as that would essentially be a form of discounting.

If, in fact, the component of these reserves was workers compensation or perhaps medical malpractice, there might be some provision for discounting under the statutory guidelines.

An alternative proposal might be to record the reserves at $100 million and the cash at $55 million, but also record a deferred charge, an asset equal to the difference of $45 million, which would be amortized over the expected pay-out pattern as the investment income is received.

The issue here is that there would be a question as to the admissibility of the asset, certainly for statutory purposes. For GAAP, the substantive issue would be that this would be tantamount to discounting the reserves.

A second example (Slide 9), which is very similar to the first, using the same dollar amounts and assumptions. The reinsurer would argue, that it has a $45 million gain. It has been realized and, in fact, should be recognized that way, consistent with the first example.

The original ceding company might argue, that the discounted value is $65 million, and since the $55 million received will not be enough to fund the $100 million ultimate liability, they should recognize a loss of $10 million.

The original ceding company would record the liability for $65 million, cash for $55 and an expense for $10 million. Statutory accounting principles and GAAP, require full value accrual accounting. If the original ceding company recorded a deferred charge of $35 million, there would be a question of admissibility for statutory purposes. Again, in substance, we are dealing with a discounting issue.

In the third scenario (Slide 10), both the reinsurer and the original ceding company reflect a $45 million gain and loss, respectively. The reinsurer had a liability of one hundred million, paid $55 million and recorded a gain of $45 million. The original ceding company had a recoverable of $100 million, only realized $55 million and, in fact, has recognized a loss of $45 million.

Until (Slide 11) the last couple of years, there wasn't any authoritative guidance under statutory accounting practices for accounting for reinsurance commutations. There is nothing in the NAIC Accounting Manual. There wasn't any information in the Examiner's Handbook or the instructions to the annual statement or any other authoritative sources.

The NAIC Working Group on Emerging Issues tackled this issue back in 1985 and it is important to note that the same issues arose with respect to the accounting treatment for uncollectible reinsurance. The issues are very similar and the conclusions of the Working Group are virtually the same for both issues.

The (Slide 12) NAIC Emerging Issues Working Group concluded at their meeting of August 5, 1987, that the full gain or loss should be recognized immediately for both the reinsurer and the original ceding company.

Implicit in all of this is that the losses should be recorded at ultimate value and there is no provision for any deferred charges. Thus, Scenario C (Slide 13), where there was symmetry in the accounting where the $45 million gain and loss is recognized, is consistent with the conclusions of the Working Group.

Secondly (Slide 14), the gain or loss should be reflected in underwriting income. There is no provision for direct charges or credits to surplus and there are no amounts reflected in other income or other expense, and no provisions for any combination of those.

The one instance where you would have a direct debit or credit to surplus would be where the ceding company did not have the recoverable fully collateralized from an unauthorized company and, as a result of the commutation, in going through the calculations of the Schedule F reserve, there would be a credit to surplus for the Schedule F penalty.

The third conclusion (Slide 15) was that all amounts involved in the commutation should be reflected in the income statement on the balance sheet and reflected in the pertinent exhibits and schedules, including Schedules P and F.

All losses and loss adjustment expense entries resulting from the commutation should be made in Schedule P to the appropriate accident year and the year in which the transaction occurs. This will be significant for performing various reserve studies.

The fourth (Slide 16), (Slide 17) conclusion was that all of the balance sheet accounts should be analyzed and should be effected to reflect the economics of the transaction. It can get pretty complicated looking at the debits and credits, but it shouldn't be a big task at the accounting stage because all of these account categories have to be identified as part of structuring the settlement arrangement.

The fifth (Slide 18) conclusion is a requirement for specific separate note disclosure for material amounts related to loss commutation agreements.

With respect to GAAP (Slide 19), there is really no authoritative guidance on accounting for reinsurance commutations.

The issue was discussed (Slide 20) some time ago by the AICPA's Insurance Companies Committee. There was a draft discussion memorandum several years ago. However, my understanding is that there haven't been any formal conclusions reached by that group.

It is safe to say there has been some divergence of practice in accounting for commutation agreements and the level of disclosure that exists. I don't think there will be any formal guidance on this until the loss reserve discounting issue is resolved. That issue is on the Financial Accounting Standards Board (FASB) agenda but it appears that it will be several years before the FASB develops a definitive position on discounting of loss reserves.

In practice, companies are going to have to use the best information available. The statutory accounting model makes a lot of sense and is the treatment that would leave companies open to the least criticism.

It just seems inappropriate for a ceding company, using the fact pattern from the example, to take credit over a number of years for the reinsurance recoveries in the financial statements, build up surplus of $100 million and then when circumstances, such as a loss commutation indicate that they will never realize the full $100 million to then defer the loss when, in fact, they know that the value of the credit they have taken over time has been impaired. That type of situation and that accounting treatment could lend itself to potential abuses, including manipulation of reported financial results.

There is no authoritative guidance that has come from the SEC. Informally, I am aware of instances where the SEC has indicated that they do not support any deferral of the loss recognition by the original ceding company.

I understand that there was at least one instance where the SEC became aware that a company had entered into a commutation agreement, through either reading management's discussion and analysis or a note disclosure, and inquired directly of the company the accounting treatment that was afforded.

The company had followed the statutory model and that was consistent with what the SEC was looking for. So although there is nothing formal the indications are that the SEC would look for companies to recognize any loss on a commutation arrangement.

The key here, in addition to appropriate accounting is for the reader of the financial statements to have meaningful note disclosure when the results of operations for the year are significantly impacted by one or two single agreements, such as loss commutations.

A (Slide 21) couple of other considerations. As I previously noted, the effects of the commutation must be reflected in Schedule P. The affected losses must be allocated by accident year. For any actuarial analysis, where loss development is being presented for purposes of analyzing the development and assessing reserve adequacy, to the extent that there are loss commutations in the data they need to be analyzed so that their impact on the loss development can be understood.

In the example, the ceding company would reflect adverse development a number of years out, across all accident years, to the extent of the loss of $45 million. Likewise, the reinsurer's Schedule P would show favorable development of $45 million, because it was able to settle reserves of $100 million for a $55 million payment.

From a loss reserve development and analysis perspective there are two approaches that could be taken: One, some judgments could be made to override the distorting effect on the loss development trend. Secondly, depending on how pervasive the reinsurance program was throughout the accident years, one might consider going back and restating the data as if the reinsurance program hadn't been enforced, so that there was more representative loss development history for purposes of reserve analysis.

Another area that could be a problem is that while the commutation negotiations, discussions and settlement are all generally between the original ceding company and the reinsurer, the reinsurer is ultimately going to need to look to its retrocessionaries for their support, participation and agreement that the commutation is both prudent and valid; that could present some complications.

I'm aware of one situation where a company executed the front end of a commutation and has been a little reluctant to finalize all the accounting because they haven't gotten the support of their retrocessionaries.

If the retrocessionaire was participating in a quota share program, it would probably be a easier to negotiate with them than on an excess of loss program. Another factor would be to settle up any broker balances and adjustments to the broker fees that might be required.

Briefly, some points on tax planning strategies under SFAS No. 96. Under the new accounting rules, which will be required in another year or so for companies reporting on a GAAP basis, the provisions of the Tax Reform Act, requiring discounting of loss reserves for tax purposes and not for book purposes, give rise to a temporary difference.

That temporary difference is referred to as a deferred tax asset and there are limitations on the recognition of the asset. There are provisions for tax planning strategies which would enable a company to realize that asset. The essence of the tax planning strategies is to adjust the timing of when the temporary differences reverse, to ensure that they offset taxable income.

One tax planning strategy that has been debated pretty seriously within the insurance industry is a reinsurance arrangement where through a loss portfolio a company could accelerate the reversal of the loss reserve discount by paying the losses.

Another view that has been given some consideration in the industry is that a loss commutation might be another tax planning strategy. Certainly there are others but these should give you can idea of the types of things companies are considering which you may find yourself involved with at some point.

The other (Slide 22) consideration, which I mentioned earlier, is potentially having an allowance for uncollectible reinsurance recoverable balances. By way of illustration, using my earlier assumptions, the ceding company, is going to record loss reserves of one hundred million; they are going to get cash of $55 million and a loss on the transaction of $45 million.

Presumably, the ceding company was aware that there might be a potential collectibility issue related to this reinsurer and previously they may have established a reserve for uncollectible reinsurance recoverables. Assuming they had established a reserve for $70 million for this particular reinsurer. From a financial reporting standpoint, the line items that this might show up on would depend on what captions the company had used.

But, pretax income would be benefited by $25 million from the commutation. If the $70 million allowance was specifically attributable to the $100 million recoverable, they would have provided $70 million when, in fact, they really only needed to provide $45 million, since they received a cash payment of $55 million, and the net of effect of the transaction would be a gain of $25 million.

Thank you.

(Applause)

MS. HUTTER: Thank you, Scott. We now do have some time for questions. Again, I'd like to remind you that we ask that you step to the microphone in the center of the room to ask your question and make sure it is recorded.

QUESTION: Hello. I'm John Narvel from Coopers & Lybrand in Bermuda. I have a comment or clarification in relation to Mr. Ogden's speech and then I'll have a question for Mr. Moore.

I am personally involved with one of the entities that he listed on his list of companies in liquidation that pursued commutations as a way out of their problems. I think that there should be some awareness on the part of the audience that, in those situations where there is a fire sale and the ultimate collectibility from those either insolvent or soon to be insolvent reinsurers is deeply in question, the commutations can take on very strange proportions.

In particular, one that I worked on, I didn't actually negotiate this; I was doing some other work for the client. The client was able to negotiate deals with 98 percent of their creditors whereon they paid one hundred percent of paid balances outstanding, which was money due to the ceding companies, twenty percent of case reserves and zero percent on IBNR.

They were able to accomplish this with 98 percent of their creditors. The creditors were able to see that there was just no money in the kitty and this was the best offer they were going to get, so they accepted it.

In relation to the comment that was made about Mentor, I'd like to propose another example which I was personally involved with which wasn't on his list, and that is Cambridge Reinsurance which was liquidated in Bermuda.

The liquidator proposed and accomplished a very novel technique where we estimated IBNR actuarially for all of the creditors in the liquidation and basically got the court that had jurisdiction over the liquidation to approve the actuarial evaluation of the claims of all of those creditors and to effectively impose commutations on every ceding company to that particular reinsurer.

The advantage there is that everyone was treated on an equal footing. There were no differences in negotiation skills which entered into the process. It was very quick. I'm

very happy to say that we've written checks to a very significant proportion of the creditors to get the cash back in the hands of the insurance and reinsurance industry.

This is very different from the approach that is being followed by Mentor, which has a similar number of creditors -approximately 3,000 -- where, as Mr. Ogden pointed out, they are trying to negotiate, individually, commutations. You can imagine the nightmare of negotiating three thousand commutations.

Going back to Mr. Moore, I was very intrigued by the other considerations, the first one being historical loss reserve data and the effect on Schedule P. In that Schedule P is presently being used by the IRS to derive discounting patterns which are being imposed on the insurance industry, I would think that the distortions that could arise in Schedule P could be quite significant.

For example, the reinsurer would be very happy just to book the paid losses, the cash, he's paying back to the ceding company and not have to worry about his Schedule P, whereas it is more the ceding company that is reassuming it that is really going to have the big distortionary effect.

There could be a significant penalty or a significant distortion which occurs in the Schedule P if one party in the transaction doesn't adjust its Schedule P and the other one does. Has there been any further discussion on this from the standpoint of what gets published and what gets notified and how this will all filter out?

ANSWER: I'm not aware of any specific position taken by the IRS. My experiences, in dealing with the tax-related issues, is that there is not a lot of flexibility in using the Schedule P information for the purposes of discounting reserves for tax purposes.

Many companies use the industry averages, so this would not have much of a distortive effect. But, if a company was to use its own experience, the impact could be distortive. The substantive view would be that what you are trying to develop is a representative payment pattern to develop a discount rate, but when it comes to complying with the tax laws, it's not always a substantive issue.

Under the rules, you would use the paid information as reported in Schedule P for the purposes of developing the payment pattern, so I would agree with you there could be some distortive effects.

If you have a situation like that, I think you need to evaluate the effects and then try to get some consultation from someone who has a clear view of the IRS thinking.

I'm not aware of any provisions in the Code that would allow or provide for adjusting for unusual types of reinsurance agreements that would distort your payment data.

MS. HUTTER: John, I think there would be a very simple way to probably make sure that you wouldn't get tabbed with a penalty and that is, as I recall, every five years, you would calculate your discounting payment pattern and it only uses the diagonal of the triangle, not the data interior to the triangle.

If you know that it is going to be the year that you want to use your data, then you could probably either accelerate or wait a few months or try to accelerate a few months to make sure that the distortion wouldn't be there. Alternatively, if it were favorable to you, you might time it that way.

I think that's probably -- I mean, my overall estimation is that that is probably a much smaller effect of the whole commutation environment that is taking place these days. I think mostly, people are concerned about what can I collect on my dollar where the reinsurer is not paying full dollar.

The tax implications after that are probably tertiary level, relative to people who are taking, as in your example of a hundred percent of paid losses, twenty percent of case and nothing in IB&R. I think the tax impact of that is probably of lesser concern than the fact that you are collecting so little on your dollar.

MR. OGDEN: I think another comment that goes along with that is that very few of the companies for whom I've negotiated commutations are anywhere near a tax paying situation.

(Laughter)

MS. HUTTER: Are there other questions from the audience? We've concluded our session now, and I see that time is up, so will you all please join me in a round of applause for all of our panel?

(Applause)

CASUALTY LOSS RESERVE SEMINAR

ACCOUNTING FOR COMMUTATION OF REINSURANCE CONTRACTS

September 19, 1989

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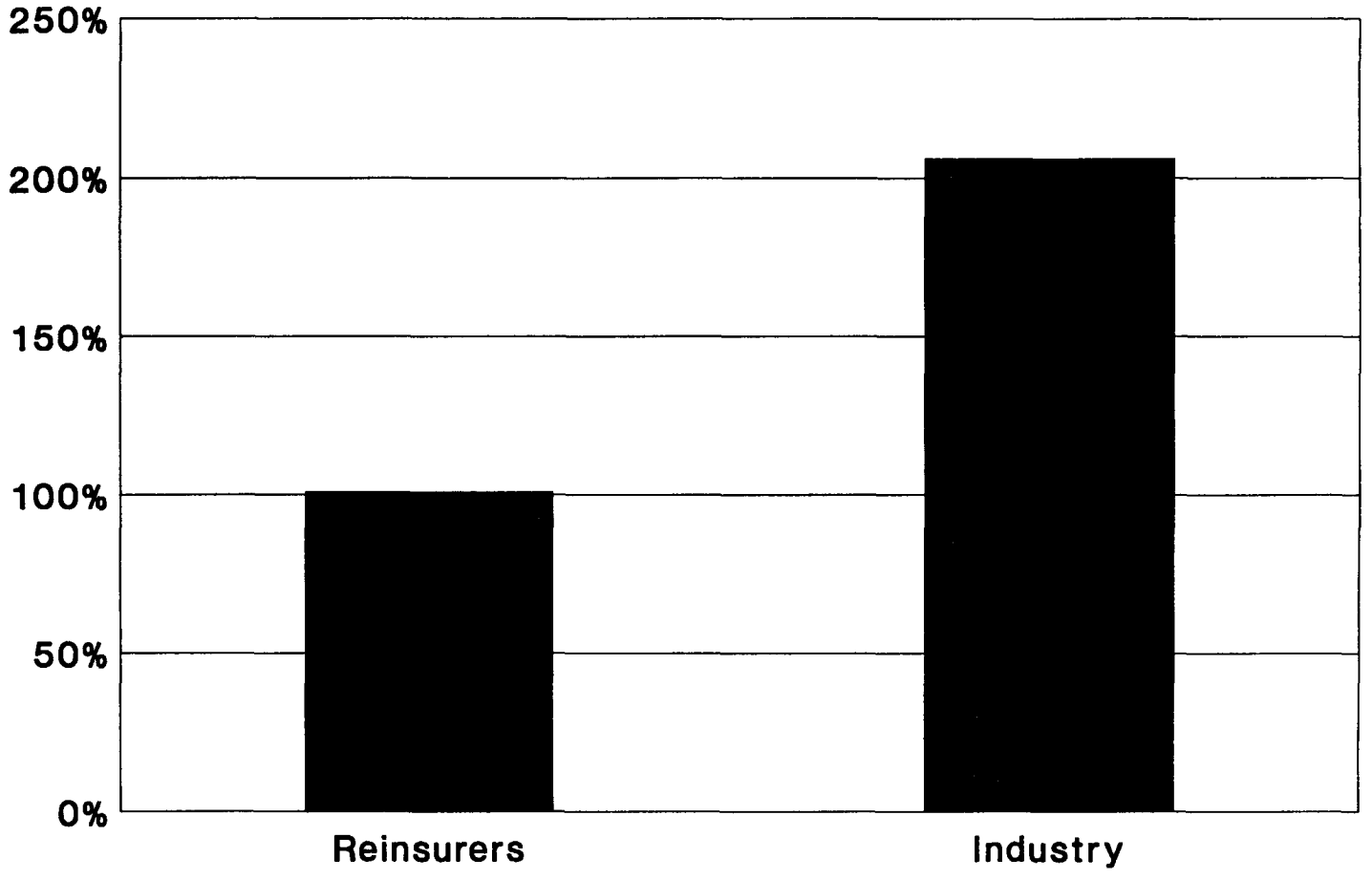
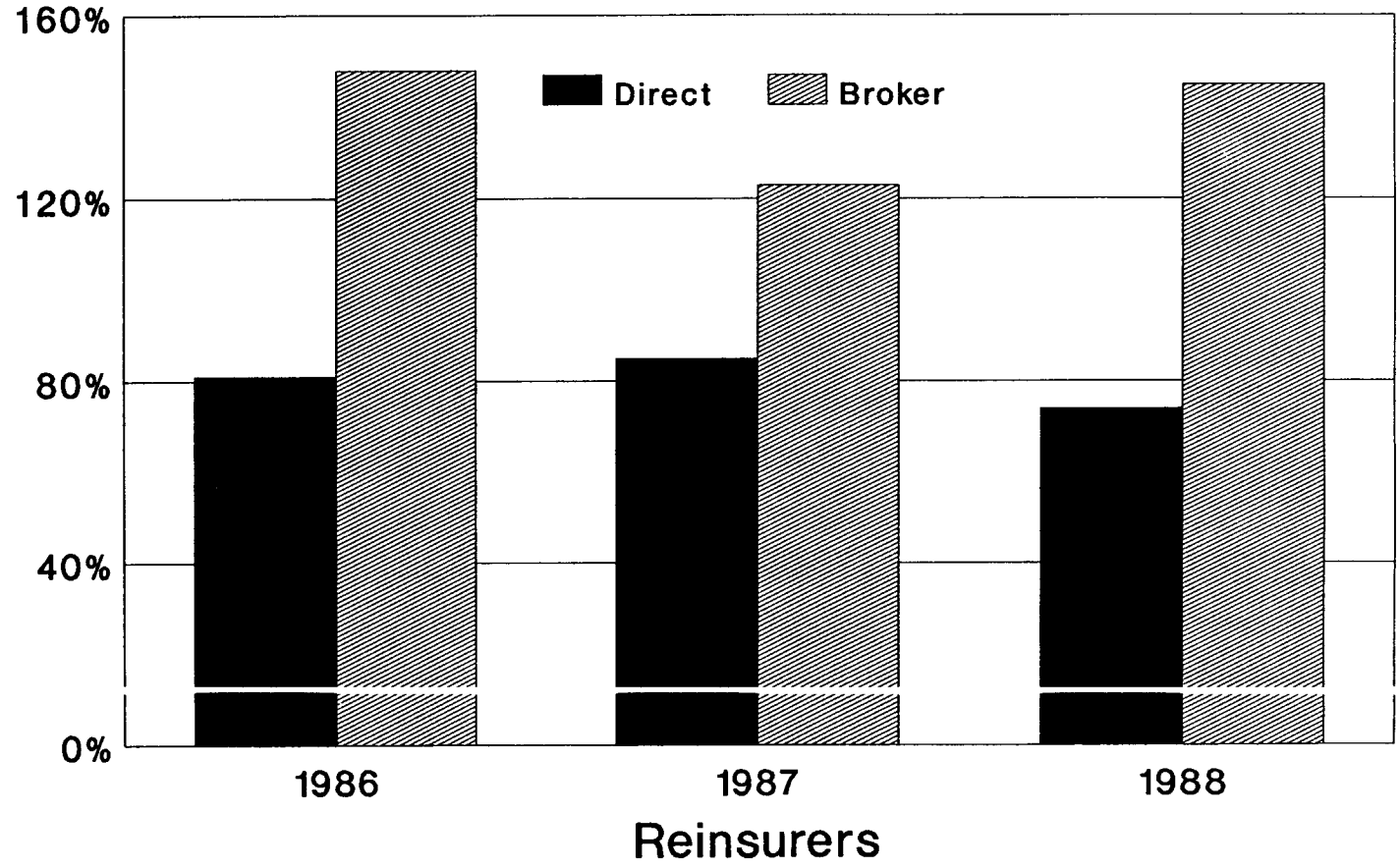
Reinsurance Recoverable as a Percentage of Policyholders' Surplus - 1987



Source: Best's Aggregates and Averages.

Reinsurance Recoverable as a Percentage of Policyholders' Surplus



Source: 25 largest RAA Companies.
Study prepared by NACRe.

1008

SLIDE 2

Reinsurance Commutations

- Reversal of an existing reinsurance agreement - ceding company assumes losses ceded to the reinsurer in exchange for consideration
- Consideration is generally a discounted amount of the expected ultimate liability
- Consideration is invested over time to cover future claim payments

Accounting Considerations

- Ceding Company
- Reinsurer
- Income vs. Surplus
- Underwriting Income vs. Other Expense
- Balance Sheet Impact
- Disclosure

Underwriting Income vs. Other Expense

- Underwriting Income
  - •• current year underwriting performance
  - •• Schedule P and Schedule F
  - •• five year historical data
- Other Expense
  - •• consistant with treatment for write off of agents balances
  - •• loss development schedules not distorted

Balance Sheet Impact
Ceding Company / Reinsurer

- Cash
- Loss Reserves
- Reinsurance Recoverable
  - •• paid losses
  - •• unpaid/IBNR
- Reinsurance Balances Payable

Scenarios

Assumptions:

Ultimate value of reserves	$100 million
Consideration paid	$ 55 million
Discounted value	$ 65 million

Scenario - A

	Reinsurer	Ceding Co.
Loss reserves	$100	($55)
Cash	(55)	55
Gain (loss)	$ 45	$ 0

Scenario - B

	Reinsurer	Ceding Co.
Loss reserves	$100	($65)
Cash	(55)	55
Gain (loss)	$ 45	($ 10)

Scenario - C

	Reinsurer	Ceding Co.
Loss reserves	$100	($100)
Cash	(55)	55
Gain (loss)	$ 45	($ 45)

Accounting Considerations

- Statutory Acounting Practices (SAP)

NAIC Working Group on Emerging Issues - Conclusions

- Full loss must be recognized immediately
  - reinsurer
  - ceding company

Scenario - C

	Reinsurer	Ceding Co.
Loss reserves	$100	($100)
Cash	(55)	55
Gain (loss)	$ 45	($ 45)

NAIC Working Group on Emerging Issues - Conclusions

- full loss must be recognized immediately
- should be reflected in underwriting income

NAIC Working Group on Emerging Issues - Conclusions

- full loss must be recognized immediately
- should be reflected in underwriting income
- all A/S schedules should be adjusted
  - Schedule P
  - Schedule F

NAIC Working Group on Emerging Issues - Conclusions

- full loss must be recognized immediately
- should be reflected in underwriting income
- all A/S schedules should be adjusted
- all appropriate B/S accounts should be affected

Balance Sheet Impact
Ceding Company / Reinsurer

- Cash
- Loss Reserves
- Reinsurance Recoverable
  - •• paid losses
  - •• unpaid/IBNR
- Reinsurance Balances Payable

NAIC Working Group on Emerging Issues - Conclusions

- full loss must be recognized immediately
- should be reflected in underwriting income
- all A/S schedules should be adjusted
- all appropriate B/S accounts should be affected
- disclosure in notes to the financial statements
  - •• materiality
  - •• separate note disclosure

Accounting Considerations

- Statutory Acounting Practices (SAP)
- Generally Accepted Accounting Principles (GAAP)

GAAP

- No formal authoritative guidance
- Divergence of practice
- Will be impacted by resolution of discounting issue
- Securities and Exchange Commission (SEC)
- Appropriate disclosure is key

Other Considerations

- Historical loss reserve data
- Retrocessionnaires
- Tax planning strategy under SFAS No. 96
- Allowance for uncollectible reinsurance

Illustration

	Ceding Co.
Loss reserves	($100)
Cash	55
Loss on commutation	(45)
Allowance for uncollectible reinsurance	70
Net gain	$ 25

1989 CASUALTY LOSS RESERVE SEMINAR

5F: LOOKING BEYOND THE NUMBERS

Moderator

Robert S. Miccolis
Tillinghast/Towers Perrin

Panel

Ernie Hanson
Tillinghast/Towers Perrin

Walter C. Wright
Price Waterhouse

MR. MICCOLIS: This is Session 5F: Looking Beyond the Numbers. This session is going to be recorded. There is a handout in the back that we're going to be going through later in the session, so if you haven't picked up a handout, there are plenty back there.

My name is Bob Miccolis. I am a consulting actuary with Tillinghast in Philadelphia. I'm going to be your moderator and narrator for this session. To my far left with the name sign in front of him is Walt Wright. Walt is an actuarial consultant and a management with Price Waterhouse in the Hartford office. Next to him is Ernie Hanson. Ernie is a consultant with Tillinghast in St. Louis in the management and operations consulting practice.

Walt is an actuary, a Fellow of the Casualty Actuarial Society, and has done a lot of work in the loss reserving area. Ernie Hanson has had executive and management positions in various companies, including specialty companies, major stock companies and reinsurers, where he has been in charge of claims, actuarial and financial areas.

In this session, we are going to be talking about looking beyond the numbers. The other sessions have covered the numerical side and the analysis of numbers. We are going to go beyond that. The first time this comes up in this kind of training is in the basic track, where the first session is called Considerations in Setting Loss Reserves.

We are going to go the next stop beyond that basic session and we are going to discuss what you should know and what you need to know before, during and after any kind of numerical analysis. We are going to be discussing things that can't be easily quantified and things that may affect your quantitative analysis.

We are going to illustrate this in a role playing format, which I think you will enjoy, and then we're going to briefly go through the questionnaire and illustrate some of the more structured ways to get information.

We'd like you to come away with four major points: The first, that whoever is doing the loss reserve analysis needs to have a good understanding of the company's operations, the underwriting, the claims, the EDP, the finance area and accounting area. You really need to know what is going on in those areas as they may affect the loss reserves.

The second thing is that you need to ask questions about what is going on in those areas. The third item is you need to ask more questions. The fourth major point is that you really have to look for changes, even though people may not identify them for you.

Now, these comments and this illustration should apply both to people doing analysis from the inside, the inside actuaries, as well as the outside auditors or independent actuaries. We are starting with the illustration where Ernie and Walt represent the company person and the outside consultant going in to try to get background information for the first time.

This is the first time the analysis will be done, and they are going to illustrate both the good things about how to do this kind of interview and some of the mistakes are also going to come up, so we are going to start with Walt and Ernie.

(Interview)

MR. WRIGHT: Ernie, how are you? Walt Wright.

MR. HENSON: Walt, nice to meet you. How was your trip in?

MR. WRIGHT: Oh, it was pretty good. It was a short trip, just under two hours and, unfortunately, it was nonsmoking, which just about killed me. It seems that the airlines have just caved in to the nonsmoking lobby.

MR. HENSON: Walt, we don't smoke in this building, especially in my office.

MR. WRIGHT: Oh, oh. Pardon me, Ernie. Well, we'd better get right on down to business then, Ernie.

(Laughter)

I haven't had much of a chance to get to know you with Upstart Insurance Company. What can you tell me about its history and organization?

MR. HENSON: Well, Walt, Upstart was founded in 1925 as primarily a worker's compensation writer. Then, going into the 1940s and 1950s, they focused more on other forms of general liability. Since the '60s, as packaging became prevalent, we moved into the multi-peril types of policies.

I'd say the company has predominantly focused, over this period of time, though, on habitational risks, pretty much since its inception.

MR. WRIGHT: On the habitational risks, can you tell me exactly what types of risks you are writing and how this business is distributed between various types of risks?

MR. HENSON: I'd say about half of the business is, in fact, multiperil. Ten to fifteen percent of it is comp and auto business. We're trying to break into personal lines to give ourselves a little bit of diversification. I'd say most of the business, eighty percent of it, is in the State of New York, and the rest is throughout the New England region and some of the Mid-Atlantic States.

MR. WRIGHT: I see. Now, the SNP business that you're writing, can you be a little more specific in terms of what type of business you're writing in that program?

MR. HENSON: Well, within the packaged business, as I say, it's predominantly habitational risks, about seventy percent, apartments, condos, co-ops; ten to fifteen percent are restaurants; another ten to fifteen percent light manufacturing and maybe five points or so of miscellaneous.

MR. WRIGHT: What is the miscellaneous business?

MR. HENSON: Miscellaneous I guess would probably be mostly mercantile, maybe a little bit of products. I can get you a report that would have all the detail information.

MR. WRIGHT: That report would be for the miscellaneous classes only?

MR. HENSON: Yes, that's correct.

MR. WRIGHT: I don't think that will be necessary, Ernie, but I would like to have some more information on your major categories -- the dwellings, the restaurants, the manufacturing business. If you could give me the history, say, for the last five years of premiums for each of these categories, perhaps by state, I think that would be very useful to me.

MR. HENSON: Sure, Walt. We can do that easily enough.

MR. MICCOLIS: Well, Walt almost got killed there on the cigarettes. Note that Walt didn't get off the track on the minuscule data on the miscellaneous business. He stuck to his guns on getting the major classes and the major focus of the business.

MR. HENSON: Walt, when we give you this information, what are you going to do with it? I mean, after you've gotten it, how are you going to use it to estimate our reserves?

MR. WRIGHT: I plan to use the incurred loss development method to estimate your reserves.

MR. HENSON: The incurred method? What makes you think that's going to be appropriate for our company?

MR. WRIGHT: Well, I'm from TPF&C Mercer, the world's largest actuarial firm, and that's the method we always use.

MR. HENSON: Gee, Walt. Do you use any other method? I mean why do you think that's going to work for us?

MR. MICCOLIS: Watch out here. Walt is getting himself into hot water, going down to a particular method in an interview. Maybe he can get out of this, though.

MR. WRIGHT: Ernie, you're absolutely right. It was certainly premature of me to say what methods I'll be using. I'll probably use the incurred loss development method. It's a basic method and it usually is very useful.

I'll probably use it certainly as one of the preliminary tests that I do, but I'll definitely have to consider the ways in which your company's operations are affecting not only the choice of methods that are most appropriate, but also how those methods are applied.

Really, that's the whole purpose of our meeting today: for me to gather information so that I can intelligently apply the techniques that may be suitable for your company. I certainly won't use a cookbook approach.

Ernie, what can you tell me about the underwriting of your business, the guidelines, procedures and so forth?

MR. HENSON: Well, we write our business through independent agents. We have some large accounts, some large agents. The largest probably produces eight percent of our business. There are only a handful of agents like that, though.

We are basically an ISO company. We use ISO rates for the package business and we use the National Council for our comp business. Our guidelines are pretty well documented.

MR. WRIGHT: Could I get a copy of your underwriting guidelines?

MR. HENSON: Oh, sure.

MR. WRIGHT: Have there been any changes to those underwriting guidelines in the last five years?

MR. HENSON: Changes? No, I wouldn't say so. We've been pretty consistent.

MR. WRIGHT: So, you are saying that the printed guidelines that you'll be giving to me, they should have a date of 1984 or prior, since there have been no changes since then?

MR. HENSON: Well, gee, Walt, actually, I think they are dated 1985 but I don't think that's significant, because there really hasn't been any changes.

MR. WRIGHT: Well, could I have a copy of the guidelines that preceded the '85 guidelines?

MR. HENSON: Well, we'll look around and see if we can dig one up for you.

MR. WRIGHT: I'd appreciate that, Ernie. It's very important. I'd like to take a look and see what changed between '84 and '85. You mentioned that you use ISO rates for your SMP business. How do you evaluate the rates in terms of deciding whether or not they are appropriate for your business?

MR. HENSON: Well, we look at the rates as we get them from the ISO and then we compare them with our projected accident year losses and see if the rates make sense.

MR. WRIGHT: Can you give me a history of your rate changes?

MR. HENSON: Sure.

MR. WRIGHT: What about rating plans, schedule rating plans, for example? Do you use them?

MR. HENSON: Yes, we have schedule rates.

MR. WRIGHT: Do you have a history of the credits that you have used over time?

MR. HENSON: Yes, we track that. The credits have approximated about five percent over the years.

MR. WRIGHT: Do you have a report, Ernie, that would back up that five percent estimate?

MR. HENSON: Well, not exactly a report. That would be pretty hard to develop on our system for the SNP product.

MR. WRIGHT: How are you able to state that the credits have averaged five percent if you don't have any documentation to back that up?

MR. HENSON: I got that from our underwriters and they say it's based on internal audits that they do routinely.

MR. WRIGHT: I know that the underwriting manager is not in today, but could you check with the underwriting department and get some documentation for me on that?

MR. HENSON: Sure, I'll talk to them and see what we can find. Walt, why are you so interested in schedule rating?

MR. WRIGHT: Well, on the flight down here today, I did have a chance to look through your annual statement. I noticed that the loss ratios for Schedule P for your multiperil business had really been reduced in recent years. There was such a dramatic decrease in those loss ratios that I want to make sure that I gather enough information to be able to evaluate what might have led to that decrease.

MR. MICCOLIS: Notice here that Walt is doing pretty well. He got most of his questions in, did his homework in preparing for this particular question. SNP was a big part of the company's book. He went through the annual statement and saw something was happening to the loss ratios. He was trying to get that information out of Ernie.

He didn't strictly stick to his standard set of questions. He went and looked ahead, and he looked at that published information to try and see how he could use it.

MR. WRIGHT: Tom, I really haven't had a chance much to look at your other lines of business, so I don't know of any pricing information for those, but it may turn out that I'll need that. Would that be available?

MR. HENSON: For the other lines? Particularly GL, it's easy. We get that off the system. The rest of the lines, we can give you a rate history with no problem.

MR. WRIGHT: Ernie, I have a feeling I keep calling you Tom. If so, I apologize. I think I'm confusing you with somebody else.

MR. HENSON: I was worried about that. I hope that doesn't happen with our reserve results.

MR. WRIGHT: I'll hope not. Have there been any other changes, Ernie, that might have affected your SNP book or business?

MR. HENSON: Let's see. Back at about the beginning of 1984 when the market tightened, we did some reunderwriting. In fact, we reunderwrote the entire book and found that we could concentrate on our preferred risks to improve our selection. We dropped, oh, I guess at least a third, if not half, of our units in force since 1984.

In particular, we got out of a group of large mercantile risks, you know, department stores.

MR. WRIGHT: The department stores that you had been writing, you cancelled those completely in 1984 and got out of that business entirely?

MR. HENSON: Absolutely.

MR. WRIGHT: That's interesting. Were they a major segment of your business prior to 1984?

MR. HENSON: Well, we talked about the mercantile maybe being about five points of our business now. It could have been twenty, 25 percent back then.

MR. WRIGHT: Well, I'm glad to know that, Tom -- pardon me, Ernie; that's very important to me.

MR. MICCOLIS: Surprise, surprise. No changes in underwriting guidelines in the last five years but a third of the accounts disappeared and 25 percent of the business went down to five percent.

He didn't get the answer to his first question, but Walt persisted as part of asking a specific question about SNP, found out there was a major change in underwriting. If he had only gotten those '85 underwriting guidelines, he wouldn't have picked this up and he wouldn't have known that the prior history included that mercantile business.

MR. WRIGHT: Ernie, we touched briefly on the fact that you use ISO rates and that you do some in-house evaluation of those rates to determine how they should apply to your business. Can you tell me more about that?

MR. HENSON: Well, we do use the ISO rates and do some scheduled crediting on that. On our standard business, we write that in a subsidiary, Quick Start Company.

MR. WRIGHT: I'm sorry. You say you have a sub, Quick Start?

MR. HENSON: That's right.

MR. WRIGHT: Gee, I didn't realize that.

MR. MICCOLIS: Well, another surprise. Walt asked Ernie to describe the company. It has been in business since 1925, just writing a few lines of business. Now, we get down to the rates and find out there's another company.

If Walt had looked at the annual statement and flipped all the way through to the end and looked through the organizational chart, he probably would have seen that both Quick Start and Upstart were part of the same organization.

MR. WRIGHT: Ernie, are there any other significant changes that you can tell me about?

MR. HENSON: Let's see, I don't think so. Well, maybe you'd be interested in -- if you are interested in using the Schedule P data, you might want to know about the commutation that we did.

MR. WRIGHT: Sure, that sounds important. What can you tell me about that?

MR. HENSON: Well, basically one of our reinsurers that participated on our casualty program, it looked like they were getting into trouble, and they approached us about doing a commutation. We thought about it. We did some analysis and we did it.

We booked the transaction in our statistics through the annual statement and it's part of Schedule P. Schedule P is basically net of that transaction. To describe it, we basically just credited the outstanding losses in Schedule P and credited the paid losses.

MR. WRIGHT: I'm sorry, Ernie. I'm not sure that I quite understood that. Can you clarify how you treated that in the Schedule P?

MR. HENSON: Sure, Walt. When we booked the retro in our system, the outstanding losses that were ceded to the reinsurer were set up as debits in the annual statement, in other words off-setting the usual credit balance of outstanding losses. Then we got the payment from the reinsurer, we booked it as a credit loss payment. Ordinarily, loss payments are debits. It's just like a ceded recovery.

MR. WRIGHT: Gee, Ernie. I'm still not sure that I understand.

MR. HENSON: Well -- (Laughter)

MR. HENSON: -- basically, backing up, loss reserves are usually a credit and any offset to those loss reserves are a debit, okay, or a ceded loss recovery reducing the outstanding; when we credited our loss reserves, we increased them.

MR. WRIGHT: I think I might understand this. Ernie, let me see if I can repeat this. When you commuted these reserves, you took the loss reserves back and so you increased your reported loss reserves.

MR. HENSON: Yes.

MR. WRIGHT: That's what you mean when you say you credited the ceded reserves?

MR. HENSON: That's correct.

MR. WRIGHT: Then you were paid for taking these reserves back? MR. HENSON: Yes.

MR. WRIGHT: So, that payment, you actually reflected that by reducing your paid losses?

MR. HENSON: That's right.

MR. WRIGHT: That's what you mean when you say you credited your paid losses?

MR. HENSON: That's correct, Walt.

MR. WRIGHT: So, you credited your paid losses and you credited your ceded reserves. I think I do understand, Ernie, how that fits into your annual statement. That's the way it appears in your statement for 1987?

MR. HENSON: That's exactly right.

MR. WRIGHT: Okay, I'm glad to know that. I'll be able to work with the data more easily then.

MR. MICCOLIS: Boy, this was tough. Did anybody understand Ernie? Debits and credits and Walt was looking for his accounting book, but he figured that wouldn't work. Obviously, this had a big impact and he had to determine what happened.

Walt could have written some notes and said, "I'll come back to this later", but he persisted and tried to get Ernie to come up with some kind of simple description of what happened and actually how Schedule P might be affected. But now, he's got to go a little further because he has to know what development data he's going to get before these commutations or after these commutations.

MR. WRIGHT: Ernie, the Claim Department operations often have a major impact on the data that I'm looking at for my reserve evaluations. What can you tell me about Upstart's claim functions?

MR. HENSON: Our Claim Department, it's been fairly consistent over the years. We've had long-term management there, but the former vice president, he finally retired at the end of '83 or was it earlier '84, and we hired a new guy who has been pretty aggressive about seeing that the function is run according to his training that he got elsewhere.

I guess he felt that we were moving a little bit slowly, and he really did decide that the adjusters were not being aggressive enough about setting up case reserves. So, they've done a fair amount of reserve strengthening but I think it's just timing. It's just setting them up a little faster than previously.

MR. WRIGHT: You think that they have strengthened up their case reserves?

MR. HENSON: Oh, I believe so.

MR. WRIGHT: I don't see that at all in the data, Ernie.

MR. HENSON: Why do you say that?

MR. WRIGHT: When I was flying out here, I was looking through the ratios of your paid losses to incurred losses and, if what you say happened, I'd expect to see those ratios decreasing; as case reserves are strengthened and incurred losses increased, then the ratio of paid to incurred would decrease, but I didn't see that happening.

MR. HENSON: Walt, I've got a memo from the head of the Claims Department that says he has strengthened reserves.

MR. WRIGHT: All I can tell you, Ernie, is what I saw, but thinking about it, maybe there is a possibility that the case reserves were strengthened. If I'm looking at the ratios of paid to incurred, then I really should be looking at both the enumerator and the denominator of that equation.

Maybe the incurred -- maybe the case reserves were strengthened and I guess maybe the paid losses were speeded up also, so that the ratios didn't really change much.

MR. HENSON: Gee, I don't think so. I don't think we've had any changes in the paid losses.

MR. WRIGHT: What about the Claim Department caseloads? Have they changed over time?

MR. HENSON: There may have been some of that. The new guy came in with a formula approach to allocating the caseload to his adjusters. It's based on the degree of complexity of the case, whether it is in litigation or not. I don't know how much that would really have affected the claims people and what they were really doing, though.

MR. WRIGHT: Have there been any mandates to the Claim Department that they should speed up their processing of claims, for example, pay the easier claims, get them out of the way? Did anything like that happen?

MR. HENSON: I don't think there has been a change there, but the new guy's philosophy is -- he says he'd rather pay a claim today than some higher value later, get it out of the way, assuming that the payment would be less today, the present value would be less today than some future payment.

MR. WRIGHT: Would this have represented a dramatic change in any way from the past?

MR. HENSON: Oh, I can't see it being a dramatic change.

MR. WRIGHT: I'm puzzled, then, Ernie. I think if you want me to give full credit to the fact that you say case reserves have been strengthened and I don't see that in the paid-to-incurred ratios, then I need to do some more investigation. I'm wondering if I could talk to your claim adjusters. Maybe they have some insight in terms of how the claim payments might have been speeded up.

MR. HENSON: Well, Walt, I think that might turn out to be a real waste of your time and a waste of the adjusters' time.

MR. WRIGHT: I think it's really important, though, Ernie. I'd really like to spend some time talking to them.

MR. HENSON: At $300 an hour, I'm sure you would, but the adjusters are always complaining about something. They've always got too much to do and I think you'd just get a lot of whining out of it. Besides, the claims vice president is out of town for a couple of weeks.

MR. WRIGHT: You said I'd get a lot of whining out of the claims adjusters? What would they be whining about?

MR. HENSON: Anything that happens to change their way of doing things. You've never seen a more stubborn bunch of people in your life. I know the last change was this IAS system that the New York Courts put in.

MR. WRIGHT: What is the IAS system?

MR. HENSON: IAS stands for individual assignment system. Now, my understanding of it is that the New York Courts, where most of our claims are, most of our suit claims, had a central court calendar and all cases funneled through the central calendar. When they finally got their act together and were ready to take the case to trial, then it would be assigned to a judge.

Well, then you've got a judge and he may be on vacation, he may have had something else going on, and the system was really sluggish. There were so many outstanding cases that New York decided to just split the central calendar into individual calendars assigned to individual judges.

When they did that, the judges became responsible for managing the caseload. They panicked about the amount of cases that they had and starting pushing the companies and the plaintiffs' attorneys to settle these cases. So, now that I think about it, if they had pushed them to settle, we weren't going to court as often and we were getting more cases settled.

MR. WRIGHT: You know, that really sounds like the piece of information we were looking for, Ernie. Maybe that's what caused the paid losses to increase. Can you give me any documentation on those changes in the court system?

MR. HENSON: Yeah, we can give you some documentation on the changes in the court system.

MR. WRIGHT: Good, I'd appreciate that.

MR. MICCOLIS: Note here that Walt really had to dig and dig and dig, and go back and forth, to get his information. Reserves were strengthened. At least that is what the memo said, but something had happened to the claim counts, and Walt couldn't see those in advance. He finally got Ernie to see the light and come up with his own explanation of what might have happened.

MR. WRIGHT: Well, Ernie, I think that pretty well wraps things up. Your secretary is getting a copy of your latest Actuarial Review for me so I'll take all this information back to Hartford and start my preliminary analysis. After I finish that, I'll probably need to come back and sit down with you and spend some more time going over any more questions that might have arisen.

MR. HENSON: Very good. Any time, Walt.

MR. WRIGHT: Okay. Good talking to you.

MR. MICCOLIS: Let's look at some of the high points of this little skit. There were some good things and bad things out of the interview. On the good side, Walt was persistent, almost to a fault, but he had to get his information in some way.

Now, if Walt just had asked for the data and had started his analysis, he wouldn't have realized that something was wrong or that something couldn't be easily explained. He may have used the old SNP data and may have come up with inappropriate tail factors because it had that mercantile business in there.

Walt also asked for documentation. The important thing here is not just to ask for it but to follow up and make sure that it is provided and make sure that it is in the right amount of detail. Walt realized that the methods he was going to use, both in asking the questions and when he actually has to do his analysis, have to be flexible. They have to reflect the changes in the operations of that company.

He requested clarifications of any terms he didn't understand, the accounting treatment of the commutation, that IAS system and other things he didn't really have a background in. He weeded out the immaterial data and the other things that didn't seem relevant to his analysis.

Well, what didn't he do quite right? Well, Walt went through the interview process somewhat haphazardly. His outline seemed to be roughly company, then overall information and underwriting and claims. He didn't have his questions organized in any kind of a systematic fashion, although even if he was better organized, that demonstration showed you you can't just ask questions in the order that they are written down, because sometimes the answers don't come out in the right order.

Ernie mentioned the commutation program. Obviously, Upstart had bought some reinsurance. If Walt had looked through the annual statement some more and looked through Schedule F, he would have seen that he bought reinsurance, but he didn't ask any questions about that ceded reinsurance program.

Loss adjustment expenses, we didn't hear anything about them, whether they were included in the case reserves or whether they were separately posted as a bulk reserve. Also, the process by which the claims are recorded or reported, we didn't hear any questions on that, which is usually an important area.

The whole data processing and accounting areas were not looked into in any depth. There were no even initial questions. Even though Walt asked for the latest actuarial analysis, eh didn't get into how the IB&Rs were being set on an accounting basis.

Now, your handout that was piled up in the back was pulled together from several different sources. We tried to put it in a reasonable order. We are going to go through it -- maybe not every question, but we're going to highlight it.

We'd like you to feel free to ask questions on some of these items as we go through them. It is titled on the front "Questionnaire." I think of it more as an interview guideline. It is not something you'd necessarily hand to a company or to people in a company and say, "Answer these questions." In some cases, you may have to provide some of those questions in advance so that some of the information can be prepared.

Walt is going to go through the first part of that questionnaire on the background and the organization of the company and highlight some of the questions and some personal background. He will also go through the underwriting and pricing questions.

Ernie will touch upon the 16 questions on the claims area and then I'll go over the ceded reinsurance and the systems and accounting questions at the end. So, I think, Walt, we can get started on that.

MR. WRIGHT: Okay. I really was planning on spending just a few minutes going over the background and organization questions and the underwriting and pricing questions. I think most of the questions are fairly obvious. I should say the intent of the questions is fairly obvious.

First, in the background and organization, it's really important, whenever you go to any insurance company for the first time, to try to get a pretty good overview of that insurance company. Any insurance company, even the smallest, is apt to be somewhat complex in the way it is organized and if you don't get the basics down right away, you are apt to kind of get lost and keep coming back with one question after another.

So, why don't we start first with just getting the basic information on the company? Get a brief description of the company's operations, an organization chart for the company. That's apt to be very helpful.

Even as we note on this questionnaire, getting a count of the number of people in each functional area I think is important just to put that company in perspective in your mind, so you get a feel as to how their operations are organized.

You want to get a description of the company's major business segments. Of course, as you go through and get into more and more detail in your analysis, you'll continue to get more depth and a more detailed understanding of those business segments. I think right at the start, it's important to get some feel for what kind of business that company is writing.

In moving on to the underwriting and pricing, we have about eleven questions here which I think are fairly comprehensive in terms of a basic set of questions to start with in talking to somebody from the underwriting department. A number of the questions you'll see, such as questions dealing with the rate change activity, you can see what the direct link might be to the loss reserving.

If you are concerned, for example, about the estimated loss ratios that are coming out of your analysis, you're going to want to be able to go back and look at what the rate change histories have been to see whether those changing loss ratios may be consistent with the rate change activities.

Other questions, though, are not so obvious in terms of what the direct link is to loss reserving, but I think you'll find that, as you go through these questions, the answers or, in some cases, the lack of answers, can really provide you with a much better perspective on that company.

Often, frankly, just letting the people talk and ramble to some extent about their operations can provide a lot of good information. You might ask -- I can recall once asking about the major business segment and an underwriter explained to me that for auto insurance, they only underwrote drivers over the age of 55 and, therefore, they didn't really need any IB&R reserves. I am still not quite sure why he thought that, but that kind of information can come out of an interview.

So, I'd start with a good comprehensive set of questions like we have here, first just finding out about the underwriting department in general, how it is organized, the underwriting process in terms of underwriting guidelines and underwriting authority, the type of business that's being written, a profile of that business by state, by major business segment and, of course, finding out if there have been any major shifts in the business over time, finding out about any special risks that are not really characteristic of the book of business.

Sometimes, I think what you'll find now is as you're doing your loss reserve analysis, if you are relying, for example, on standard information, maybe from the actuarial department, you may miss an entire book of business, a whole block of business, that is somehow treated on an exception basis within the company and you would not otherwise know about it.

Find out if there have been any material changes in the company's policy forms or policy terms. A question that I always like is to ask for the rate change history. I think that often tells a lot about the company and how conscientious they are in terms of their record keeping.

Many times, you'll ask for that information and the company will tell you they don't have that, they don't have any way to get that, they'd have to dig back through old files and try to determine what the historical rate changes have been.

That's quite different than a company that tells you certainly, they can give you a report that comes out every six months with a summarized history of rate changes by line and by state. I think it's important to get that information and to get a perspective on the kinds of data that the company is keeping.

You want to find out how the loss reserving data compares to the data that is used for rate making purposes. Often, you might find that the responsibility for pricing is in the underwriting department and in a small company without any actuarial staff, you might find that there's no link at all between the pricing and the reserving. In fact, you might find that the underwriters really don't even have a feel for what's going on with the loss reserves, so that's important.

The other extreme would be companies that do use, basically, the same loss history, both for pricing purposes and for loss reserving and if they don't use precisely the same

information, at least they are doing tests occasionally to make sure that the pricing assumptions are consistent with the reserving assumptions.

So, in asking the questions of the underwriters, I think you want to focus really on two areas, those questions which will have a direct impact on the loss reserving and those questions which will give you additional understanding and perspective on the quality of the underwriting and pricing decisions.

MR. MICCOLIS: Ernie, on the claims?

MR. HENSON: Okay. Obviously, we want to find out something about the claims operation in the company because that is where all the loss data starts. That's where the settlement process takes place.

The list of 16 questions we have, I'll just review some of the major points that those questions are getting at. First of all, you want a feel for has there been any major changes in the organization or the procedures that are used in the claim department or would affect the claim department that may lead to inconsistencies or at least changes relative to past data in terms of payment patterns or reserving patterns.

Secondly, you want some feel for how they manage the settlement process, how they control the settlement process. Is the company's staff actually managing the claim to a settlement or are they relying on outside adjusters and defense counsel to effectively manage the settlement of the claim? That will have a great impact on loss adjustment expense, as well as final losses, and their control over the costs.

Are they monitoring what they are doing? Is there adequate management information reports, as Walt was discussing, so that they know what is happening in the claim department? Are there audits for the claim department? Who does the audits?

If you don't find good management information on what is happening in the claim department or if you don't find good audit information, you have to assume that there is a strong possibility that what the company thinks it is doing in the claim settlement process is different than what is actually happening.

Are there staffing standards? Understaffed claim departments often result in weak case reserves, as well as changes in the payment pattern. Variations in the strength of the staffing will lead to variations in those processes.

Again, I can think of a particular company that went through two budget cutting cycles in a six-year period of time. They cut the claims department along with all the administrative areas and, each time, it led to a bout of weak case reserves and inconsistency in the case reserves to the point that you couldn't use incurred losses for loss development purposes.

How do they measure their adjusters? Is there pressure to get claims closed quickly? If you see pressure of that sort, you have to ask yourself: Well, how may adjusters be responding to this? You'll find such pathological behavior as a lot of payment after closing activity, if their systems and their procedures provide for it; that's one way for adjusters to get claims closed quickly, just to write "closed" on the file and put "closed" in the system and then go ahead and settle the claim afterwards.

Again, I know of one case where fifty percent of the liability payments were payments after closing. Clearly, there was a lot of loss adjusting going on after the cases were

closed. Well, that's going to distort your open and closed statistics, your ratios of open cases to closed cases, in terms of what those ratios really mean relative to the payment of losses and to the average severity.

Something else comes to mind, too, in that respect. You put pressure on adjusters. They'll open up a lot of cases that they know aren't real good cases. They know they're going to close them with no payment, so when the pressure comes to increase the closing ratio, they just pull out their drawer full of unlikely cases and close a bunch of them, and then you get a bunch of closed no payments going through the system.

So, understanding the management and the measurement of the claim adjusters and the adjusting process can be very important to you in terms of making smart reserves. Do they use formula reserves at the case reserve level? If so, who sets the formula? Who sets the parameters? If it is the actuarial department or the financial department, then you've got some other considerations outside the claim department in terms of the quality of the case reserves.

How is a claim recorded? Who decides that there is a claim? Ideally, you want a very mechanical process where, if somebody from the outside, a claimant, an insured, calls up and says, "I've got a claim", somehow that gets into your statistics very quickly and very consistently with very little time delay.

If it comes in and there is some qualitative process where somebody looks at it and says, "Is this really a claim or isn't this a claim? Are we going to set up a file? Are we going to create a file number? I'm not sure, so I'll set that aside and we'll see what develops." If you've got that kind of a process, you may have some very inconsistent data over time on how many claims you really have and the recording delays of those claims.

What is the philosophy on reserving and settling? That will affect the quality of case reserves, especially if it changes over time. Is there a lot of emphasis on having adequate case reserves in the company? That may be quite different than the company that puts a lot of emphasis on lean case reserves. How do they define a lean case reserve, an adequate case reserve, an excessive case reserve, in terms of their procedures?

In paying cases, are they aggressively trying to pay cases and close them or are they resisting settlement? Are they only paying when it looks like it's going to be too expensive in terms of court costs or punitive damages or some kind of penalty for not paying, so their philosophy on payments and any changes in those philosophies are going to affect what their statistics look like relative to other companies, especially if you are using some kinds of norms that you are bringing with you, normal payout patterns, and trying to compare them to the particular company that you are looking at.

If you look through the list of questions, Question No. 14 has a quick list of statistics that are good to check, the kinds of numbers that if you can get some history on them over time will give you some indications as to potential problem areas.

MR. MICCOLIS: The next area, ceded reinsurance, is on page 8. This can be fairly simple or it can be very complex. There is a list here of items that are asked for by year. It's a judgment as to how far back you have to go.

One of the difficult areas is where there is a lot of overlap between treaty and facultative reinsurance. The facultative reinsurance can be somewhat of a nightmare sometimes because it is on individual risks, so you don't know how prevalent it is.

Usually, if it is used heavily, it is spread over several books of business and it is very hard to delineate where it is and where it isn't.

I don't know of too many primary company's systems that can separate out their treaty sections from their facultative sections and provide those in triangle format, but that's something that would be very helpful.

The major areas of exceptions seem to come up in portfolio transfers, this new area of financial reinsurance and how that might affect the numbers. The application of retentions and limits can be pretty simple, it can be a per currents limit, or it can be pretty complex. There may be an adjustable retention; there may be an aggregate retention that may impact particular kinds of claims or particular kinds of insureds.

The worst example is the asbestos litigation. Any company or reinsurer that has claims in that area, I've seen some of the diagrams and they fill up three or four pages of who is on for what layer and how many different interpretations there might be of how to interpret the different retentions and limits.

Similarly, with allocated loss adjustment expenses, you read the literature and they say, well, you can either share in proportion to the loss or expenses are included in the limit. Then you talk to some of the claims people, and there are five interpretations of each of those basic ways of doing things.

Again, in the extreme case, there can be the ceding carrier who interprets it one way, the excess carrier who interprets it in another way, and then the reinsurer interprets it a third way, so it can get very complicated. One example I've actually seen is where one interpretation has a zero reserve, a legitimate zero reserve, on a case for excess layer and another interpretation is a $3 million reserve. So, it can be pretty significant on where these issues are.

Reinsurance is subject to retrospective or lost rating or contingent commissions. Now, someone may say, "This doesn't directly affect the loss reserves. It affects the asset side or an offset." Sometimes, there can be a substantial liability on a primary company for future reinsurance premiums they'll be obligated to pay if the reserve numbers come out a certain way.

Similarly, on an assuming reinsurer, they could have a receivable or a future premium collection from their reserves, which may be high on a particular account and means that they're going to be able to collect more money when the reserves on those losses actually emerge.

Changes on the ceded reinsurance coverage over time, sometimes that's difficult to dig up, but if your reserves are heavy for older years, it becomes pretty important. As we saw in the illustration in the skit, commutations have become quite popular in the last five years, and they can really destroy the Schedule P statements.

Collectibility of ceded reinsurance and what happens when something is uncollectible, it's almost like a commutation. The company writes off the collectible. Now, what do they do with it? Is it in their development data? Is it not in their development data?

Let me switch over to systems and accounting. Now, some of this, a lot of this, even in the other sessions, they go through some of these questions and you have to know when the cut-offs are and the end of each month, any changes to when the cut-offs are, changes in the DP system.

Everybody, every three to five years, is upgrading their system or some part of their system. You may find that the loss development data gets distorted because of the way the claims are recorded or the way they are processed.

Coding changes. Ernie, at dinner last night, was telling me about something that happened in a company he worked for, that caused the counts to change. In questioning the systems people, they said, "Well, that system hasn't been touched. It's the same system. We haven't been working on it, so you shouldn't have any changes in counts." So, it took a lot of digging to find out what happened that would create changes in the claim counts which were unexpected.

A major item, number four here, that I don't think is done a whole lot, and that's verifying or cross-checking the loss reserve data that's used for analysis in the source documents against the annual statement. I've seen some major reserve studies done. They get all done and they're finished; at the end, they don't balance with the annual statement.

Then you say, "Well, how do we know where we are relative to our statutory reserves if we can't balance?" The worst case is where you are missing a major portion of the reserves. Fast track systems, a definition of those and how they may affect certain pieces of information, how payments are treated and how they are assigned to accident period and line of business.

Any kind of a toxic or pollution case creates a problem as to when the data loss is assigned. I've also seen some companies that record their premiums -- this is more prevalent in reinsurance, but they record their premiums according to what the underwriting thinks the line splits are of that premium.

But, as the claims come in, the claim adjuster knows it's a worker's comp claim, so it gets coded to worker's comp, but the premium that was collected was not necessarily a sole worker's comp premium; it was some portion of a total premium for a given contract. Obviously, if that changes over time, that can affect loss ratios.

There are some other questions about how partial payments are treated against case reserves. Is it possible for an outstanding case reserve to be negative? Sometimes that can happen. Deductible reimbursements. I had one client that when they paid the case, they pay it, they record the payment, and then they have to go to the insured to collect the deductible.

So, they have this crazy pattern where they make the payments and in six months, twelve months, 18 months later, they get the deductible in and then the pattern goes down. They actually needed to split their information between gross of deductibles and then the deductible recovery in order to do any reasonable kind of analysis.

Claim definitions and how multiple claimants are treated. Most DP departments that I've seen and claims departments consider claims as what some people call features. It's an individual claimant for a particular coverage on a claim. So, one accident, and a lot of actuaries like to count accidents, may create twenty or thirty features, because different coverages are involved and different claimants are involved. There may be a problem in how claims are counted and how they may have changed over time.

Again, on reopened claims, that's a fairly typical problem. Do you count the claim twice, once when it originally opened and then when it reopened, or does it count only once?

There are some other questions in here about background, external environments and a list of special questions, each of these dealing with MGAs, assumed reinsurance, financial guarantees, pools and associations, assigned risk business, professional liability and other D&O, E&O types of coverages. On some of them, you could have a questionnaire almost as big as this questionnaire, because of the number of variations in how these things are treated.

We'd like to move on now. I'm going to ask Ernie and Walt to give some of their thoughts on this overall process and their personal experiences in their dealings with this kind of a process, and what they've seen and what the important points are. I guess we'll start with Ernie.

MR. HENSON: Well, in my experience, the most prevalent problems I've run into or observed in estimating required reserves, those problems are problems in data integrity. That's not a lot of fun, because those aren't glamorous problems. For some of us that have a mathematical bent, you know, we like to think we're very clever in looking at the data and pulling the truth out of the data, but if the data is no good, you're not going to get any truth out of it.

I guess my bottom line is: You can't take anything for granted. To give you some specific examples, the one that Bob alluded to, using accounts and averages method for reserving because of inconsistency in case reserves, incurred losses were useless, so we were using counts and averages based on severity or paid claims, and had the wisdom to check the data to make sure the paid counts eventually climbed up and equalled the reported counts, actually checked that.

Then, it turns out, looking back, three years later, the reserves I thought we were making that were very good didn't turn out to be so good because, somewhere along the way, the paid counts were no longer equalling the reported counts over time. Somehow, there had been a change in the system and the paid counts for the more recent accident years were clearly not going to get close to the reported counts. So, we had overestimated the number of cases and we had actually over reserved.

As Bob said, when we tried to investigate this, we were told that that wasn't possible because there had been no changes to that system. Obviously, there had been, so you have to be very careful about data integrity, definition -- especially definition of claims.

Another case study situation. A company was making very good reserves on the data base it was using. There was a separate data base for the actuarial department that was being used to do reserve analyses. For some reason, it went on for a number of years and nobody caught the fact that not all of the company's business was getting from the master file into the actuarial department's data base. So, they were doing an excellent job in terms of methodology. They just didn't have all the losses. So, again, the company, in one year, had to recognize a significant reserve shortfall.

Look at the data when you are doing reserve work. Don't just feed it into the computer and begin to focus on it when you get your development factors and you start to do your analysis. Look at the raw data as it is going into your development triangles for reasonableness.

A common problem that I've seen is you can look at two development periods and you'll have very low development in one period and very high development in the next period.

You say, "Well, that's just variation and it evens out." In most cases, I've found it is just data put into the wrong place.

If the data doesn't look right to you, go back and check it to see if something peculiar may have happened. I will bet you, in more cases than not, you'll find out there has been some mistake in recording the data. My philosophy on making reserves is the only thing you can be sure of is that you're wrong when you set the reserve level. You just want to be reasonably wrong and not unreasonably wrong. Again, my experience is when you are unreasonably wrong, it's often due to a data integrity problem.

MR. MICCOLIS: Walt?

MR. WRIGHT: Okay. I'd like to just offer five nontechnical, common sense tips that I think will be helpful to you in gathering information. Number one, be prepared. Start with a comprehensive set of questions like the ones we've passed out today. Otherwise, you risk overlooking a whole line of questioning, such as ceded reinsurance or changes in the company's data processing procedures.

Further, if the quality of your analysis is ever brought into question, having a comprehensive list of questions like this in your work papers may serve to document the fact that you began your analysis in accordance with sound actuarial principles.
So, to be professional, be prepared.

Number two, don't be afraid to ask dumb questions. Ask for definitions, clarifications, explanations. Your role is to obtain information, not to show how knowledgeable you are. Don't let your ego get in the way. If you don't understand something, ask. If you're not sure if you understand something, ask. Even if you do understand, it doesn't hurt to ask. In fact, by playing dumb, you may find out things that otherwise you'd never learn, so ask dumb questions and learn all that you can.

Number three, focus on the important issues. Don't get sidetracked on irrelevant issues, no matter how interesting they may be to you. As you gather information, sort out the important issues from the immaterial and keep probing the important issues.

If you don't go through this sifting process, you're apt to end up with a lot of information but little in depth understanding of the critical items, so keep your focus on the important issues. Keep narrowing the focus of your inquiry in order to reach the best professional opinion that you can.

Number four, be persistent. Don't be overly concerned that your questions might be annoying. Your analysis will be judged by its thoroughness, not by whose feathers you ruffled. Be persistent in requesting what you believe is important. To do your job right, you need to dig in and to probe.

If the specific wording in a commutation agreement appears to be important to you, don't be satisfied until you get a copy of it. If data on large losses appears important but not readily available, don't be satisfied until you receive it. Be persistent, so that your final opinion will be based on all the important information.

Number five, plan to ask a second series of questions. After you gather your initial information, you should begin your numerical evaluation, but keep in mind that this may only be a preliminary analysis. As you do your calculations, new issues will surface. Then, you can refocus your investigation and ask another series of questions if necessary.

You have no obligation to stick with your preliminary findings. Your obligation is to go through the iterations necessary to be satisfied with your estimate, so recognize, at the outset, that a second round of questions may be necessary.

To summarize, be prepared. Don't be afraid to ask dumb questions. Focus on the important issues. Be persistent and plan to ask a second round of questions. I think these five simple tips will help ensure that you help perform your job as an actuarial professional.

MR. MICCOLIS: I'd like to get either some questions or comments or personal experiences from those of you in the audience. Do we have anybody that's got any questions? While you're thinking, one thing that I have seen that's been helpful is when you have two people asking the questions.

This doubling up may seem to be a little overkill, but sometimes you get the interview dynamics where one person is asking the question and the other one is listening to the responses. It may help the -- the two people might help on the responses a little quicker than somebody who is trying to focus on asking and getting the information at the same time. They may be able to cycle back faster and get the information faster, and it may save a lot in the end.

There was another session on presentations to management that talked about being able to give results and also explained what happens, especially if there is a change in the reserve levels. What they pointed out there is that management really needs an explanation and they really deserve an explanation.

You are really not going to be able to do it very well unless you have this kind of digging and trying to find out what is behind changes in the reserve patterns that cause changes in the final reserve levels, and may have affected your analysis or your particular approach.

In all of these areas -- underwriting, claims, systems, reinsurance -- any change in there could have a material effect on your reserve levels. There are numerous examples where companies have changed their retentions or changed just their underwriting strategy that have had an impact.

Even if they didn't make a change, particularly in underwriting or systems, their marketing people may have made a change and that may have had an effect. Does anybody have any questions? Any other comments over here? Why don't you come up and use the microphone.

QUESTION: I'm Steve Herman from Continental. I'm just wondering whether the process shouldn't be written rather than oral, providing this company that you are dealing with the questions that you want and getting written responses, so that then you can come back to them and question them further.

ANSWER: Well, certainly, it's helpful and I'm sure it's really courteous to the company to send them a list of questions ahead of time to let them know that this is what you are expecting to go over with them, and that way they can arrange more properly for the interviews you'll need to have with people, and they can start gathering some of the background information. I hadn't really thought of asking for the answers in writing.

ANSWER: I've done that. I've given somebody that insisted on having the questions and I gave them a list of questions, and they had written responses and then we did the interview. We might as well have thrown away most of the written answers, because they were trying to not give you the information. They were trying to, in some cases, protect their particular territory.

So, it may be helpful after you go through the interview, documenting the answers and then cycling back and saying, "This is my understanding. Is that correct?" and giving the people a second chance to clarify something, where you may have come to a conclusion that it's not right. The only way they're really going to understand it is possibly if they see it in writing.

QUESTION: Okay. I'm also wondering whether you are describing an initial going into a company, whether it would be perhaps a good idea, okay, to get the company to understand that you would need changes, for them to consider these questions on an ongoing basis and let you know about what's going on on a continuing basis, rather than every time you come in.

ANSWER: Right. There are different ways to get that information. I mean, you can have a formal -- if you are inside a company, you can have formal meetings or periodic meetings with different department people and you can have informal, take a claims guy to lunch type of thing.

One of the things I'd just like to mention, going along with Walt's comments about asking dumb questions, I was talking about expenses with a claims person. We were going through his file and he had something in there on his loss adjustment expenses that were called DJ expenses.

Does anybody know what DJ expenses are? Declaratory judgment expenses. Then you say, "Well, what is declaratory judgment expenses?" because the policy didn't cover, in this particular case, the excess policy didn't cover loss adjustment expenses.

They agreed to get the thing settled and in the process of getting it settled, they had to pay some attorneys' fees and some court fees to get a judgment. They agreed to pay a portion of those expenses to get the thing settled, even though it wasn't in the process of adjusting the claim; it was just to get the issue settled.

So, you have to keep asking these questions because you have to know how significant some of these shorthand considerations are by some of the other departments. Anybody else? Thank you very much.

LOSS RESERVE QUESTIONNAIRE

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LOSS RESERVE QUESTIONNAIRE

A. PURPOSE

This questionnaire is intended to develop information on:

- The major internal and external factors affecting the analysis and establishment of loss and loss expense reserves
- The general methods currently used to establish the company's loss and loss expense reserves
- The data needed to evaluate the company's reserves

B. BACKGROUND AND ORGANIZATION

1. Briefly describe the company's operations. Include a brief history of the development of the organization in terms of its primary purpose and fields of activity.

2. Provide an organization chart and a description of the major functional responsibilities at each level including both branch and home office areas. Include the number of employees in each functional area. Describe any significant changes in the functional structure of the organization or in staffing levels in the past few years.

3. Describe the company's major business segments. Include a profile of the company's business by major segment in terms of types of insureds, geographical distribution, lines of insurance, limits and deductibles, and any special coverages offered. Provide information by segment on the number of policies written and direct/net written premiums for the past five years.

C. UNDERWRITING AND PRICING

1. Describe the underwriting management organization. Who is responsible for underwriting overall and for each major business segment?

2. Describe the underwriting process for each major business segment and any changes in underwriting that have occurred over the last five years. Furnish information about the following areas:
   - Underwriting manuals, written underwriting procedures, and risk selection guidelines
   - Underwriting authorities (internal and external)
   - Rating methods and procedures including classification systems
   - Rating plans (e.g., experience rating, schedule rating,

retro plans) and dividend plans

- Excluded classes, maximum limits, eligibility requirements, etc.
- Underwriting reviews
- Audits, inspections, or other reports

3. Describe each major business segment in terms of the underwriting characteristics (by line or by program) over the last five years. Indicate any major shifts in business, cancelled programs, and any significant changes in coverage terms or pricing. Also, describe any major changes prior to the latest five years for any long-tail lines of insurance.

4. Provide a profile of premium volume for each major business segment as follows:
   - By state and major cities
   - By size of risk
   - By major risk class
   - By rating plan including retros and variable dividend programs

   Have there been any significant shifts in the composition of these profiles within the past several years?

5. Describe any large or special risks that are not characteristic of the book of business.

6. Describe any material changes in policy forms and provide a copy of non-standard policy language.

7. Have there been any changes in policy term, e.g. six month policies vs. annual? Are any policies written for a term longer than one year?

8. How is business recorded for assigned risks (or other residual market mechanisms)? Has the company experienced any major changes in this area?

9. Describe how the company establishes its rates and price levels for each major product line including the use of bureau rates and deviations. Have there been any changes in these ratemaking procedures? Indicate the extent to which market conditions have dictated previous and current rate levels.

10. Outline any price monitoring systems in place for the past three to five years. How is the level of premium adequacy determined for the past two to three years? Have any corrective actions in pricing or underwriting been taken in the last three years?

11. Compare the data used for ratemaking with the data used for loss reserving.

D. CLAIMS OPERATIONS AND CASE RESERVING

1. Describe the claims organization and the distribution of responsibilities for administration, investigation, litigation, case reserving, settlement, and salvage/subrogation. Discuss any significant changes in the claims operations that have occurred in the past several years.

2. Describe the procedures for monitoring and settling claims including the use of outside adjusters and for handling litigated claims including the selection and monitoring of outside defense counsel. Briefly discuss the claims administrative process including initial reporting, review (diary) system and settlement authority levels. Provide a copy of the claims procedures manual and any bulletins or memos relating to claims procedures.

3. Discuss the average caseloads of the claims personnel. Have caseloads changed materially over the past several years? What has been the claims backlog situation and how is it controlled? Indicate the performance measures used to evaluate the claims personnel, particularly any quantitative factors that relate to number of cases settled, average settlement amount, and settlement amount vs. case reserve.

4. Describe the company's specific guidelines or objectives in setting case reserves. Have there been any changes in these guidelines over time?

5. Are any claims reserved through the use of formulas? If so, describe the types of claims using formulas, the formulas, and any changes to the formulas over time.

6. Discuss how the company sets case reserves in terms of their current value (if the case were to settle today) and projected ultimate settlement value (allowing for future inflation). Indicate any historical changes or developments that may have had an effect of the historical reserve patterns.

7. How are case reserves established when a claim is first reported? Are there any cases that use initial formula(average) reserves, "no reserve" or "one dollar" reserves. How are incidents recorded?

8. Discuss the procedures used to review or audit case reserves. Are claim files evaluated by an independent consultant or outside party? If so, how often?

9. Has there been an audit of the claims department? If so, outline the results of this audit.

10. Do the case reserves include a provision for allocated loss adjustment expenses? Is there a separate case reserve for these expenses? When are these expenses usually paid?

11. How does the company test the adequacy of its case reserves?

12. What has been the company's philosophy and practice on settling claims vs. a rigorous defense? Any changes in this area?

13. Describe any special procedures or guidelines for very large or catastrophic claims or for unusual claims (asbestos, DES, environmental impairment or other toxic torts).

14. Have there been any noticeable changes in:
    - o settlement rates
    - o reporting patterns
    - o claim litigation rates
    - o average settlement costs
    - o number of small vs. large claims
    - o number or amount of reserve changes
    - o number of questionable or fraudulent claims
    - o number of claims closing with no payment?

15. Describe the process for establishing IBNR (or bulk) reserves. Outline the methods used to establish Annual Statement loss reserves (including IBNR) for each line of

insurance. Provide supporting documentation for the Annual Statement reserves including any internal or external studies, audit reports or actuarial analyses of the company's reserves. How often are reserve reviews conducted?

16. Describe and supply documentation for the determination of allocated and unallocated loss expense reserves.

E. CEDED REINSURANCE

1. Describe the company's external ceded reinsurance program(s) by line or major business segment. Provide the following information by year:
   - o use of treaty and facultative reinsurance
   - o use of excess of loss and pro-rata reinsurance
   - o use of portfolio transfers
   - o major reinsurers
   - o retention amounts
   - o reinsurance limits (layers)
   - o use of aggregate deductibles, aggregate limits, loss ratios caps
   - o treatment of allocated loss adjustment expenses
   - o details on any reinsurance subject to retrospective or loss-sensitive rating where additional premiums are possible

- o details on contingent commission arrangements

What major changes have been made to the ceded reinsurance covers over time?

2. Have there been any commutations of the company's ceded reinsurance? If so, describe the details of the transactions.

3. Has the company evaluated the collectibility of its ceded reinsurance? If so, describe the portions that are considered uncollectible, the basis for that determination, and how the uncollectible reinsurance has been recorded.

4. Describe how reinsurance recoveries are recorded for paid losses, case reserves and allocated loss adjustment expenses. Can historical loss development statistics be produced on both a gross and net basis?

5. Is there any unresolved litigation regarding the company's ceded reinsurance? If so, outline the nature of the litigation and the potential magnitude of the recoveries.

F. SYSTEMS AND ACCOUNTING

1. When are the data files closed at the end of the various accounting periods? Have there been any changes in these procedures?

2. Have there been any changes in the data processing system that have caused changes in the rate at which claims are processed and entered on the books?

3. Have there been any material changes in coding or data processing procedures that would affect the consistency of the loss payment or reserve data over time?

4. To what extent are the loss reserve data audited or verified against source documents, Annual Statements, or other company reports?

5. Does the company utilize a "fast-track" procedure for certain claims? If so, how are such claims defined and has the definition changed over time?

6. Does the loss development history include payments that have been made but were not yet entered into the data system? If so, how are these payments recorded to accident period, line of business, etc. How are such payments reported in the Annual Statement?

7. When partial payments are made, are the case reserves automatically reduced by the amount of the payment? Is it possible for an outstanding case reserve to be negative?

8. How are deductible reimbursements recorded? Are loss payments reduced by actual received reimbursements and do case reserves reflect expected deductible reimbursements? How are allocated loss adjustment expenses affected by deductibles?

9. Provide the definition of a "claim" as treated by the system. Indicate how multiple claimants from a single accident or occurrence are handled and how claims are recorded for each coverage (e.g., BI and PD).

10. How are reopened claims coded with respect to the report date of the original claim and the date of reopening?

G. EXTERNAL ENVIRONMENT

Describe any recent changes in each of the following areas that you believe may affect your underwriting or claims. If applicable, specify the lines or business segments affected.

1. Legal and judicial (specify state(s) if applicable)

2. Statutes or regulations (specify state(s) if applicable)
3. Social climate
4. Economic (e.g., rate of inflation)
5. Competition (particularly how it relates to pricing decisions and quality of business)

H. SPECIALS

Has the company had any significant business that falls into the following categories:

- Managing general agents (MGA's) or underwriting managers
- Reinsurance assumed
- Excess coverages (e.g., umbrella liability)
- Financial guaranty insurance
- Financial reinsurance (loss reserve buy-outs or loss portfolio transfers)
- Pools and associations
- Fronting for self-insurance, captives, risk retention groups, etc.
- Professional liability, errors and omissions (E&O), Directors and Officers (D&O), medical malpractice

1989 CASUALTY LOSS RESERVE SEMINAR

5G: CONFIDENCE INTERVALS AND PROFIT RECOGNITION

Moderator

Stephen W. Philbrick
Tillinghast/Towers Perrin

Panel

Spencer M. Gluck
Milliman & Robertson, Inc.

Robin A. Harbage
Progressive Corporation

MR. PHILBRICK: I went around and talked to some of you before the session started to find out why you were here. Some of you really wanted to go to the tax session but you took the wrong turn and ended up here. Too bad, the doors are locked, you can't leave.

Some of you read Confidence Intervals and thought this was going to be something to do with building up your confidence. Forget it. Then, there are a few pure actuaries in here, the techie types who really dig this stuff. I hope not everybody falls into that last category.

I'd like to explain to people why this is not just a subject for the pure actuaries. To do that, I'm going to go back and look at a definition of insurance. Insurance contracts involve the exchange of assets that are certain for liabilities that are uncertain, either in amount or timing or both.

Essentially, a restatement of that is that insureds pay fixed premiums to the insurer for which the insurer assumes the responsibility for a defined set of contingent liabilities from the insured. The key point here is uncertainty; that's what business the insurance industry is in, taking uncertainty and eliminating uncertainty.

Now, in fact, I contend that uncertainty is not eliminated when the policy transfer takes place. It is finally eliminated when the last dollar is paid. The original price paid for a policy includes discounted expected losses plus a margin for uncertainty. This all sounds like pricing, which is something we are not even supposed to be talking about.

These people are here to talk about uncertainty in loss reserving. What is the relationship? Well, the relationship has been discussed before, but I'll repeat it again. One starts out with a transfer of premium, including a margin for uncertainty. That margin for uncertainty ought to flow into profit over time as the uncertainty is eliminated.

Therefore, at any point in the life of a policy, we have to look at the remaining outstanding, the remaining case reserves and the IBNR and look at how much uncertainty is left, because that will help us measure how much ought to have flowed into profit.

Let us look at some of the building blocks of accounting. I'm telling you how I think profit ought to be accrued, but who am I to say how profit ought to be accrued? Let's go to the people who make the rules, the Financial Accounting Standards Board.

We go to their Statement of Financial Concepts. These are the building blocks. We might call them axioms; it is how they build up all their financial statements. The FASB says that guidance for recognizing revenues and gains is based on these items being earned. Revenues are not recognized until they are earned.

When are they earned? Revenues are considered to have been earned when the entity has substantially accomplished what it must do to be entitled to the benefits represented by the revenues. It is a bit of a mouthful, but they are not trying to deal with just the insurance industry; they are trying to deal with all industry in general.

To figure out when you have earned your revenues, you have to determine when you have done what you intended to do. I contend that what the insurance industry intends to do or what it should intend to do is eliminate uncertainty, so it doesn't deserve the profit until

the uncertainty has been eliminated. However, this does not occur on the last day; it is ratably over the period, ratably in proportion to the reduction of uncertainty.

Well, some of you may be saying, "That sounds nice, but I don't recall that the industry actually does this, so why not?" Well, the industry has appealed to a higher authority, that accounting theory that says two wrongs approximate a right.

What are the wrongs that we've been doing? Well, for many years, the insurance industry has contended that thou shall not recognize the time value of money. They've done this for a number of reasons, some that actually make some sense but, in balance, not defensible. One of the arguments is that insurance companies are in the business of making underwriting profits, not earning investment income. Investment income is incidental.

If any of you have heard that argument and still buy that, I would ask you to tell me when was the last year that the insurance industry's underwriting income exceeded its investment income? The answer is: 1950. A lot of people don't realize it's that long ago.

In 1951, for the insurance industry as a whole, investment income exceeded underwriting income and has every year since. As you know, in more recent years, the underwriting income actually is negative, but we have been an investment income dominated industry since many of us in this room have been born and certainly since most of us have been in the business.

Yet, we still, as an industry, try to pretend it's not important. Well, we've managed to propagate that fiction so we managed also not to have to deal with the second issue: Reserves ought to have a margin for adverse deviation. In general, that margin for adverse deviation, on balance, is somewhat less important than the time value of money. So, as long as we were able to get away with not discounting, we could forget about the other issue.

Under the old accounting rules prior to the Tax Reform Act, insurance companies issued policies at a premium that they expected to generate an economic gain and, in fact, did. But when they booked this premium, they generated an accounting loss. It didn't matter whether you were using statutory accounting, GAAP accounting or tax accounting. It generated a loss.

I hope this is evidence to you that something is wrong. Insurance companies have managed to write policies that are expected to generate an economic gain, (at least, most of the time, they expect to generate an economic gain). Yet, they try and tell the world that they're generating an economic loss.

They got away with this fiction for a long time, but finally, the IRS said, "Enough is enough." The IRS said, "I don't care how you want to account for this business. We're going to recognize the time value of money, we're going to calculate your income and we're going to tax that income."

So, now we have the current situation. We still issue policies that we expect to generate an economic gain. We still contend, for accounting purposes -- statutory accounting and GAAP accounting -- that they create a loss, but not for tax accounting. In tax accounting, we show income, but we've gone too far. We haven't; the IRS has.

The gain now recognized by tax accounting exceeds the amount immediately realizable. What do I mean by immediately realizable? Tax accounting says you have made this much money. Well, if you really have made this much money, you ought to be able to go out and sell your loss reserves off and realize that gain, actually realize that gain, immediately, as opposed to having it as some future investment income.

I contend that because of the margin for uncertainty in loss reserves, they have overstated the amount that the industry has earned. But, as a profession, we missed our opportunity. We should have recognized that the IRS wasn't going to stand for this forever, and we should have come up with a compromise that said, "Look, we will recognize the time value of money. In response, though, we have to tell you about uncertainty and explain it to you and build it into the formulas."

(Graph)

I'd like to quickly go through a graph that shows how some of us should work. We start at time zero and pick a very simplified example, no expenses, and think of it as a one day policy so I don't have to worry about the unearned premium.

When we originally issue a policy, we issue it for a price equal to discounted expected losses plus a margin for uncertainty, a margin that we hope will translate into actual profit at some time. So, when we originally book this, the red bar is booked as an IBNR loss reserve. We ought to book an amount equal to the uncertainty. The sum of those two is the amount that we actually should receive net of expenses.

As time goes on, paid losses emerge, case reserves emerge and then go away and the IBNR eventually goes away. At each point in time, we should be able to look at the outstanding amounts and measure the uncertainty associated with that. We would expect that the uncertainty represented by the green should go away over time.

The residual amount is the profit. The profit is the amount that the insurance company earned over time as it eliminates the uncertainty on this policy. Now, some people look at this and say, "No, what you're trying to do is put off the recognition of profit. You're doing this just so you can try and reduce the taxes because your net goal is to convince the IRS that this is how things ought to operate." That's true.

I contend that you have not earned all of the profit on day one. The proof is that, at the end of year two, if you decided to go out of business, the paid losses are all paid, you've got some case reserves and you've got some IBNR. You're going to have to transfer this to somebody.

How much will it cost to transfer? Well, if we work in a world of rational insurers and reinsurers -- a big hypothesis, I understand -- but working with those rational insurers and reinsurers, they're not willing to take on this amount of expected loss for that amount of dollars. They are going to want a margin for uncertainty and that's what the green amount represents. (Remember that all values shown are discounted.)

If you transfer that to them, what you're left with is the blue amount or profit. So, at any point in time, the blue amount residual represents the profit, and the profit should flow into the company over time.

Well, as I mentioned, we've got three major sources of accounting -- statutory, GAAP and tax. We've missed our opportunity with the tax authorities, but there still are two left. We, as a profession, ought to work on establishing reasonable rules for

Why Are You Here Today?

- You really wanted the tax session, but you took a wrong turn.
- You thought this session had somewthing to do with building up your confidence.
- UNCERTAINTY is your middle name.

Tillinghast

What Is Insurance?

Insurance contracts involve the exchange of assets that are certain for liabilities that are uncertain, either in amount or timing or both. Insureds pay fixed premiums to the insurer, for which the insurer assumes responsibility for a defined set of contingent liabilities from the insured.

Financial Accounting Standards Board

Statement of Financial Accounting Concept No. 5

Guidance for recognizing revenues and gains is based on their being EARNED. Revenues are not recognized until earned. Revenues are considered to have been earned when the entity has substantially accomplished what it must do to be entitled to the benefits represented by the revenues.

Two Wrongs Approximate A Right

- Wrong # 1 --
  Reserves should not be discounted to reflect time value of money.

- Wrong # 2 --
  Reserves should not include a margin for adverse deviation.

Tillinghast

Old Accounting Rules

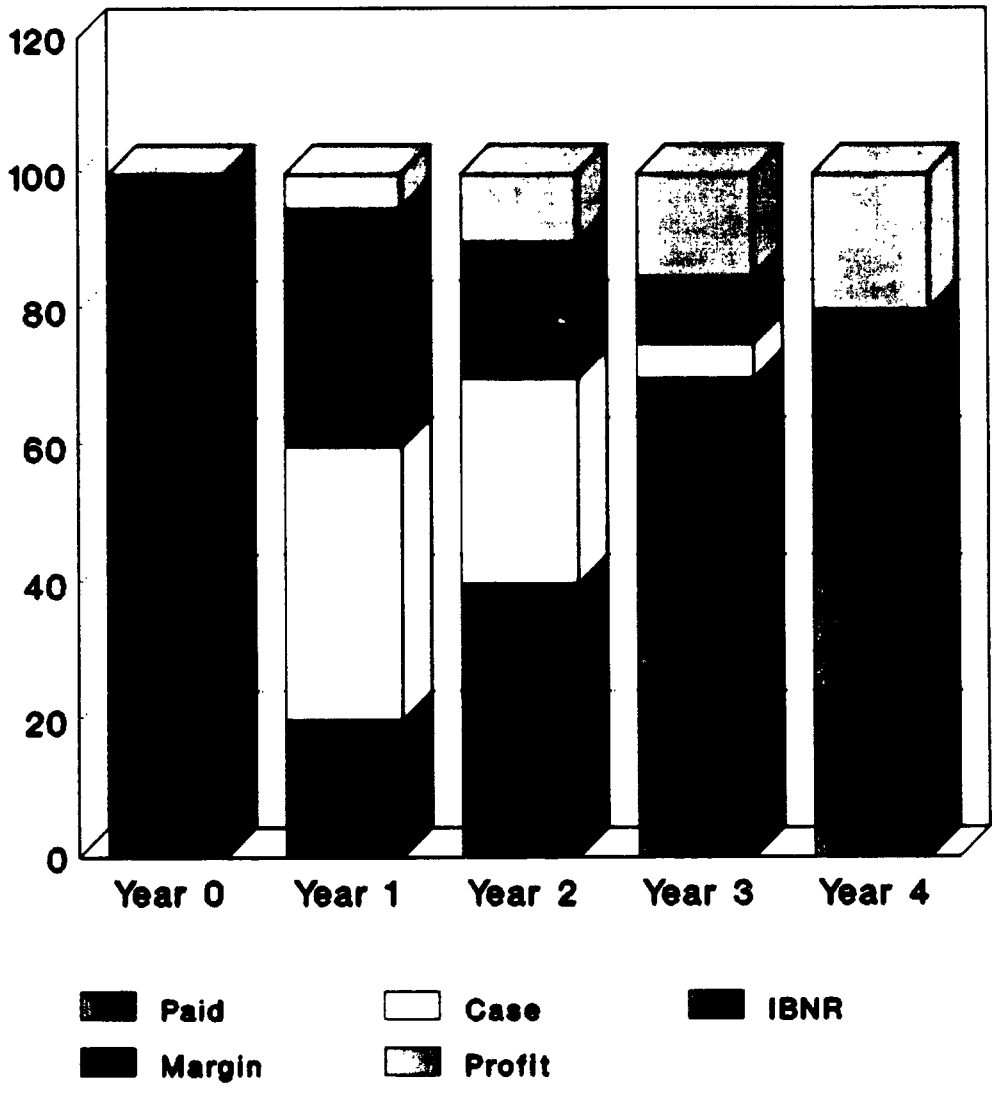
Policy issued at a premium, expected to generate an economic gain, created an accounting loss whether statutory GAAP or tax accounting.

Tillinghast

Current Accounting Rules

Policy issued at a premium, expected to generate an economic gain, creates an accounting loss for statutory and GAAP purposes - - but not for tax purposes. However, the gain recognized by tax accounting exceeds the amount immediately realizable.

Profit Recognition Of An Accident Year



Recommendation

Let us establish reasonable rules for incorporating uncertainty in loss reserves so that the profit reflected in each calendar year corresponds to the actual services rendered -- the elimination of uncertainty.

incorporating uncertainty in loss reserves, so profit reflected in each calendar year corresponds to the actual services rendered, which is the elimination of uncertainty.

Those of you who were in on the discounting session heard Wayne Upton talk about what's going on now. The FASB is tackling this question again. They have a committee that met on September 11th for the first time. It will certainly take some time, but they are addressing this issue now and we, as a profession, ought to be providing some input into this.

Now, again, to explain how this point relates to the rest of today's discussion, we as a profession cannot go to the accounting profession and say, "We think you ought to incorporate a measure of uncertainty in the loss reserves, but, gee, we can't tell you how to do that." We've got to do better than that.

Our two speakers here today are going to talk about how one actually does that, one in a practical "Here's how I actually do it" and one in a more theoretical sense. So, I hope I've given you some incentive for listening to these two speakers with special interest.

Our first speaker today will be Robin Harbage. He is a Vice President and Corporate Actuary of Progressive. He joined Progressive in 1987 and is responsible for establishing the corporate loss and loss adjustment expense reserves and overseeing reinsurance.

He came to Progressive after seven years with Nationwide where his responsibilities included auto and home owners pricing, actuarial research and personal, commercial lines loss reserves. He got his BA from the College of Wooster, an MBA from Ohio State. He is an Associate of the CAS and a member of the American Academy.

MR. HARBAGE: Good morning. I'm going to give you, as Steve pointed out, practical applications for measuring the probability of having adequate loss reserves and how that might relate to profit recognition over time. This is one company's approach and there are probably as many approaches as there are companies. The difference is that we are actually using the analysis and have for about ten years.

It has been accepted in every annual statement that we've filed and in the annual report, so it has passed that test of time.

I will talk about our objectives. First we are attempting to model the process risks for our total reserves and determine the confidence interval for the process risk.

I'm going to use the term confidence interval loosely, because I've already heard at least three speakers with three different definitions for confidence interval in the time I've been here. I've realize we all have different images of what confidence interval means. What I'm trying to measure is the probability that we are going to have more losses than carried loss reserves.

We calculate the reserve amount associated with the confidence interval. We to allocate this reserve amount to the individual accident years or the reserve dates, either way you want to look at it; one is just an accumulation of the former. We release the reserves associated with the process risk each reserve date matures and we know more about it. There is less supplemental reserve, which is recognizing the reduced uncertainty as of that reserve date.

Our procedure is fairly straightforward. We collect internal data or the development of losses and loss adjustment expenses. We calculate a range for the historical paid development, and I emphasize that it is on paid development. I said before that we're doing this for the process risk. By the process risk, I mean the random variation in the process that we're measuring, in this case loss development, and not for the parameter risk or the estimation error. I'm not saying, "Gee, if I estimate all the parameters wrong, what is the possible chance that we could be outside the range?" I think we all know that if we just do our job badly, the range is pretty enormous. So, I'm looking at paid data and not at incurred data. I take my reserve estimates out of the variations of the process.

I assume some model for the distribution of loss development. In this case, our model is the uniform distribution, which has a fairly wide dispersion, probably a conservative assumption.

We simulate the loss and loss adjustment expense development using this distribution. We calculate a mean and a standard deviation. Standard deviation is the important number for us to know because we want to know what the dispersion is of our probable outcomes around the estimate.

We do this by accident year, because we'll need this in order to be able to determine how much reserve we should have for each accident year at any given point in time. We select the desired probability that we want for reserve adequacy. This is a subjective management decision, how much to hold as a probable maximum for your reserve. We calculate the reserve required to meet that probability standard.

There are several benefits that we derive from this process. One is we have an estimate of the riskiness of each line of business which we model. If we do this on separate lines of business -- i.e., commercial versus personal and even break out some of our more unusual commercial lines separately -- we have a little feel through doing this model of what inherent riskiness there is in some of the different lines of business. We can compare the risk of alternative products.

We can have secondary check of historical accuracy via the mean of our distribution. If the mean that we calculate via the simulation is nowhere close to what our carried reserve it gives you a check of whether your model that's wrong or whether your loss reserves were wrong. Finally, we match our profit with the risk uncertainty that reduces over time.

I'll show the material to you. It's fairly simple and straightforward. It has to be, because I have to explain it to all of our management and not all of our management is as sophisticated as our CEO. I say that in case he reads the transcripts.

The number incurred is the first triangle that I look at. What I'm doing is looking at development historically and seeing how high or low the development was by year, then picking a high and a low. There is a subjective approach here to picking the high and low.

(Slide)

In this particular exhibit, I've taken the loss development factors for the number incurred. I calculated the loss development factors and looked through to see what were the historical highs and lows and picked those. Those are end points in the range within which I'm going to do my simulation.

It's quite likely that I could have a number that could fall outside that range, but as I noted earlier, I used the uniform distribution and it has probably a larger dispersion than would be expected for the loss development model; that's a conservative assumption.

Picking end points and limiting the range within which I do a simulation is a nonconservative assumption. I feel comfortable since the two are offsetting and are probably conservative in total.

I also do the same thing for the average paid losses. Remember, I said we used paid and not incurred in this development. I calculate the loss development factors for this as well, pick high and low ranges and then do my simulation.

You'll want to flip a couple of pages back to find this next slide.

(Slide)

This is the summary. This is one simulation. We go through and do five hundred simulations where we randomly generate loss development factors between the high and low for our incurred development, our average paid development, our allocated loss adjustment expenses and for our legal allocated loss adjustment expenses, so we have four different triangles that we're doing the simulation on.

One pass of this will calculate what the required reserve would have been for that pass. We do this for five hundred simulations, then find the mean and standard deviation of all simulations. Then we can calculate our probability requirement.

Across the top in row one are the average reserves we should have as of 12/31/88 for each of these reserve dates. Of course, it diminishes over time as the reserves are released for each of the prior reserve dates. This is based on the five hundred simulations. We go back and look to see what we actually carried for reserves has been at least approximately equal to the mean.

The key number is the next one down on line two where we have our standard deviation for these dates. Next we calculate the coefficient variation, two divided by one, and as you look back at the prior reserve dates, you'll note the coefficient of variation goes up. As we release reserves, we are releasing some of the more certain, easily paid losses. The reserves that are left are more volatile, but in terms of the total losses for that reserve date, there is more certainty because we've paid out a lot more of the losses from that reserve base.

We select a confidence interval for our particular company which enables us to say with 99 percent certainty the reserves are not going to be deficient due to the process risk that it is inherent in this model. We convert the confidence interval into a reserving factor. For this particular line of business, it happens to be 5.4 percent. It varies from line to line of business.

I calculate correlation coefficients between the different lines of business in order to derive an overall reserving factor we put up as a corporate overlay for all of our lines of business combined.

This is not allocated to individual lines of business because I don't want the individual product managers or pricing people to be confused when they go to look at their reserve estimates. We set a reserve for each of the individuals lines that is accurate, then use

CAS LOSS RESERVING SEMINAR
CONFIDENCE INTERVALS AND PROFIT RECOGNITION

OBJECTIVES

1) Model "process" risk for total reserves.

2) Determine confidence interval for "process" risk.

3) Calculate reserve amount associated with confidence interval.

4) Allocate this reserve amount to individual reserve dates.

5) Release reserve associated with "process" risk as it matures.

CAS LOSS RESERVING SEMINAR
CONFIDENCE INTERVALS AND PROFIT RECOGNITION

PROCEDURE

1) Collect historical data on development of losses and LAE.

2) Calculate range of historical loss development for paid data.

3) Assume some model for the distribution of loss development.

4) Simulate loss and LAE development to develop a distribution.

5) Calculate mean and standard deviation of loss and LAE reserves by accident year from distribution.

6) Select desired probability of reserve adequacy.

7) Calculate carried reserves by accident year required to meet probability standard.

CAS LOSS RESERVING SEMINAR
CONFIDENCE INTERVALS AND PROFIT RECOGNITION

BENEFITS

1) Derive estimates of inherent risk of business types.

2) Compare risk of alternative products.

3) Provide explicitly for recognition of confidence interval.

4) Secondary check of historical reserve accuracy.

5) Match recognition of profit with reduction of risk which makes profit uncertain.

Accident Year	Number Incurred (LDS) 4	8	12	16	20	24	28 (Ult)
7912	54,791	55,690	55,551	55,474	55,430	55,422	55,410
8012	49,924	52,166	52,064	52,031	52,028	52,015	52,000
8112	69,550	73,225	73,156	73,093	73,042	73,019	73,005
8212	90,791	92,947	92,794	92,695	92,640	92,616	92,612
8312	82,334	84,585	84,399	84,328	84,271	84,252	84,246
8412	86,260	89,050	88,760	88,689	88,626		88,589
8512	115,886	121,070	120,744	120,626			120,564
8612	129,437	135,461	135,283				134,973
8712	159,454	164,952					164,457
8812	193,038						198,580

Accident Year	8/4	12/8	16/12	20/16	24/20	28/24	Cumulative LDF's
7912	1.016407	0.997504	0.998613	0.999206	0.999855	0.9997834	
8012	1.044908	0.998044	0.999366	0.999942	0.999750	0.9997116	
8112	1.052839	0.999057	0.999138	0.999302	0.999685	0.9998082	
8212	1.023746	0.998353	0.998933	0.999406	0.999740	0.9999568	
8312	1.027339	0.997801	0.999158	0.999324	0.999774	0.9999	0.9999
8412	1.032344	0.996743	0.999200	0.999289	0.9997	0.9999	0.9996
8512	1.044733	0.997307	0.999022	0.9999	0.9997	0.9998	0.9995
8612	1.046540	0.998685	0.9989	0.9992	0.9997	0.9999	0.9977
8712	1.034480	0.9987	0.9994	0.9995	0.9997	0.9998	0.9970
8812	1.0320	0.9989	0.9987	0.9995	0.9998	0.9999	1.0287
High	1.046540	0.999058	0.999366	0.999942	0.999856	0.999957	
Low	1.023747	0.996743	0.998614	0.999207	0.999685	0.999712	

Accident Year	Average Paid (LDS) 12	24	36	48	60	72	72 (Ult) Average Incurred
7912	$ 795	$ 928	$ 1,007	$ 1,048	$ 1,06[illegible]	$ 1,078	$ 1,102
8012	860	1,019	1,106	1,145	1,16[illegible]	1,178	1,184
8112	1,001	1,187	1,281	1,336	1,36[illegible]	1,370	1,377
8212	1,031	1,210	1,306	1,360	1,39[illegible]	1,416	1,422
8312	1,029	1,227	1,330	1,388	1,42[illegible]	1,438	1,445
8412	1,074	1,310	1,424	1,496	1,51[illegible]		1,537
8512	1,294	1,522	1,651	1,725			1,799
8612	1,401	1,661	1,797				1,939
8712	1,552	1,808					2,122
8812	1,646						2,285

Accident Year	24/12	36/24	48/36	60/48	72/60	Ult/72	CUMULATIVE LDF'S
7912	1.167147	1.084836	1.041147	1.015082	1.0132[illegible]1	1.0220792	
8012	1.185965	1.085012	1.034845	1.018737	1.0104[illegible]9	1.0045343	
8112	1.186453	1.079234	1.042650	1.018382	1.0071[illegible]9	1.0050110	
8212	1.173121	1.079571	1.040753	1.026203	1.0147[illegible]4	1.0043515	
8312	1.191886	1.084375	1.043687	1.027359	1.0080[illegible]5	1.0049	1.0049
8412	1.219831	1.087716	1.049960	1.015612	1.0075	1.0046	1.0121
8512	1.176316	1.084582	1.045110	1.0269	1.0107	1.0049	1.0430
8612	1.185527	1.082122	1.0480	1.0157	1.0090	1.0044	1.0787
8712	1.165415	1.0871	1.0465	1.0196	1.0075	1.0045	1.1738
8812	1.1796	1.0845	1.0390	1.0261	1.0130	1.0048	1.3884

Accident Year	24/12	36/24	48/36	60/48	72/60	Ult/72
83-High						1.0050
Low						1.0044
84-High					1.0148	1.0050
Low					1.0071	1.0044
85-High				1.0274	1.0148	1.0050
Low				1.0151	1.0071	1.0044
86-High			1.0500	1.0274	1.0148	1.0050
Low			1.0348	1.0151	1.0071	1.0044
87-High		1.0877	1.0500	1.0274	1.0148	1.0050
Low		1.0792	1.0348	1.0151	1.0071	1.0044
88-High	1.2000	1.0877	1.0500	1.0274	1.0148	1.0050
Low	1.1654	1.0792	1.0348	1.0151	1.0071	1.0044

Accident Year	Legal Fees/Paid Losses									
	4	8	12	16	20	24	28	32	36	40 (Ult)
7912	.0014	.0099	.0254	.0372	.0440	.0470	.0484	.0488	.0490	.0491
8012	.0010	.0111	.0263	.0357	.0411	.0440	.0447	.0447	.0449	.0449
8112	.0031	.0106	.0251	.0356	.0410	.0436	.0449	.0452		.0454
8212	.0032	.0124	.0267	.0360	.0429	.0459	.0477			.0483
8312	.0038	.0141	.0264	.0373	.0449	.0485				.0501
8412	.0038	.0123	.0246	.0353	.0412					.0462
8512	.0039	.0118	.0239	.0328						.0445
8612	.0025	.0107	.0218							.0427
8712	.0031	.0104								.0461
8812	.0030									.0475

Accident Year	8-4	12-8	16-12	20-16	24-20	28-24	32-28	36-32	40-36	CUMULATIVE LDF'S
7912	.0085	.0154	.0118	.0069	.0029	.0015	.0004	.0002	.0001	
8012	.0101	.0152	.0094	.0055	.0029	.0008	.0000	.0001	.00006	.00006
8112	.0075	.0145	.0104	.0054	.0027	.0012	.0003	.00018	.00006	.00023
8212	.0093	.0142	.0094	.0069	.0030	.0018	.00034	.00019	.00006	.00059
8312	.0104	.0122	.0110	.0076	.0036	.00134	.00003	.00017	.00006	.00158
8412	.0086	.0123	.0106	.0059	.00298	.00161	.00018	.00016	.00006	.00499
8512	.0078	.0121	.0090	.00745	.00289	.00110	.00002	.00019	.00006	.01170
8612	.0081	.0111	.00987	.00602	.00329	.00128	.00022	.00019	.00006	.02092
8712	.0073	.01449	.01018	.00640	.00306	.00134	.00007	.00017	.00006	.03575
8812	.00813	.01529	.00925	.00727	.00341	.00081	.00009	.00015	.00006	.04446
High	.01038	.01542	.01180	.00755	.00361	.00176	.00035	.00021	.00006	
Low	.00730	.01212	.00897	.00537	.00269	.00076	.00001	.00014	.00006	

Accident Year	(1) Ultimate Number Incurred	(2) Ultimate Average Paid	(3) Ultimate Losses (1) X (2)	(4) Ultimate Legal	(5) Ultimate Adjuster	(6) Ultimate ALAE (4) + (5)	(7) Ultimate Losses + ALAE (3) + [(3) x (6)]	(8) Paid at 12/31/88 Losses	(9) Paid at 12/31/88 ALAE	(10) Loss + ALAE Reserve at 12/31/88 (7) - (8) - (9)	(11) Cum. Sum
1979	55,410	1,102	61,048	.0491	.0457	.0947	66,831	61,046	5,783	1	1
1980	52,000	1,184	61,549	.0449	.0353	.0802	66,486	61,544	4,937	5	6
1981	73,005	1,377	100,545	.0454	.0262	.0717	107,749	100,531	7,181	37	43
1982	92,612	1,422	131,696	.0483	.0209	.0692	140,813	131,611	9,055	147	191
1983	84,246	1,445	121,723	.0501	.0120	.0621	129,280	121,051	7,385	844	1,035
1984	88,589	1,537	136,194	.0462	.0114	.0575	144,027	134,339	7,094	2,594	3,629
1985	110,564	1,799	216,949	.0445	.0113	.0558	229,064	207,102	9,243	12,718	16,348
1986	134,973	1,939	261,697	.0427	.0100	.0527	275,494	240,440	7,803	27,251	43,599
1987	164,457	2,122	349,056	.0461	.0092	.0553	368,360	289,653	5,578	73,130	116,728
1988	198,580	2,285	453,686	.0475	.0105	.0580	479,982	264,357	3,114	212,511	329,239

		Reserve Dates						
		12/31/88	12/31/87	12/31/86	12/31/85	12/31/84	12/31/83	12/31/82
(1)	Average Reserve @ 12/31/88. (000).	$314,935	$115,816	$ 44,013	$ 15,617	$ 4,166	$ 1,032	$ 171
(2)	Standard Deviation. (000)	$ 7,326	$ 3,074	$ 2,101	$ 1,029	$ 346	$ 65	$ 17
(3)	Coefficient of Variation. (2)/(1).	.0233	.0265	.0477	.0659	.0830	.0633	.1013
(4)	.054/Coefficient of Variation.	2.32						
(5)	Probability of Adequacy.	99.0%						
(6)	Coefficient of Variation x (4).	.054	.062	.111	.153	.193	.147	.235
(7)	Supplemental Reserve. (1) x (6). (000).	$ 17,007	$ 7,136	$ 4,876	$ 2,388	$ 803	$ 152	$ 40
(8)	Supplemental Reserve by Accident Year. (000).	$ 9,870	$ 2,260	$ 2,489	$ 1,585	$ 651	$ 111	$ 28
(9)	Percentage Distribution by Accident Year.	58.0%	13.3%	14.6%	9.3%	3.8%	.7%	.2%
(10)	Smoothed Percentage Distribution by Accident Year.	58.0%	15.0%	13.0%	9.3%	3.8%	.7%	.2%

this supplemental reserve to realize the uncertainty in the corporation for adverse reserve development.

We also look at this by accident year statutory purposes because this is a reserve that is carried on our books.

I'll let Steve introduce the next speaker and I'll take questions later. Thank you.

MR. PHILBRICK: The next speaker is Spencer Gluck. He is an actuary with Milliman & Robertson with extensive background in loss reserves analysis for primary insurers and reinsurers. His current practice emphasizes medical malpractice. Previously, Spencer as a vice president for Kramer Capital Consultants, manager in the actuarial division of Peat Marwick and a regional actuary for ISO.

Spencer is currently a fellow of the CAS, a member of the American Academy of Actuaries and holds a bachelor's degree in math and a master's in education from Cornell. Spencer?

MR. GLUCK: I think this stuff is practical. In any case, I want to start from the context of a regression analysis, so we are assuming that you are now analyzing your reserves by regression. The technique I'm going to describe is a computer intensive technique called Bootstrapping, which will be used to take a regression analysis and project a whole range of probability distributions or results from it.

Bootstrapping was first invented in 1979 by Stanford, so it is relatively new, and that's not because the mathematics is so fancy but, rather, because it's very computer intensive. We're doing it now on a 386 type PC. We're bumping up against the capabilities of the machine all the time, but we're getting it done.

(Slide)

In any case, I'm going to start here with a little picture there which is a pseudo-equation. We start with the triangle of actual data and we do a regression analysis, and I'm not going to go extensively into how we do that because that's in a different session.

We do a regression analysis and what a regression analysis gives you is it gives you fitted data. Since, of course, we are interested in projecting it, notice that I have the fitted data both for the past period that matches the actual data and for the future period, which is the lower half of the triangle there that we are interested in.

How do you fit into our regression? We take our actual data, we subtract our fitted data, and this gives us the residuals. The residuals are real important and we're going to be focusing on them heavily in this discussion. Without going through the whole regression again, it is essential that none of this means anything unless the regression model is valid.

The regression model somehow has to be a reasonable picture of the process. We're working here on triangles and summarized data, so again, we're not modeling the individual claims process. Somehow, what we come up with has to seem like a reasonable model of the process and for that to be true, the residuals have to have certain properties.

Ideally, the residuals would be random, independent, identically distributed and normally distributed. We can relax some of these. We can relax at all the first one. They must be random. If there is a functional relationship left between the residuals and any of your independent variables, it means your model is no good. There's something important happening that you didn't model and you're not going to get good projections out of it.

Normally distributed, you see we're going to jump that right away with the Bootstrap. We don't really need this. A regression is only ideal if the errors are normally distributed, but the Bootstrapping technique does not assume that they're normally distributed, so that even if your regression isn't ideal, it doesn't mean that the results you get out of Bootstrap are not valid results.

The other two -- identically distributed and independent -there are things that you can do about it if they're not. I'll touch briefly on that later, but for now, we're going to move on, assuming that the residuals are random and independently identically distributed, although not necessarily normally distributed.

(Slide)

These are a few pictures which I used in my other talk about showing some bad residuals. I've got the residuals here plotted against three axis and one graph against the accident year and another against the development period and another down the diagonal against the calendar year, just so we can see, again, if there are important functional relationships that have been missed.

This is a real bad example of an unanalyzed trend. As you see, there is obviously a trend in the residuals, either on the accident year or the calendar year graph.

(Slide)

In this one, these are not too clear looking residuals either because if you look down at the lower left-hand corner and check out the development pattern graph, you can see that we haven't really done the development pattern accurately in this case at all. I point out that this particular model has an almost 97 percent r-square, and it gives ridiculous projections because it is valid; in fact, the model can fit pretty tight and still not be valid.

This is a better version of residuals. I don't know if they're great, but this is the one I went on and used, so that's the best I could do.

Now, the process of the Bootstrap involves the creation of pseudodata. What we do is we have our fitted data both in the past and the future and now we have to randomly generate new residuals. What we do is we take our residuals and let's say we have a ten-by-ten triangle which would give us 55 data points.

So, we have 55 residuals which we would presume are independent and identically distributed, so those are, in effect, 55 random selections from the same distribution. What is that distribution? In Bootstrapping, we don't assume anything about it. We say, "Let's assume that the distribution is a discrete distribution with 55 possible results, and those are them."

So, what we do is now we select 55 new ones from that same distribution, selecting with replacement and, of course, they don't come out in the same order because the order is

all shuffled up. So we get 55 new ones. In fact, we have more than 55 new ones, because we have 55 new ones at the top and we take a whole bunch more for the bottom.

So, we randomly select a whole bunch of new residuals and we add those to our fitted data and this creates a triangle, both past and future, of pseudodata. Now, we take the past pseudodata and we do the whole regression analysis on that again. That gives us projected future fitted pseudodata.

Now, we know the future. In the pseudodata, we know the real future because we created the pseudodata. We created it both past and future. We also have what the regression analysis shows for the future, so we can now compare the future pseudodata with the future fitted pseudodata.

Note that the computer is throwing in the word "converted" on that path and that's because, in our analysis, we did a log transform to make the model linear. We had to take the logs off both sides and convert the data before we did the analysis. Now at this step, to see how we really did, we've got to convert the data back and see if the process of taking logs distorts anything, and it does, so it's important to measure that.

So, now we have the total projection error for one particular iteration of the Bootstrap, the difference between the fitted future pseudodata and the actual future pseudodata, and we have that projection in total detail. You have it for every point in the future triangle as well as any summaries by total accident year, total calendar year, payment, summarized any way you like, and the grand total.

Then we do that same process five hundred times or a thousand times, so now we have lots of readings of actual, if you will, projection errors in gory detail. Remember, any time through this loop, we are redoing the entire regression analysis so that's why it is a computer intensive technique. We also create tremendous volumes of actual and fitted pseudodata.

If you wanted to save all the detail to be able to calculate anything let's say we have in the extended rectangle that was ten by ten, we have a hundred values, then make it two hundred because we have the actual pseudodata and the fitted pseudodata, and we have a thousand copies of that, so that's a lot of data.

Now we can measure anything. Now we have a complete distribution of actual versus projected results, and we can measure whether there is a bias. There will be a bias in the particular example I used because of the log transform. A regression gives you an unbiased result if you use a straight linear regression and you have normally distributed errors.

Once you take a log transform, your errors become abnormally distributed and you do introduce a bias. Furthermore, even in general, if your errors don't come out normal, you might have a bias, so this gives you a way to measure the bias. You can make a variant standard deviation. We took the coefficient of skewedness. We figured that was enough. You can specifically do confidence interval because you have a natural distribution of results.

Here are a couple of sorts of ways you can look at the variants and break it in pieces. The top piece I have there is the variance for the total projection error, which is, of course, the difference between the pseudodata and the fitted pseudodata.

The statistical error or process risk is the difference between the pseudodata and its own mean, so just the pseudodata and the variation you see in the pseudodata is a measure of how much variation is in the process.

The parameter estimation error -- sometimes called the parameter error and sometimes called estimation error, so I decided to call it both -- is the difference between the fitted pseudodata and its mean or the variance of the fitted pseudodata around its means.

The point here, again, is not that this parameter risk measures whether you are a good or a bad actuary, but that simply because of the randomness in the data itself, it causes the parameters of your models themselves to be random variables. There is not as much random variation as the data itself, and that's what we're measuring here as the parameter estimation error.

There is another big source of error that's not on the list and that's called model specification error. The point is that all of this assumes the model is valid, assumes that the actual process of this model is the process that's going on. Now, as we said, we are working on summarized data, but we know that the model is not exactly the process that's going on.

So, to the extent the model specifies it is not the real process, then that creates another whole category of error, and that's real.

This is just a bunch of statistics that came out of this one particular run of the Bootstrap. What we did here is -- I haven't looked at the distribution around every individual point in the future triangle, but what I have done is I've summarized the reserves into total reserves by accident year, the total reserves by calendar year and grand total.

You will notice there is a significant bias. I think it is about $2 million on a $30 million reserve projection as an example, so that's a warning against doing a regression when you have to take a log transform and then thinking that the fitted result that you get is your answer. It's not. The log transform introduces bias and you have to correct for it.

Anyway, I corrected for the bias and got the standard deviation of the variance, even the coefficient of skewedness. I don't think it turned out to be too seriously skewed. Then I calculated the process error and the parameter error, as I have just discussed them.

Interestingly, if you look at the process error column, any way you summarize it, the grand total, by having double checked the grand total, was absolutely equal to the sum of the individual pieces, but if it is not exactly, it should be close. That's because the process error is presumed to be independent. We assume that all the errors are independent when we pick the points independently.

On the other hand, the parameter hand is completely dependent. Every run through the Bootstrap, to the extent you've misestimated your parameters, all of your errors come out biased the same way because of that, so you'll see that the grand total parameter error is far larger than the sum of the individual pieces, because the individual pieces are highly correlated with each other.

When you look at one small piece, the process risk is a much bigger, more important thing than the parameter risk, but once you look at the grand total, a lot of the process risks can be allowed because of the randomness of the parameter risks.

Now, this is just another output from the same Bootstrap. We wind it up as confidence intervals, just reading out the different percentiles of the distribution. Again, we've got it summarized by accident year, reserves, totals, calendar year, payment, reserves, totals and grand totals. Again, you cannot add down the columns. You have to have your distribution in all its detail to be able to do these calculations because the various errors have relationships with each other; they are not correlated.

Now, this is just a few pictures. That's a histogram of the results of the 250 iterations of the Bootstrap that we're looking at in this example. I think that's the total reserves. You can move along.

(Slide)

We have a histogram of the reserves for this one calendar year. I can't quite see it. What is at the top? This is the first calendar year of payment in a particular reserve analysis that you might be interested in it. In cash flow, you might be particularly interested in how next year's payments might vary, for example, if you were using an analysis like this to chart an investment strategy, you might want to invest with enough confidence that you'd have enough money to make next year's payments, for example.

Here is a much, somewhat nastier one. This is the accident year. These are just some examples, that you can summarize your data in many ways in all this detail and it all comes out different. If I want to look at accident year '87's distribution, I'd have to, in every iteration through the Bootstrap, look at the result for the sum of those particular cells and see how that distribution comes out. You have to summarize the data in every iteration because the points are not independent.

I've got a few other examples. This is the original. You can just look through these quickly. This is the original fit to the data from the original model. I think we've had it for three years. One year, it seems to fit.

One year it is a little far off, and that's because in our model, we don't let every accident year find its own level. We have a more simplified, fewer parameters, describing the relationship between all the accident years. So, this particular accident year is a little out of line from where you'd expect it to be.

Here is an example of a brand new accident year. You can see in this case, it ran a little higher than your real data. We have accident years coming in, so far, low compared to where you'd expect it to be.

Now we have three more graphs that look almost exactly the same, but they're not. What we've done is now that these data, the actual data, is the same, but now the fitted data has to be corrected for bias according to the Bootstrap. At every point, we measure the bias in the Bootstrap from 250 iterations and add it into the fitted data.

If any of you got handouts -- there might not be enough to go around -- and you get out a microscope, you can see that these three curves are slightly different. They are all exactly the same. In total, we thought there really was a $2 million bias on the $38 million reserve projection, so it is quite important to make that projection.

Okay, that's the end of my slides. The only other thing I wanted to mention is a brief mention about the concept of independent, identically distributed errors. I did mention that if they weren't independently identically distributed, there was something not right.

The easier one is identical. I'd say that I don't think we've ever had enough information to presume different shapes of the error distribution at different points, but there may be some heteroschedasticity (phonetic) that you can measure. There may be a tendency for the variance in your distribution not to be the same all through the triangle.

In each of your equations, you can come up with a model for that heteroschedasticity, saying that there is some functional relationship between the flared errors and the various independent variables that you might think they're in relationship with.

Once you measure that heteroschedasticity, number one, you do the regression and the weighted regression and then you do your Bootstrap on the weighted errors. So, the original errors, heteroschedasticity, and the weighting errors, so, therefore, you get around the nonidentically distributed errors that way.

Now you do your Bootstrap on the weighted errors. When you create your pseudodata, what you do is you take your actual errors, you weight them to make them identically distributed. Now, you randomly select a bunch of them. You reverse the weights. You now divide by the same weight and you multiply to reintroduce the heteroschedasticity, and then you add that back to your data to create your pseudodata.

Independent is a bit of a tougher issue. Again, what we have been looking at is we look at a correlation analysis on the residuals in several different dimensions to see if they appear to be independent. Now, if there is some significant evidence that they are not independent, again, you can deal with that in the Bootstrap if you can model it.

So, you build a model of the relationship between the errors.
We just used some very simple ones. For example, where we got some significant evidence that the lag (phonetic) one auto correlation coefficient was positive and significant -- if it was negative and significant, that would be an issue, too -- and then we modelled it with a first order auto regressive model.

What I did is, number one, you can correct the regression for that but, even more importantly, when you take your residuals, you back out your auto correlation model so you get the random shocks. You Bootstrap and randomly generate a new random shock and then again you've got to run them back through the auto correlation so you reintroduce correlated residuals. That can have a big effect on your errors.

You would think that correlated residuals would make your error projection a lot larger. So far, in the example I showed you, we didn't do that. Introducing the first auto regressive model doesn't seem to add that much projection error, according to the Bootstrap technique.

I have kicked around the idea of trying to model a random (inaudible) rather than a first auto correlated and also, I would allow the errors to drift away from the curve over time, and I don't know whether that's realistic but it would obviously very substantially increase my projection errors in the Bootstrap and it is something I have the capability of doing within the Bootstrap.

So, we're kind of looking at a regression and then maybe doing a time series analysis on the residuals. A time series analysis is important not so much for changing the fitted curve, but it has a very big impact on the error projection.

In general, regression applied to a time series situation tends to underestimate the errors in projection. This is not a classical time series situation where it seems to me that time is moving out at a right angle and as you get far from the area you fitted the curve, there is some decent chance that it will move away from the curve. That about does it.

MR. PHILBRICK: Let's open up for questions.

QUESTION: Ed Weissner. I guess I have two questions. The first one is: When you do this process, Spencer, it seems to me the regression itself is independent of the Bootstrap, that you could put any process in for the Bootstrap. Am I correct that the Bootstrap does not require the regression?

ANSWER: Well, the Bootstrap does -- I guess somehow, you have to get fitted data and have a bunch of residuals which you are willing to conclude are independently identically distributed.

QUESTION: If I did age-to-age development and I was convinced I had all those properties, I would be in the same place that I could do the Bootstrap. I think that's important to at least separate the concepts. I don't challenge you on the assumption.

ANSWER: I agree with you. Bootstrapping is not a concept that is necessarily limited to regression. To some degree, what Robin did is a kind of Bootstrap because he randomly generated a bunch of new things, again, around an empirical distribution, not exactly the same way. He did it column-by-column.

One of the reasons that we do a regression analysis is that we supposedly have 55 or however many points there are in the triangle that are all supposedly from the same distribution. If you have somehow done age-to-age factors and averaged them column by column, it becomes more difficult to make that assumption.

QUESTION: Okay. We're in the same place then, I think. The second point is, I guess, and that is just a problem I have, is: I really have a problem working from the triangle of data. Now, I realize you have got to start somewhere.

It seems to me that -- first of all, I'm in reinsurance, so my triangle is probably seven claims that have been added up. I realize yours may be a hundred thousand; I don't know. But, it seems to me the smoothing property of summing into the triangle takes away a lot of the process risk.

So, in some sense, by taking a triangle, you sort of have got one point of the process and now you're just taking what's left of the process risk. What I'd really like to do, and maybe it's impossible, is to go back and sort of regenerate the claims, if I knew the claim process, and start back there with these five hundred or five thousand iterations in the Bootstrap.

Personally, I just have this problem of starting with the triangle, because I think you've either got a nice triangle or an outlier triangle, if I could use that phrase. I don't know, would either one of you like to comment on it since both of you started with a summarized triangle?

ANSWER: I agree that we're not really capturing all the process risk because the summarization process of putting the data into the triangle should have eliminated some substantial portion of that.

What we are, in effect, modelling is this summarized process. The data is summarized in the past but it will also be similarly summarized in the future and, of course, we're not interested so much in the variation of every individual claim, but we are interested in the variation which will exist in the same kinds of summarized data in the future.

So, if we can model that summarized data adequately -- and I mean, my model is strictly empirical. I fit a curve that looks like it fits. We decide if the model is valid by carefully examining the residuals and seeing if they seem to have the properties that they're supposed to have. That is empirical, but I agree that we are capturing the process risk at a summarized level.

Of course, we are really interested in measuring the process risk at a summarized level because, again, we don't need to know how every individual policy is going to vary or how every individual claim is going to vary. We only really want to know how our reserves are going to vary.

QUESTION: Spencer, I'd like to make an observation and you can correct me, because you obviously know a lot more about Bootstrapping than I do. My understanding of Bootstrapping was that part of it was to avoid the problem that he was trying to address.

What we'd really like to do is specify the underlying process, the underlying distributions and sample from them but, in fact, that's often very difficult and if we have enough data, we can avoid having to deal with that issue by using the Bootstrapping. Bootstrapping is independent of specifying the underlying distributions.

ANSWER: Yes. It's independent of specifying -- right -- the distributions around your model but what we are Bootstrapping here is around the residuals from around our model. So, what we are trying to do here in this case is model a summarized process and the errors, therefore, that we are modelling and Bootstrapping on are, again, the errors in a summarized process, not the entire process risk, as I mentioned.

QUESTION: If I can just pick up on that, I think the question is: What is the data? Is the data the triangle or the individual claims themselves?

ANSWER: Right. I'm using the data really as the individual claims themselves, but for my purposes, the data is the triangle. That's all I have. That's all I'm going to get. That's all I'm really projecting, is the future triangle.

QUESTION: Janet Kappers, Commercial Union. I have a lot of questions for Robin, so if I start hogging the microphone, please tell me to sit down. I am very interested in this, because you say this is how you actually do it, you've been doing it for ten years, and so you've gotten it by the auditors and the examiners and all those type of people. Is that true?

ANSWER: Keeping in mind that facts are public domain and the rest is my opinion, not the company's, yes, we actually publish a report of this annually, describe it in some detail, file it in all fifty states. It's public information, so there is nothing secretive. We haven't hidden anything here. That's one of the strange parts about the environment in which I work, is that it is a very open environment.

So, yes, we have done this and it is fairly well accepted by the auditors. In fact, if you look at their objective, which is to say, "Yes, we think there are sufficient reserves," they'd probably look at this and say, "Yes, there are really sufficient reserves."

Since our auditing actuary is in the audience, he can either agree or disagree with me on this comment.

QUESTION: So, you go ahead and you set the reserves on sort of a mean basis?

ANSWER: Well, we look at each of the individual underlying segments that we do, analyze the reserves and set what we think are the correct reserves for that segment. We do an awful lot of segmentation just because of the nature of the company's profitability measurements.

Then we look at the overall corporate need as far as reserve to see what we should have up now to guarantee ourselves, according to the model, the 99 percent probability we will not have a deficiency in the total reserves. We set that up and we recognize how much of that is needed for each accident year.

Theoretically, then, as each accident year matures, that need goes down. If we were to stop writing business today, then the reserve would eventually go down to zero as all of the reserves mature.

QUESTION: Now, do you do the probability -- this process that you showed -- by line?

ANSWER: We do it in three major segments. We could break it down. It's really only a constraint of time and desire for accuracy that we do it in any other way. We used to do it for the whole corporation. The whole corporation used to be pretty much just personal lines.

Since we entered into a lot of commercial lines, we decided to break commercial out because it tends to develop lot differently than personal lines. You could even do it between liability and physical damages line if you wanted that additional accuracy.

QUESTION: Then if you did it in too many segments, then --

ANSWER: The noise would overwhelm the process, I'm sure.

QUESTION: Plus, it would seem to me that the whole idea of insurance is the more insurance you write, the less uncertainty I think there's supposed to be.

ANSWER: That's right, which is why it's important, when I measure the individual lines, that I don't just add up the amounts I need for each line but I actually measure the covariance between the lines.

It is sort of a portfolio theory. If I write enough different types of lines and they are independent, then I won't need as much for all the lines combined as I will for each of the lines independently, because there is some offsetting. One may develop high and another one may develop low.

QUESTION: But when you do this, you do it only in a segment. You just mentioned lines. I'm trying to see at what level are you measuring this variability.

ANSWER: We look at the personal lines and commercial lines separately and then combine the two together.

QUESTION: Oh, I see. Okay. Now, when you get finished with this, you said that, in terms of your internal results, you use what you think the actual reserves should be and then, for an annual statement, you allocate this extra reserve to annual statement lines?

ANSWER: For annual statement purposes, it's the same amount allocated to each individual line; I don't identify the need by line of insurance.

QUESTION: It's a percentage?

ANSWER: It's a percentage.

QUESTION: Okay.

ANSWER: Theoretically, obviously, it will vary by the line; since I don't measure it by the lines, then there's no way I could decide to do that unless I were to go into finer detail with the model.

QUESTION: So, you take what you might call an expected reserve and then you discount it back and then you jack it up by a percentage? Are you discounting in this process?

ANSWER: Our annual statement reserves are not discounted; obviously, our GAAP reserves are discounted for tax purposes.

QUESTION: Because I thought Steve sort of started the discussion with the idea that the point might be that you would discount reserves, but you've got to have this additional amount for uncertainty. What you're saying is you take your best shot at it and then you add in extra amounts. Is that correct?

ANSWER: That's correct.

QUESTION: I can see why nobody would get too upset about you adding the extra amount.

One other question: When you do it by accident year, don't you have somewhat the same situation where if you have a lot of accident years, some uncertainty, the uncertainty should be lower?

ANSWER: I'm not sure I understand.

QUESTION: I'm thinking about the whole idea of the volume, the same thing we were talking about. As you write across a lot of lines, the uncertainty is reduced. If you are righting across a lot of accident years, doesn't the same thing occur?

ANSWER: To some extent, yes.

QUESTION: But you don't take that into consideration here?

ANSWER: Well, we look at the development for each column independently. In other words, we don't try and say here's the age-to-age; we actually model the age-to-age factors.

QUESTION: Okay. Thanks.

QUESTION: My name is Aaron Halpert. I'm with Peat Marwick and I want to take off on the same concept. Steve, you mentioned that, really, what we are talking about is going from undiscounted to discounted reserves, in a sense reflecting the economic value of the reserves.

Then, also, I think you are talking about the market value of the reserves in the sense of what are these reserves worth on the open market, given the uncertainties involved.

The question I have, both for you, Steve, and I guess for Robin, is: It would appear to me that to handle the uncertainty from an accounting standpoint, there are still two ways to do that. One would be to regulate or to manage the leverage ratio between the reserves and the surplus and sort of manage the extra amount, the safety, if you will, by increasing the amount of surplus to the extent that you have a line or a collection of accident years where uncertainty is greater.

The other alternative is to actually increase and decrease the reserve itself based on those uncertainties. I wonder, Robin, it seems that your company has taken one route in putting this buffer into reserves. I wonder if you can elaborate on it. Steve, I wonder if you have any thoughts from an accounting perspective, really, which is the better of the two ways.

ANSWER: I'm not sure what the best approach is. My choice would be to put it into the reserves, simply because it is part of an explicit recognition of it. I think trying to manage the surplus would be more implicit, would kind of tend to hide the whole issue. I'd rather be more open: "This is how we're going about it." This is just a personal preference for myself and it just happens to be the way that we're doing it.

ANSWER: Aaron, I'd like to say I like your summary. I thought it was an excellent summary. I'm saying that we have to make two adjustments, one to recognize the economic effects of discounting and, second, to reflect the market value of reserves.

The issue of whether this adjustment, assuming you people agree that there ought to be adjustments, are to be in the reserves or the surplus, above the line or below the line, is a subject that has been of quite a bit of debate. I can give you just a little bit of history.

I am a member of the Committee on Theory of Risk, which has been dealing with this issue for some time. We have given a number of presentations on this subject. I can say that at some of the early meetings, I was rather vehement that a margin ought to be calculated, but that's what surplus is for and it belonged in surplus, not in reserves.

(Applause)

But, I changed my mind. I was wrong. Essentially, what I tried to outline today was the reasons that I was wrong. In fact, as you pointed out, the market value of the reserves is the critical issue. The profit starts out above the line and ought to flow below the line as it's earned, as it's recognized.

It becomes earned and recognized when the company has fulfilled what it intends to do. If the market value of the reserves exceeds the present value, then the market is saying you haven't gotten rid of that uncertainty yet, and, therefore, you can't call it profit; it's not yet profit.

It doesn't deserve to flow into profit. It doesn't deserve to flow below the line, through the income statement and into the surplus account until it is profit. It was that argument that convinced me that the adjustment really does belong above the line.

QUESTION: Ed Weisner again. Robin, in your talk, I think you suggested that this special reserve was roughly five percent in the case that you did. I'm a little concerned that if I did it for myself as a reinsurer, I'd be talking at least a hundred percent, two hundred percent.

Since you said that a number of these things were filed and on public record, what was the highest percent you ever put into this reserve? I mean, if you don't feel comfortable answering, fine. It seems to me five percent is ho-hum, big deal; I mean, do any method you want to throw five percent in.

(Laughter)

When you start talking twenty, 25, then, of course, I need to know how big your reserves are relative to other numbers, so, anyway, what was the largest percent that you would feel comfortable sharing with us?

ANSWER: Since it is a matter of public record, the highest that we've actually put into the reserves is 8.1 percent. It's currently at eight percent, and it varies from year to year depending on the model. While I agree that five percent is ho-hum, we're talking tens of millions of dollars here, and the CEO doesn't look at it with the same ho-hum when I suggest it at the end of each year.

MR. PHILBRICK: Peter is next.

QUESTION: I'm Pete Lindquist and I'm with Coopers & Lybrand, but I guess I have to be particularly careful about how I phrase this. First, I want to commend you guys. I think this stuff is really super in terms of trying to get at the true, underlying economic reality of what's going on here, and then comes the "but."

I haven't met all the accounting partners of my firm or all the members of the accounting profession, but I haven't met anybody in the accounting business who would pretend to be stating that the function of accounting is to give you a picture of true, underlying economic reality.

Instead, what they all tell you, if you grab them by the neck and throw them against the wall, is that the function of accounting is to provide a common set of rules, so that when you pick up a financial statement, whether it's a steel company or something else, you know approximately what is meant by each of the numbers.

It strikes me that you're going to have a real selling job going to people with that mindset and trying to convince them that the insurance business should be treated separately because of heteroschedasticity. I'd just like to know some observations on that.

ANSWER: I'll make a quick observation. I think you are absolutely correct. I spent a couple of years at Peat Marwick and I talked to a lot of accounting partners, so I share your thoughts that economic reality is not on the tip of everyone's tongue when they're doing their work.

On the other hand, as you mentioned, one of the important functions for accounting statements is that you should be able to compare from company to company and have some idea of what you're talking about. I think the accounting profession at least pretends, if not really attempts, to want to measure economic reality.

I think that's the reason why they've convened this group. I'm not sure what its exact name is, but to deal with the investment income issue, interest methods, they're calling it, and I think they want to do it. They know it's difficult and they put it off for years, and they want to deal with it.

The other issue is you say, "Why should the insurance industry be considered different?" Well, it's different in the sense that very few other industries carry uncertain liabilities. Their liabilities are of a different sort. The problem comes up if you try and treat insurance companies as the same, if you try and treat a payable for one company identical to a payment for an insurance company.

So, I think that, in fact, a point is you want to recognize differences here and there are some differences.

QUESTION: If I might just follow up, I'll give you that in an insurance company, the liabilities are uncertainty and everybody else has the asset side. My father-in-law is in the lady's sportswear business, and I'm sure he would love to be able to use heteroschedasticity to value his inventory at something other than what his accountant would let him do.

Basically, you know, I think the objection you're going to meet is a real one and, you know, lots of luck.

MR. PHILBRICK: Does anyone have any comment on that?

ANSWER: I just, again, want to comment. I'm not sure that accounting is supposed to be exact economic reality, but it should be some reasonable approximation thereto. You can't compare accounting statements.

One of the problems we have in the insurance industry as we all know it is that the financial statement of the insurance industry and the net worth on that statement cannot be readily compared to the net worth on statements of other industries because of the very substantial distortions in insurance accounting, exactly the type we are talking about here.

So, we don't have to be exact, but I think there is some surgery needed on insurance accounting, along the lines we've been discussing here.

QUESTION: My name is Pat Crowe. I'm with Kentucky Farm Bureau which is a small insurance company. Conservative, small insurance companies generally are concerned about the IRS. In other words, we have paranoia about IRS audits.

I know in our accounting department, our accounting department is very fearful that we will get a penalty. We want to have strong reserves but we are paranoid about a penalty. I guess for Robin -- in my company, we try and set a reserve that is probably fifty/fifty, being high or low. I don't feel comfortable doing that, being in the high half the time and low half the time, because I'll probably be low more often than half.

But, for Robin, and, actually, Spencer, if you're going to set a reserve -- and I like the idea -- with a 99 percent confidence or whatever that this reserve should be adequate, then more years than not, your reserves should be high. What thoughts does your management have on that position?

ANSWER: It is a difficult question because I don't speak for my management; I speak for myself here. With regard to this, you're right. More often it will be adequate than not. In fact, over the ten-year history, we've always been adequate, which is what we were setting out to achieve and we've achieved it.

As to whether or not that's correct from the IRS standpoint, all I can say is that we have been audited by the IRS and we have, in every instance, come to a resolution on it. They've agreed, without penalty, to the reserves that we've set.

ANSWER: None of my clients are intentionally looking at any reserves over the mean, as far as I'm aware.

QUESTION: My name is Nathan Spitz, and this is a question to both Mr. Harbage and Mr. Gluck. Mr. Harbage, you've used a uniform distribution assumption; Mr. Gluck, you've used the regression method.

Is there any idea how your two methods would compare if you used them on the same book of business?

ANSWER: No, not really.

QUESTION: I mean if we're going to be setting reserves with some sort of risk loading, I was just wondering whether these two methods would compare or whether the accountants would be happier with one method than another. Would they be happier with a method they understand better?

ANSWER: My only comment would be that probably the method I use would be easier to explain to most accountants, with no apologies to my accountant friends.

ANSWER: His data is public domain, so if you like, I could try it out and see how it comes out.

QUESTION: One difference -- correct me if I'm wrong -- is that, Spencer, you are trying to incorporate parameter risks and Robin is specifically not trying to incorporate parameter risks. If you just do your method, your will come up with a bigger number.

ANSWER: That should be true.

QUESTION: Neil Bethel from Tillinghast. Robin, your margin is about eight percent. I'm curious whether you have done a calculation of what the discount amount might be; and, I guess my question for you, Steve, is would you be comfortable if this discount was ten percent or 15 percent and we were entering your new world, so effectively, he would be reducing those reserves below just a mean expected value.

ANSWER: A large part of that, of course, is going to depend on the type of book of business we write, whether it is long tailed or short tailed; that would impact the effect of the discount. Off the top of my head, I would believe that the discount is actually slighter greater than we book in the supplemental.

ANSWER: That doesn't bother me at all. I think it recognizes reality. In fact, I think that, on balance, reserves, when they are adequate nominally, are too high. I think, in fact, reserves are often not adequate nominally and that's partly because this is reflected.

Some people have said they are implicitly discounted; I don't think they are as low as implicitly discounted. I think that what happens is people tend to get the reserves somewhere in the right order of magnitude, somewhat discounted but still something less. So, we implicitly built in something like this.

Speaking of discounting, I would note -- you asked how I feel about them being discounted -- I have some concern about the fact that the discount rate for 1990 is going to be around somewhere between 8.3 and 8.4 percent, based on our estimation.

The first year it was 7.4 back when you could get nine or ten percent, and then it went to 7.77 and you could still get nine and ten percent. Now it's going to 8.35 or so, but you can only get around eight percent and dropping.

So, we may find ourselves next year discounting loss reserves at 8.35 and having marketable securities available at only the midsevens. So, that causes me a little bit of trouble when you can't buy the securities comparable to what you have to discount on. But, that's a technical issue with how the IRS specifies this discount rate as opposed to the theoretical issue of ought one to discount and then adjust for uncertainty.

QUESTION: Ken Nimwick (phonetic). I have a question for Robin concerning his last exhibit. There is a number, .054, that you used as a scale factor to come up with your confidence interval. Where did that number come from?

ANSWER: It's based on the correlation coefficient. Basically, I'm assuming a normal curve here and a one tail test to give a 99 percent probability. How many standard deviations I would have to be out in order to get to that 99 percent confidence level.

QUESTION: That's for all accident years combined?

ANSWER: Yes.

QUESTION: Somebody mentioned the word "heteroschedasticity." It's very simple. I think actuaries should know about the percentage variability. I could also understand that from year to year, the percentage variability could change; that's the definition of heteroschedasticity.

I've got one question and any one of the panelists can actually answer it. First of all, let me tell you it's not a confidence interval. It's a prediction interval. What I'd like to ask you is: What is the definition of a prediction interval?

(Laughter)

ANSWER: Do you want me to try? I think what I mean by that line that's at eighty percent on my graph is that, within the context of the uncertainty that I've quantified -- I've said before that I don't think we've quantified all of it -- that means that there is an eighty percent -- what I mean by the eighty percent column is that there is an eighty percent probability -- let me make sure I get the words in the right order here. This is a test.

There is an eighty percent probability that the true result will not be higher than that result, than the result in the eighty percent column; that's I think what I mean by it.

QUESTION: Well, first of all, there is a difference between a confidence interval and a prediction interval. With the confidence interval, you are looking at a confidence interval for a parameter, and a parameter is something that is fixed.

With a prediction interval, you are looking for an interval for a variable, something that is random, something that does not have a distribution, so that when you define your so-called prediction interval, there are two components that actually vary.

First of all, there's your sample, which is generated by the model, of your future realization of the variable you are trying to predict, so you are really looking at the interval between your prediction, which is a random variable, and what you are trying to predict. It sounds complicated.

ANSWER: No, that sounds right. I think I was trying to measure both of those things with my Bootstrap by comparing the realization of the actual future as represented by a particular run of pseudodata, and the prediction that would be made on the past period of that pseudodata.

So, I think that I was at least attempting to measure both the elements that you described.

QUESTION: My name is Sung Ko Chang (phonetic). I think a P&C insurance company should first be compared with a life insurance company before we start comparing statements of a P&C company with a manufacturing firm.

I would suggest, if a life insurance company does not take time value of money into account, all of them would be bankrupt today. I think that it is a logical step that we take a lead from the life insurance industry. I'd like to share a fairly pragmatic approach that we are working on in Canada to deal with the provision for deviation.

First of all, we think the methodology should not be dictated by the specific technique used by the actuary to come up with the mean reserve; that's item one.

Secondly, we say, "Suppose you have this specific technique and you apply that six years ago. What would be the error produced by this technique that you are about to introduce?" So, what we have done is we have looked at accident years data five or six years old and apply a specific technique. Now, we have six-year hindsight so we look at the error produced by this particular method.

The one we happened to use is a very standard incurred loss development method, and we tested that on automobile data and correlation data. We found the error produced. Amazingly, the error ranges were not that bad. We treat positive errors and negative errors the same. The absolute error has been in the range of around three to ten percent.

So, we are about to recommend to the actuaries that this is a level of provision of deviation we expect as a minimum. The percentage we eventually don't recommend is "X" percent of outstanding reserves. That would be our provision for our deviation. It seems to be very pragmatic. You don't have to explain all this statistical error.

In fact, the type of error we are measuring is the total error, so to the extent that you maintain the same methodology, you would expect to have a range of error similar to the historical error. That's the only assumption we make, that if the error produced by this method, using six-year-old data, is three to ten percent, going forward, we also anticipate that the error range would be around three to ten percent, everything else being equal.

Do you have some comments?

ANSWER: Can I ask you a question? When you say you find the error of three to ten percent, do you do the same test on many, many different companies and then that's what you're talking about is an average of many companies' results?

QUESTION: We apply it to the whole industry data, so the data base is always constant. We are looking at the total population. However, individual companies obviously have several different ways of setting case reserves throughout that period. Every year it is going to be different.

ANSWER: Wouldn't you think, just on the basis of some statistical principles, that the error for individual companies would be larger than the error for the industry combined?

QUESTION: Perhaps; however, an individual company would probably have more uniform claims handling than the total industry as a whole, so homogeneity might compensate for the size of the company.

QUESTION: The whole basic fundamental principle of insurance is to pool risks. If we pool more risks, the more risks we have, the amount per risk that we need to add is smaller, okay? We've just looked at a case where somebody has examined industry-wide data.

There is a mathematical thing that says that when you are going to forecast the sum of many individual components, your forecast for each interval to a component is smaller than if you are trying to forecast each individual component alone. So the error rate per company is much larger than the error rate for the industry.

MR. PHILBRICK: I'm sure we could go on, but we've run out of time, so I think on that note, I'd like to ask everybody to give our panelists a round of applause.

(Applause)

1989 CASUALTY LOSS RESERVE SEMINAR

6C: LOSS RESERVES FOR ENVIRONMENTAL IMPAIRMENT LIABILITY

Moderator

E. Frederick Fossa
Milliman & Robertson, Inc.

Panel

Thomas J. Coyle
EPIC Insurance Company

William P. Gulledge
Front Royal Group

Roger M. Hayne
Milliman & Robertson, Inc.

MR. FOSSA: My name is Fred Fossa. I am the Moderator for th s session. I want to welcome you to Section 6C: Loss Reserves for Environmental Impai ment Liability. It is not clear to me why a subject as important as this was given a time slot at the end of the seminar. We appreciate your staying the course and attending our se ssion.

Our charge this morning is to provide background information and a ctuarial methods for estimating the cost of environmental-type claims. It is really unusual today to pick up a newspaper and not to read an article dealing with the pollution of ou environment.

We talk of asbestos; we talk of PD removal; we speak about leakin storage tanks, toxic waste pits or the release of other hazardous substances. They are problems that exist in every state and they exist in most of our communities.

If you work for a large, multiline insurance company and I imagine even for some of the smaller ones, you have probably witnessed first the trickling in of B asbestos claims and, when you thought you knew what they were all about, you started to see some PD claims come in.

Now, you must deal with an assortment of environmental-type losses that are being reported under various lines of business. The question we must address is how to assess the cost impact of environmental claims on insurers, reinsurers or self insurers. What are they going to amount to?

Hopefully, this panel will give you some useful background and knowledge for dealing with the difficult issues surrounding the question. On the panel this morning is Tom Coyle, Vice President of the Environmental Protection Insurance Company; William Gulledge, a Vice President of the Front Royal Group; and, Roger Hayne, a consulting actuary and a principal of Milliman & Robertson.

We hope to save ample time for questions at the end of our presentation. You should realize that the entire session will be recorded. Our first panelist s Tom Coyle. Tom's remarks will be focused on an underwriting perspective addressing some of the coverage and exposure issues.

Tom is the Vice President of Underwriting for EPIC of Chicago. He has been involved in underwriting environmental impairment liabilities since 1985 and has been instrumental in the formation of Epic. Prior to this work, he worked as an EIL underwriting for Shann Moran and Company and for POLIA, the Pollution Liability Insurance Association. Tom?

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DOUG HAMILTON

Shand Morahan & Company
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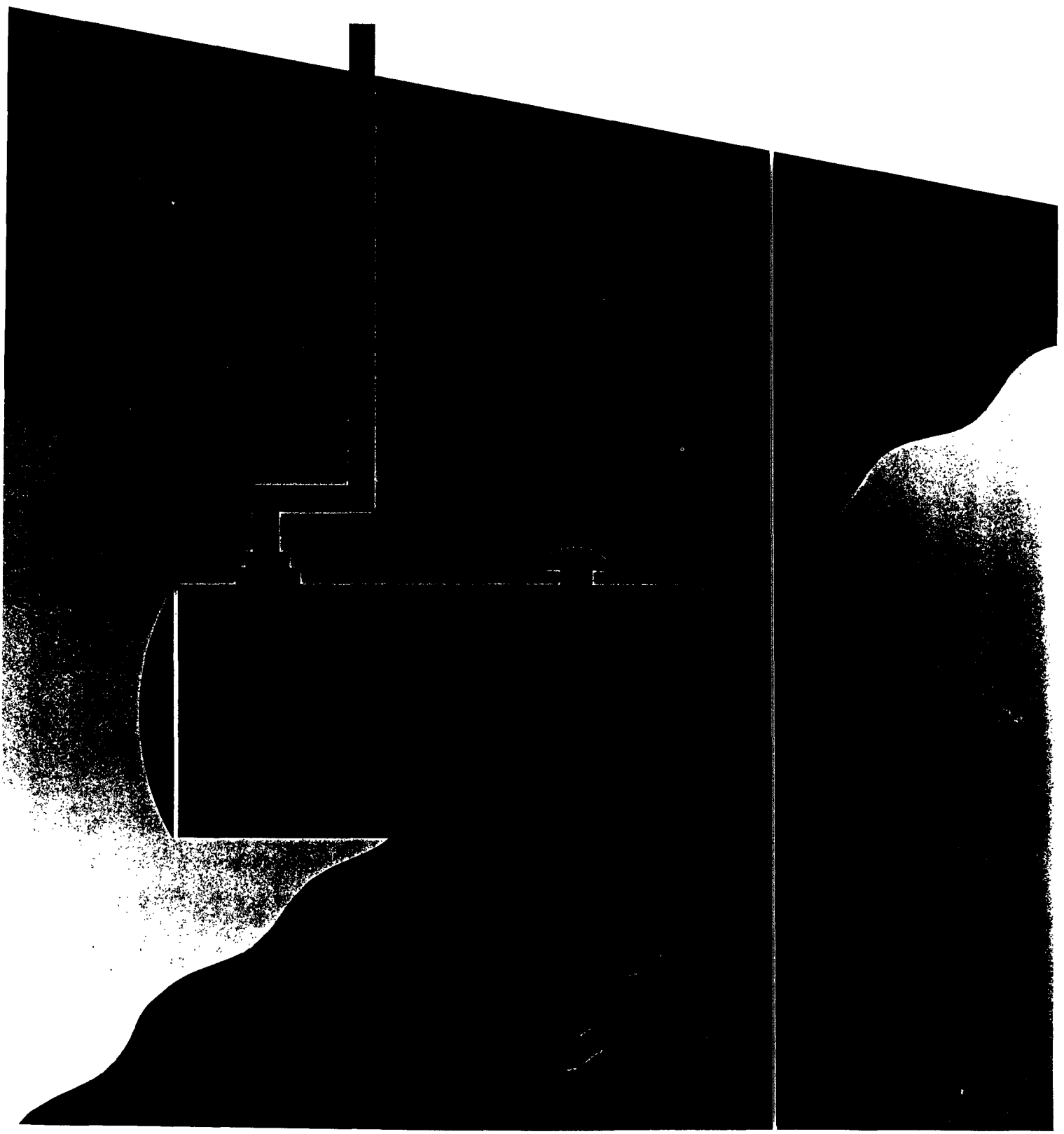
Environmental Protection
Agency

Office of
Underground Storage Tanks
Washington, D.C. 20460

EPA/530/UST-88/008
September 1988

EPA

Musts for USTs



WHAT DO YOU HAVE TO DO? Minimum Requirements

You must have Leak Detection, Corrosion Protection, and Spill/Overfill Prevention.
For WHEN you have to add these to your tank system, see the chart on the right. ⟶

LEAK DETECTION	
NEW TANKS ***2 Choices***	• Monthly Monitoring* • Monthly Inventory Control and Tank Tightness Testing Every 5 Years (You can only use this choice for 10 years after installation.)
EXISTING TANKS ***3 Choices*** *The chart at the bottom of the next page displays these choices.*	• Monthly Monitoring* • Monthly Inventory Control and Annual Tank Tightness Testing (This choice can only be used until December 1998.) • Monthly Inventory Control and Tank Tightness Testing Every 5 Years (This choice can only be used for 10 years after adding corrosion protection and spill/overfill prevention or until December 1998, whichever date is later.)
NEW & EXISTING PRESSURIZED PIPING ***Choice of one from each set***	• Automatic Flow Restrictor • Automatic Shutoff Device -and- • Continuous Alarm System • Annual Line Testing • Monthly Monitoring* (except automatic tank gauging)
NEW & EXISTING SUCTION PIPING ***3 Choices***	• Monthly Monitoring* (except automatic tank gauging) • Line Testing Every 3 Years • No Requirements (if the system has the characteristics described on page 11)
CORROSION PROTECTION	
NEW TANKS ***3 Choices***	• Coated and Cathodically Protected Steel • Fiberglass • Steel Tank clad with Fiberglass
EXISTING TANKS ***4 Choices***	• Same Options as for New Tanks • Add Cathodic Protection System • Interior Lining • Interior Lining and Cathodic Protection
NEW PIPING ***2 Choices***	• Coated and Cathodically Protected Steel • Fiberglass
EXISTING PIPING ***2 Choices***	• Same Options as for New Piping • Cathodically Protected Steel
SPILL / OVERFILL PREVENTION	
ALL TANKS	• Catchment Basins -and- • Automatic Shutoff Devices -or- • Overfill Alarms -or- • Ball Float Valves
* Monthly Monitoring includes:	Automatic Tank Gauging Vapor Monitoring Interstitial Monitoring Ground-Water Monitoring Other Approved Methods

United States
Environmental Protection
Agency

Office of
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Washington, D.C. 20460

EPA/530/UST-88/005
December 1988

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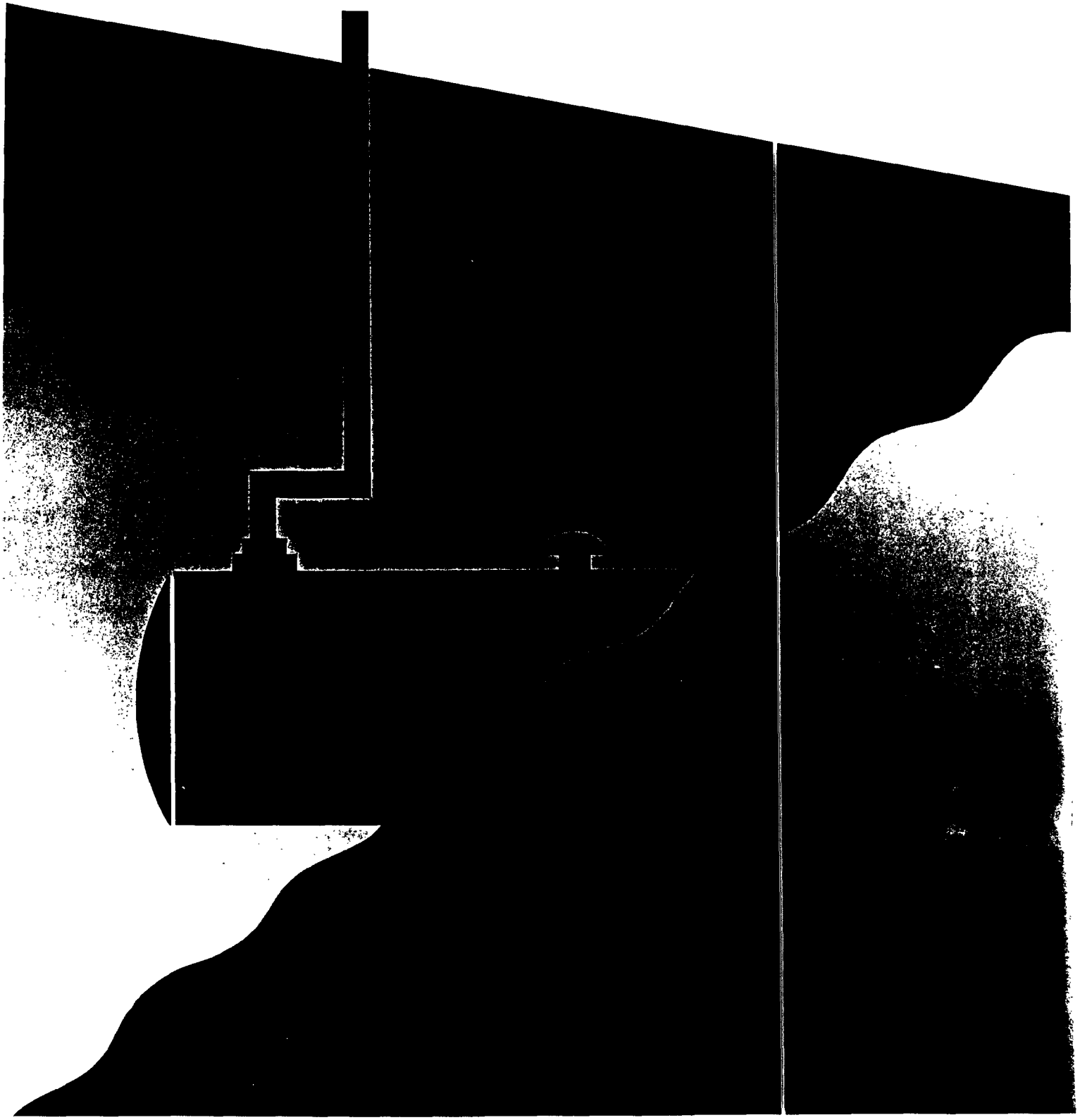
Dollars and Sense



WHEN DO YOU HAVE TO ACT? Important Deadlines

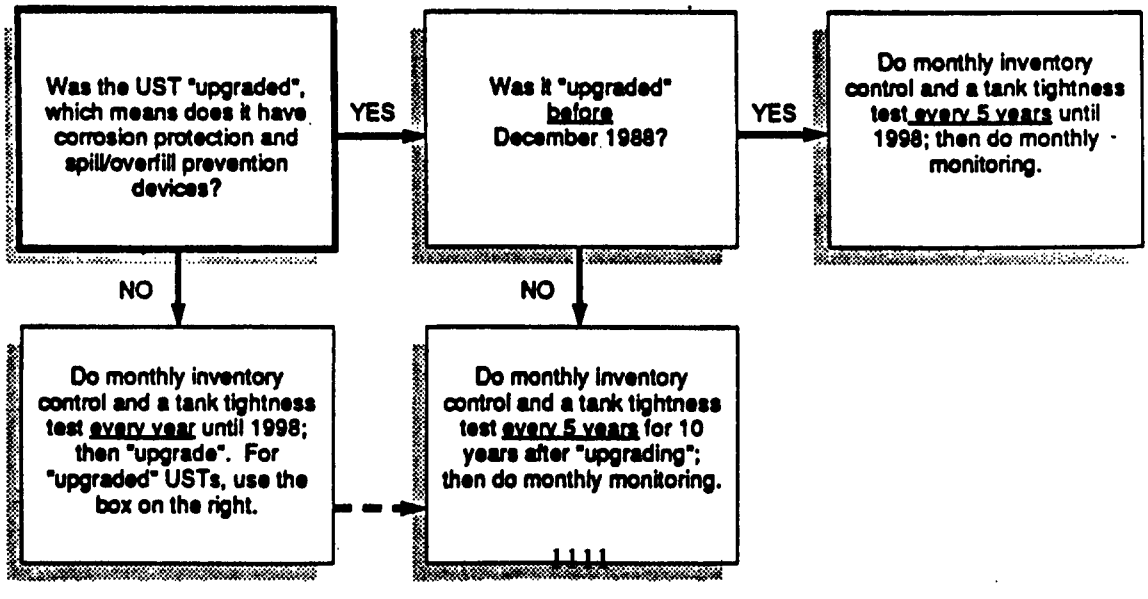
← For WHAT you have to do, see the chart on the left.

TYPE OF TANK & PIPING	LEAK DETECTION	CORROSION PROTECTION	SPILL / OVERFILL PREVENTION
New Tanks and Piping*	At installation	At installation	At installation
Existing Tanks**			
25+ or unknown age	December 1989	December 1998	December 1998
20 - 24 years	December 1990		
15 - 19 years	December 1991		
10 - 14 years	December 1992		
Under 10 years	December 1993		
Existing Piping**			
Pressurized	December 1990	December 1998	Does not apply
Suction	Same as existing tanks	December 1998	Does not apply

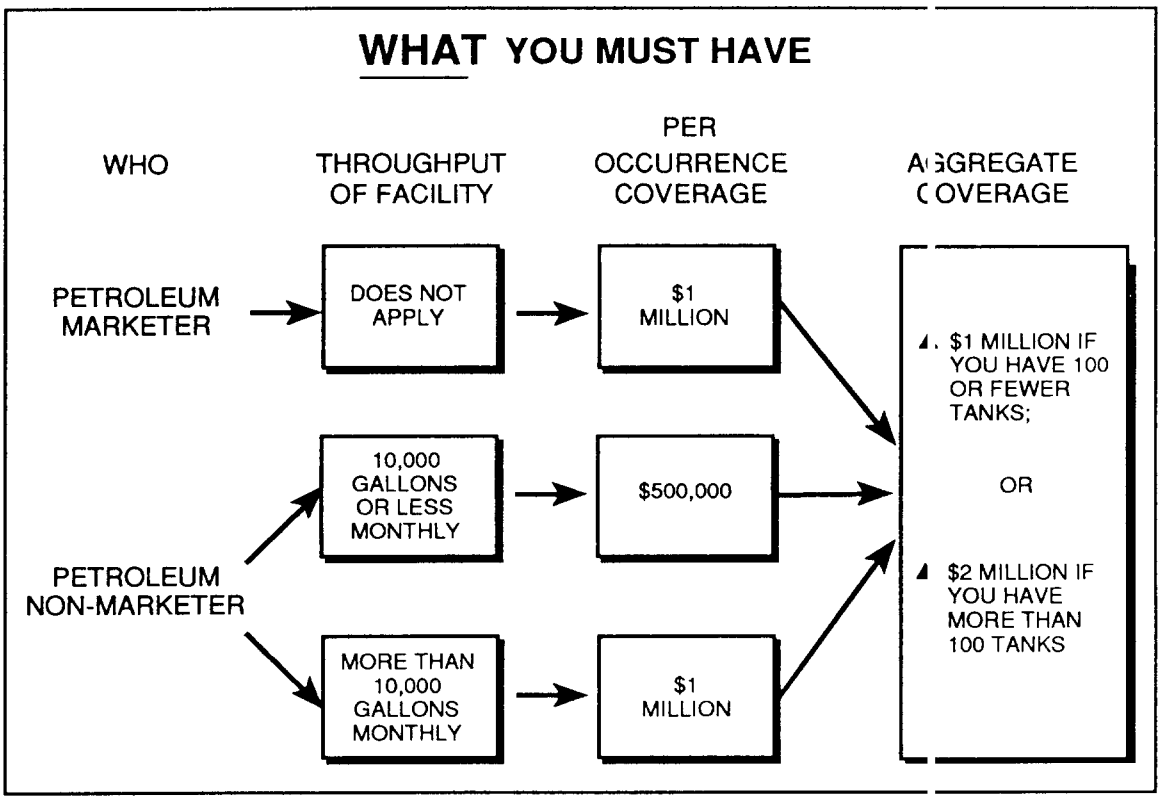
* New tanks and piping are those installed after December 1988
** Existing tanks and piping are those installed before December 1988

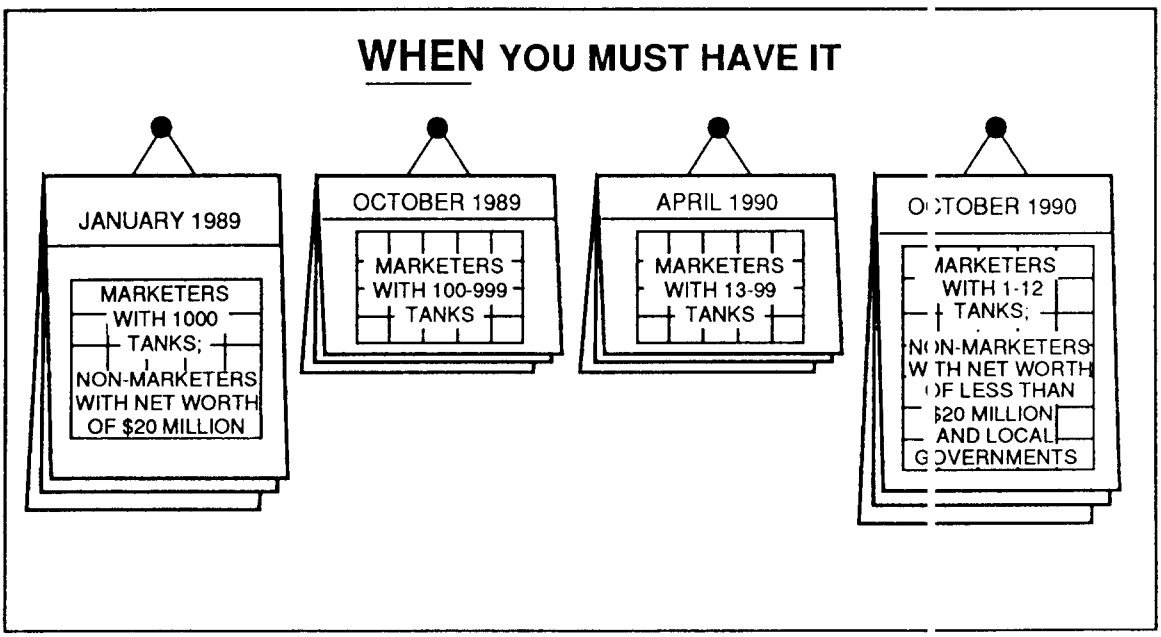
IF YOU CHOOSE TANK TIGHTNESS TESTING AT EXISTING USTs . . .

If you don't use monthly monitoring at existing USTs, you must use a combination of periodic tank tightness tests and monthly inventory control. This combined method can only be used for a few years, as the chart below displays.



IMPORTANT REQUIREMENTS AND MINIMUM DEADLINES FOR YOUR FINANCIAL RESPONSIBILITY





ENDORSEMENT

Name: [name of each covered location]

Address: [address of each covered location]

Policy Number: _____

Period of Coverage: [current policy period]

Name of [Insurer or Risk Retention Group]: _____

Address of [Insurer or Risk Retention Group]: _____

Name of Insured: _____

Address of Insured: _____

Endorsement:

1. This endorsement certifies that the policy to which the endorsement is attached provides liability insurance covering the following underground storage tanks:

[List the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located. If more than one instrument is used to assure different tanks at any one facility, for each tank covered by this instrument, list the tank identification number provided in the notification submitted pursuant to 40 CFR 280.22, or the corresponding state requirement, and the name and address of the facility.]

for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases"; if coverage is different for different tanks or locations, indicate the type of coverage applicable to each tank or location] arising from operating the underground storage tank(s) identified above.

The limits of liability are [insert the dollar amount of the "each occurrence" and "annual aggregate" limits of the Insurer's of Group's liability; if the amount of coverage is different for different types of coverage or for different underground storage tanks or locations, indicate the amount of coverage for each type of coverage and/or for each underground storage tank or location], exclusive of legal defense costs. This coverage is provided under [policy number]. The effective date of said policy is [date].

2. The insurance afforded with respect to such occurrences is subject to all of the terms and conditions of the policy; provided, however, that any provisions inconsistent with subsections (a) through (e) of this Paragraph 2 are hereby amended to conform with subsections (a) through (e):

a. Bankruptcy or insolvency of the insured shall not relieve the ["Insurer" or "Group"] of its obligations under the policy to which this endorsement is attached.

b. The ["Insurer" or "Group"] is liable for the payment of amounts within any deductible applicable to the policy to the provider of corrective action or a damaged third-party, with a right of reimbursement by the insured for any such payment made by the ["Insurer" or "Group"]. This provision does not apply with respect to that amount of any deductible for which coverage is demonstrated under another mechanism or combination of mechanisms as specified in 40 CFR 280.95-280.102.

c. Whenever requested by [a Director of an implementing agency], the ["Insurer" or "Group"] agrees to furnish to [the Director] a signed duplicate original of the policy and all endorsements.

d. Cancellation or any other termination of the insurance by the ["Insurer" or "Group"] will be effective only upon written notice and only after the expiration of 60 days after a copy of such written notice is received.

[Insert for claims-made policies:

e. The insurance covers claims for any occurrence that commenced during the term of the policy that is discovered and reported to the ["Insurer" or "Group"] within six months of the effective date of the cancellation or termination of the policy].

I hereby certify that the wording of this instrument is identical to the wording in 40 CFR 280.97(b)(1) and that the ["Insurer" of "Group"] is ["licensed to transact the business of insurance or eligible to provide insurance as an excess or surplus lines insurer in one or more states".]

[Signature of authorized representative of Insurer or Risk Retention Group]

[Name of person signing]

[Title of person signing], Authorized

CERTIFICATE OF INSURANCE

Name: [name of each covered location]

Address: [address of each covered location]

Policy Number: _____

Endorsement (if applicable): _____

Period of Coverage: [current policy period]

Name of [Insurer or Risk Retention Group]: _____

Address of [Insurer or Risk Retention Group]: _____

Name of Insured: _____

Address of Insured: _____

Certification:

1. [Name of Insurer or Risk Retention Group], [the "Insurer" or "Group"], as identified above, hereby certifies that it has issued liability insurance covering the following underground storage tanks(s):

[List the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located. If more than one instrument is used to assure different tanks at any one facility, for each tank covered by this instrument, list the tank identification number provided in the notification submitted pursuant to 40 CFR 280.22, or the corresponding state requirement, and the name and address of the facility.]

for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases"; if coverage is different for different tanks or locations, indicate the type of coverage applicable to each tank or location] arising from operating the underground storage tank(s) identified above.

The limits of liability are [insert the dollar amount of the "each occurrence" and "annual aggregate" limits of the Insurer's of Group's liability; if the amount of coverage is different for different types of coverage or for different underground storage tanks or locations, indicate the amount of coverage for each type of coverage and/or for each underground storage tank or location], exclusive of legal defense costs. This coverage is provided under [policy number]. The effective date of said policy is [date].

2. The ["Insurer" or "Group"] further certifies the following with respect to the insurance described in Paragraph 1:

a. Bankruptcy or insolvency of the insured shall not relieve the ["Insurer" or "Group"] of its obligations under the policy to which this certificate applies.

b. The ["Insurer" or "Group"] is liable for the payment of amounts within any deductible applicable to the policy to the provider of corrective action or a damaged third-party, with a right of reimbursement by the insured for any such payment made by the ["Insurer" or "Group"]. This provision does not apply with respect to that amount of any deductible for which coverage is demonstrated under another mechanism or combination of mechanisms as specified in 40 CFR 280.95-280.102.

c. Whenever requested by [a Director of an implementing agency], the ["Insurer" or "Group"] agrees to furnish to [the Director] a signed duplicate original of the policy and all endorsements.

d. Cancellation or any other termination of the insurance by the ["Insurer" or "Group"] will be effective only upon written notice and only after the expiration of 60 days after a copy of such written notice is received by the insured.

[Insert for claims-made policies:

e. The insurance covers claims for any occurrence that commenced during the term of the policy that is discovered and reported to the ["Insurer" or "Group"] within six months of the effective date of the cancellation or other termination of the policy].

I hereby certify that the wording of this instrument is identical to the wording in 40 CFR 280.97(b)(2) and that the ["Insurer" or "Group"] is [licensed to transact the business of insurance or eligible to provide insurance as an excess or surplus lines insurer in one or more states".]

[Signature of authorized representative of Insurer]

[Type name]

[Title], Authorized Representative of [name of Insurer or Risk Retention Group]

[Address of Representative]

1114

THIRD PARTY LIABILITY

All TSD facilities (Hazardous Waste Treatment, Storage or Disposal Facilities) must have third party liability insurance for sudden and accidental occurrences in the amount of one million dollars per occurrence with a two million dollar annual aggregate. Operators of landfills, surface impoundments and land treatment units must also obtain insurance for non-sudden occurrences in the amount of three million dollars per occurrence with a six million dollar annual aggregate. The limits must exclude legal defense cost.

Certain firms may satisfy either or both or these requirements by meeting the criteria of a self insurance test.

Copies of the Hazardous Waste Facility Certificate and Endorsement are attached.

HAZARDOUS WASTE FACILITY CERTIFICATE OF LIABILITY INSURANCE

1. [Name of Insurer], (the "Insurer"), of [address of Insurer] hereby certifies that it has issued liability insurance covering bodily injury and property damage to [name of insured], (the "insured"), of [address of insured] in connection with the insured's obligation to demonstrate financial responsibility under 40 CFR 264.147 or 265.147. The coverage applies at [list EPA Identification Number, name, and address for each facility] for [insert "sudden accidental occurrences," "nonsudden accidental occurrences," or "sudden and nonsudden accidental occurrences"; if coverage is for multiple facilities and the coverage is different for different facilities, indicate which facilities are insured for sudden accidental occurrences, which are insured for nonsudden accidental occurrences, and which are insured for both]. The limits of liability are [insert the dollar amount of the "each occurrence" and "annual aggregate" limits of the Insurer's liability], exclusive of legal defense costs. The coverage is provided under policy number _____, issued on [date]. The effective date of said policy is [date].

2. The Insurer further certifies the following with respect to the insurance described in Paragraph 1:

   (a) Bankruptcy or insolvency of the insured shall not relieve the Insurer of its obligations under the policy.

   (b) The Insurer is liable for the payment of amounts within any deductible applicable to the policy, with a right of reimbursement by the insured for any such payment made by the Insurer. This provision does not apply with respect to that amount of any deductible for which coverage is demonstrated as specified in 40 CFR 264.147(f) or 265.147(f).

   (c) Whenever requested by a Regional Administrator of the U.S. Environmental Protection Agency (EPA), the Insurer agrees to furnish to the Regional Administrator a signed duplicate original of the policy and all endorsements.

   (d) Cancellation of the insurance, whether by the Insurer or the insured, will be effective only upon written notice and only after the expiration of sixty (60) days after a copy of such written notice is received by the Regional Administrator(s) of the EPA Region(s) in which the facility(ies) is (are) located.

   (e) Any other termination of the insurance will be effective only upon written notice and only after the expiration of thirty (30) days after a copy of such written notice is received by the Regional Administrator(s) of the EPA Region(s) in which the facility(ies) is (are) located.

I hereby certify that the wording of this instrument is identical to the wording specified in 40 CFR 264.151(j) as such regulation was constituted on the date first above written, and that the Insurer is licensed to transact the business of insurance, or eligible to provide insurance as an excess or surplus lines insurer, in one or more States.

[Signature of authorized representative of Insurer]
[Type name]
[Title], Authorized Representative of [name of Insurer]
[Address of Representative]

HAZARDOUS WASTE FACILITY LIABILITY ENDORSEMENT

1. This endorsement certifies that the policy to which the endorsement is attached provides liability insurance covering bodily injury and property damage in connection with the insured's obligation to demonstrate financial responsibility under 40 CFR 264.147 or 265.147. The coverage applies at [list EPA Identification Number, name, and address for each facility] for [insert "sudden accidental occurrences," "nonsudden accidental occurrences," or "sudden and nonsudden accidental occurrences"; if coverage is for multiple facilities and the coverage is different for different facilities, indicate which facilities are insured for sudden accidental occurrences, which are insured for nonsudden accidental occurrences, and which are insured for both]. The limits of liability are [insert the dollar amount of the "each occurrence" and "annual aggregate" limits of the Insurer's liability], exclusive of legal defense costs.

2. The insurance afforded with respect to such occurrences is subject to all of the terms and conditions of the policy; provided, however, that any provisions of the policy inconsistent with subsections (a) through (e) of this Paragraph 2 are hereby amended to conform with subsections (a) through (e):

   (a) Bankruptcy or insolvency of the insured shall not relieve the Insurer of its obligations under the policy to which this endorsement is attached.

   (b) The Insurer is liable for the payment of amounts within any deductible applicable to the policy with a right of reimbursement by the insured for any such payment made by the Insurer. This provision does not apply with respect to that amount of any deductible for which coverage is demonstrated as specified in 40 CFR 264.147(f) or 265.147(f).

   (c) Whenever requested by a Regional Administrator of the U.S. Environmental Protection Agency (EPA), the Insurer agrees to furnish to the Regional Administrator a signed duplicate original of the policy and all endorsements.

   (d) Cancellation of this endorsement, whether by the Insurer or the insured, will be effective only upon written notice and only after the expiration of sixty (60) days after a copy of such written notice is received by the Regional Administrator(s) of the EPA Region(s) in which the facility(ies) is (are) located.

   (e) Any other termination of this endorsement will be effective only upon written notice and only after the

expiration of thirty (30) days after a copy of such written notice is received by the Regional Administrator(s) of the EPA Region(s) in which the facility(ies) is (are) located.

Attached to and forming part of policy No. _____ issued by [name of Insurer], herein called the Insurer, of [address of Insurer] to [name of insured] of [address] this ____ day of _____, 19___. The effective date of said policy is ____ day of _____, 19___.

I hereby certify that the wording of this endorsement is identical to the wording specified in 40 CFR 264.151(i) as such regulation was constituted on the date first above written, and that the Insurer is licensed to transact the business of insurance, or eligible to provide insurance as an excess or surplus lines insurer, in one or more States.

[Signature of Authorized Representative of Insurer]
[Type name]
[Title], Authorized Representative of [name of Insurer]
[Address of Representative]

MR. FOSSA: Thanks, Tom. We were talking a little earlier, prior to the program, about both the Front Royal and EPIC and, in many ways, they have somewhat of an advantage coming into the market to offer these coverages, with a lot more knowledge than the national companies that, over the years, many of them didn't even know they wrote these coverages, don't even know they were on these types of exposures, but are now faced with the problems of them.

At least, with both companies, both your organizations, you are entering the market with some degree of knowledge as to what might be out there.

Our next speaker, Bill Gulledge, of the Front Royal Group, has over thirteen years of experience in environmental risk management programs. Presently he is responsible for technical directions of underwriting and claims assistance for EIL insurance programs at the Front Royal.

Bill has previously held environmental positions with the Chemical Manufacturers Association and the U.S. Department of Energy. He is a member of a number of associations, including the American Society for Testing Materials, the Air and Waste Management Association -- these are all very impressive to me -- the Institute for Environmental Auditing, the National Association of Environmental Professionals.

MR. GULLEDGE: Thanks, Fred. I'm going to talk today about estimating environmental losses and some of the things you can do to assess losses and some ways to come to grips with an environmental exposure problem.

I'm not an insurance expert. I'm an environmental engineer by training and so my way of doing things is to go out and understand the environmental risk, and then we manage it. We take care of it, get it under control as fast as we can and accomplish this for the least possible cost.

Just a few seconds on the Front Royal Group. We are a brand new company. We formed an insurance company to write environmental impairment liability insurance. Front Royal has started with issuing EIL policies for underground storage tanks, and we are in the initial efforts of getting that underway.

We also have a subsidiary, Environmental Insurance Management, which was our original company and it is an environmental insurance risk assessment/risk management firm that offers consulting services. We've been working with a number of companies and states in that particular area.

Let's see what is the nature of environmental exposures, and what are some of the things we have to worry about? I noted with interest that there was a poll done of insurance actuaries published back in July.

It talked about, "What do you think is truly the worst environmental risks?" I thought it was interesting in some of the things that were identified in comparing their selection of environment risks to the priorities of the Environmental Protection Agency and where they think they ought to be going in the future.

Well, in the poll, ninety percent said that federal regulatory systems, such as the United States Superfund Program, are inadequate to pay for clean-up costs for abandoned hazardous waste sites in the year 2000. Most respondents, 64 percent, think additional taxes are going to be necessary to cover these costs.

Fifty percent of actuaries who responded believe that chemical wastes are the environmental risks which will pose the greatest health hazard to the general public by the year 2000. These hazardous and chemical wastes will also be the environmental risks most costly to society, according to the same 64 percent.

Federal, provincial and state governments will bear the clean-up costs, say 55 percent. Employers will protect themselves from potential environmental hazards in the workplace, such as office automation, sealed buildings and lead in water, through workers compensation health insurance, according to 62 percent. So, this is the poll of the actuaries.

Now, let's look at what they have said. They have said that Superfund is inadequate; we need more money; most of the money is going to come from the public coffers; that state and federal government and localities are going to have to pay for it; and, that chemical wastes are clearly the worst environmental risk.

Now, at the end of 1987, EPA concluded a risk study of their own. Paraphrasing the study, they said, "We've got all these programs in the Agency. We are spending massive amounts of money in the Superfund Program, in the RCRA Hazardous Waste Program; that's clearly where the priorities of the Agency are right now. But, what are the true risks?"

In terms of risk assessments, exposure calculations, and possible harm to the public, the data comes back that indoor air is a much worse problem than any chemical waste problem we have in this country. Acid rain also presents a tremendous problem, more so than the chemical waste problem.

Ozone, meeting the national ambient air quality standard for ozone -- something these guys in Southern California understand real well, because they've got massive problems with it -- is a tremendous risk management problem, and a much worse problem than chemical wastes or some of these other things.

Therefore, the Agency, under Bill Reilly -- and it started under Bill Ruckleshouse and Lee Thomas, the previous administrators -- decided "Look, we need to reshift our priorities to basically address some of the problems we think are much worse, so we're going to change our dominating focus on chemical wastes.

"We are going to review the big, big emphasis on the Superfund Program. We're going to quit studying Superfund problems to death, and we're going to get on with the clean-up of these sites but we're going to focus a lot of new resources on some of these other problems."

So, that's the way things are envisioned right now. Now, there are obviously some constraints on the Agency being able to move this way -- namely, the environmental laws and how they are structured right now -- but, clearly, in the amendments to the Clean Air Act that are before Congress right now, that's the way they're going to move; that's clearly the direction everybody wants to move -- focus on real problems.

I'd like to talk a little bit about the nature of environmental exposures and maybe provide some advice on avoiding the worst case. I'll do this from a past contamination problem, and then look forward to a new site. Environmental exposures and cleanup and damage costs can clearly escalate very, very quickly.

You really have to avoid the worst case, and the key to success in doing that is to get out there and understand the environmental problem right away. That means get some competent technical help to evaluate the site contamination, and spend the money to adequately accomplish this task.

The longer you wait, the worse you're going to get in trouble. The longer you wait, everybody gets their legal hoofs in gear and everybody comes up with entrenched positions, and it becomes even more of a mess, so it is very, very important to understand the environmental risk and get out there.

Environmental exposures range all over the place from emergency situations where you've got an accidental catastrophic problem to a small spill. The former's represented by the Ashland oil spill, where you had a storage tank collapse when they filled the tank, it failed, and you had a tremendous amount of oil going into the river and over the site and over the dikes and everything else; that's one kind of problem.

If you are a company that's in that type of business, you've got to be prepared to take care a castastrophy -- that; that means you've got to have a response network set up and people that are competent to go out on less than 24-hour notice and take care of the problem.

Each one of the incidents can be different, but you've got to have an emergency response capability set up, tested and ready to go should something happen. That's not the common type of environmental problem.

The more common type of environmental problem, frankly, is a very low level pollution incident that is contained on site. Something leaks, an underground storage tank or a treatment storage disposal facility that has been pretty well constructed and is well managed but fortuitously leaks.

Those type of problems, you have a little bit more time to address but you need to make sure, again, that there are competent technical people ready to assess the problem. There are all kinds of stages you go through in determining what an environmental problem is and how serious it is.

It can range anywhere from just going around and looking at the site and seeing what is there and what you think has leaked out, to going through some volume calculations on what you think may have leaked or spilled out, all the way to sticking probes into the ground to measure gas concentrations to see if there are petroleum hydrocarbons around. You may also sink soil borings for soils analysis, or install ground water monitoring wells. All these things are useful for understanding the kind of environmental problem and assessing the extent of contamination.

My previous experience on some of the claims comes from being called at the last moment. With this perspective, you begin to understand what typically happens, the typical scenario for an environmental claim. Usually, leaks have gone on for a period of months, if not years.

All of a sudden, you're called in and they'll say, "Well, we had some insurance adjusters out here and they did a lot of work trying to determine when coverage periods were available and what the limits were and what policies were in force at the time, and what other kind of policies may have been available at the time," but very little was done on getting information to understand the environmental risk.

That is the situation an environmental professional may be faced with. There have been a lot of questions on bodily injury. Was anybody hurt? Have we made any medical payments? What kind of coverages are in effect? Have any claims been settled for property damage? But, very little work to say, "Okay, what is the environmental risk? What kind of a problem do we have here?"

In the meantime, the regulators have gotten into it. They've taken the upper hand. You give them a chance, they've taken the upper hand because in this instance they have to. They come in, take the upper hand, and you end up with a situation where you lose control. They say, "I want this site cleaned up, pristine, that's it. Do it." That's what you have to avoid. Risk must be a factor in the cleanup question.

You've got to get out there early, and you've got to get in discussions with regulators. You've got to understand what you're doing, and that's the way you avoid some of these worst case situations.

I didn't sit in on the session before this, but there was a session in here I think that talked about it's more than just numbers, and that's clearly the case here. It's more than just health numbers. It's more than just environmental data numbers. You've got to understand what the whole situation is regarding environmental exposure.

Technical is part of it, but you've got to understand the legal perspective as to what kind of release it is; is there any environmental compliance issue involved here; have there been any environmental laws or regulations violated, which ones are they. Some are more serious than others.

States have priorities for environmental regulations. They consider some violations more important than others, and they will go after you more stringently if you break one of the "sacred ones."

There are also public policy issues and public relations issues involved here. You've got people screaming about environmental contamination and you are polluting their ground water and their drinking water wells are all polluted. You've got to take their perspective into account and you'd better start providing a water supply. There maybe all kinds of decisions like this, and all of these factors have to be assessed, and you've got to make key public policy decisions soon.

Legal expenses, as has been mentioned, can get out of hand and that's where Superfund has come into play; that's where everybody tries to lock horns. They try to either allocate expenses and allocate damages, or they decide to fight it all the way. The Agency's push now is to try to avoid some of these problems where everybody locks horns and goes at it.

In their policy guidance documents EPA lately has indicated that they are going to press enforcement in the regional offices much more quickly. They're going to press for settlements really faster and start going after people that don't settle. So, I think you are going to see the legal side of superfund speed up a little bit. They clearly have realized that legal expenses are way out of hand.

This is a case where it is easier to go on a go-forward basis. As a new insurer, you are dealing with a brand new policy. It is a claims-made policy. You have an incident. In that case, you can control legal expenses a lot better. You get down to the site quickly. It's a technical problem.

Yes, you've got a claim. First, you've got to clean it up. In a lot of cases, you can take corrective action without legal counsel. If the claim is routine, you go in and talk to the regulator, and you say, "Look, this is what has happened. This is how much has spilled. This is how we will remediate the site. These are the human health numbers. We've done all the calculations for you."

My experience is a lot of regulators will really say, "Thanks," because they don't have the time to fool with extensive details. If you go in there with all the data and understand it and talk to the regulators many times they'll say, "Fine. It looks good to us, it is in the public's interest and protects human health and the environment. Go ahead and cleanup." It helps a lot.

How do you estimate environmental losses? As a brand new company, we've had to go through this, and we have tried to understand the available data that's out there. You have to really look at the data hard, I guess is the best way to put it, and use some judgment as to what you are looking at, because it can all be gathered very strangely.

I'll give you an example. Let's say you want to develop an insurance program for underground storage tanks. Say you want to deveop this program for a particular state; it doesn't matter which state. You go to the state and you say, "How many underground storage tanks do you have in this state?" Good question.

The first answer you get is, "I don't know." The second answer you get is, "Well, we have so many tanks registered, but we figure there's probably thirty percent that are not registered, and then we have the problem of abandoned tanks that are still in the ground. We don't know how many there are at all." That's where you the insuror starts from.

So, you start with a number that is very soft. You know how many tanks are registered; that's a pretty accurate number, but that doesn't tell you what the true population is and it certainly doesn't tell you what condition the tanks are in. If you get data regarding what kind of condition the tanks are in -- whether they are bare steel, new, or not new and they've been upgraded, or bare steel and haven't been upgraded -- forget it, you won't get this detailed information.

Very few states have that data. If they do have that kind of information, they have different definitions for upgrading. They have different standards for upgrading. It gets into a real problem in trying to look at the information that you have, but you can do it.

You have to make some expert technical judgments regarding the exposures from underground storage tanks; you understand the technology; this is a good system; this is not such a good system; and, you can develop your underwriting criteria accordingly, your profile of what you want to insure -- preferred risks.

Then you can work off your underwriting basis to develop loss estimates because you know the technology of upgraded tank systems and the newer systems, and proprer installation procedures and characteristics. You can have a great deal of confidence in developing an estimate of leak rates for different types of tank systems over a period of time.

You can compare your estimate with data the EPA has collected regarding leak rates and aggregated to a national basis. It's difficult, but it can be done; that's just one example of estimating environmental exposures. You could also estimate losses from

incinerators. You could estimate losses from new waste treatment/storage/disposal facilities.

It's all a matter of understanding the risk and understanding the engineering that goes into it, and you can develop some pretty good estimates on what you think may happen in the future. Your estimates are probably just as good as anybody else has ever developed before.

I mentioned a lot of questions and controvsery has surfaced on who will pay for the problems of the past. I mentioned the survey done up front. What is going to really happen now? I think that the insurance companies are positively addressing the problem -- there is an AIG proposal which would essentially create another environmental trust fund and have EPA administer the fund and clean up all the sites. I don't think that's going to work.

One, EPA has just got too much to do right now. They don't need another massive federal program to manage and try to clean up all these sites; secondly, Congress is never going to appropriate the money. The spending priority is just not there, even if it's reimbursed through insurance premium taxes.

So, who will really pay for waste cleanup? I think it's going to be more of a partnership. You're going to see a lot of different, creative proposals that will also make somebody a lot of money. We're beginning to see this now in some areas of the country on the local level. There are instances where a state or locality will pass a bond issue or and a state program will be created to provide a loan guarantee or a low interest loan for upgrading a pollution control facility, whatever the type, and in the process of evaluating a project, go through and get a good assessment on what contamination is at the site. State backing and state assistance could also be provided to clean up any contamination.

It's kind of an upgrading program. In a way, the funding authority is practicing environmental risk management: Get an understanding of what is there now. Take care of the site environmental problems and provide financial support for cleanup and upgrading. You are going to see more environmental risk management approaches and more of what we call market-based incentives to environmental control in the future, also.

In the Clean Air Act amendments currently being debated, there is a lot of discussion on emissions trading and buying and selling of air credits in certain areas of the country. This has been going on in California for quite awhile. It is very popular. It is very profitable for some firms that arrange air emissions trading.

It's going to happen in other areas of the country and probably spread to other types of pollutants, as well. Essentially, environmental control and environmental protection is going to shift fundamentally from the traditional technology based approach or where you put this piece of equipment on; it works at this efficiency; and, it's done. The technology based approach to pollution control will serve as a baseline.

Now, we are in the area of managing the environmental risks that exceeds that particular technology-based standard. To manage that additional risk, we're getting into market-based incentives and market-based approaches like upgrade loans, emissions trading credits, like a lot of things that are probably going to happen in the future. I won't say the near future, because Congress will maybe pass the Clean Air Act by the end of the year, but the concept will be carried over into other environmental laws as well.

Before I conclude, I noticed in a recent issue of Best's Review, there was a quote that I thought was interesting, and maybe pertains to the environmental liability situation. The subject was actually reinsurance, but the concept applies.

The writer says, "Our business sells an intangible promise. We do not even know the words of the promise. The business is built on money and investments. We do not seem to care who has the money or who is investing. The business relies on security. We do not know how to establish the value of liabilities with any real degree of confidence. Could it be that our industry is headed for a crash that will rival the savings and loan industry's fiasco in the annals of modern times?"

Well, that's pretty serious stuff. We are facing big time problems. I think, if environmental claims are approached, using the very marginal approach of not really understanding environmental risks, we are heading in that direction.

We clearly have a multibillion dollar problem. It is going to take more and more money, and things are going to get worse and worse before they get better. But, there is a way to understand the environmental problems and control them in a much easier, faster method.

Just to summarize, it is our position, the Front Royal Group, that environmental claims management does require specific expertise that is normally not found in the traditional insurance loss reserving area. You don't find environmental professionals. You don't even find environmental attorneys, working on some claims. You need specialized attorneys who understand and cost effectively implement, environmental claims. It's very, very important.

Then there is the risk assessment professionals, the environmental health risk managers who get involved if there's big problems associated with bodily injury -- human health exposures and related problems have to be estimated. It is a very specialized expertise.

The risk-based approaches will continue to grow in importance as time goes on, but the road is going to be rocky. We are going to get there, but it's going to be awhile. It is going to be perceived by the public as very expensive. You are still going to see high damage awards from courts for toxic torts. You are still going to see very high legal defense costs associated with claims until some of the environmental and insurance laws change.

I think we need new insurance companies, new legislation, new regulations, a better understanding of the environment -- if we're going to help society in the future. I think in the future, we're going to see more insurance companies getting back into the environmental arena.

It may not be some of the big companies who had severe problems associated with EIL and CGL policies, but there will be more companies like us, new guys getting formed and getting out there selling newly developed EIL coverage. With that, I'll conclude and let our last speaker go on and then we'll answer some questions.

MR. FOSSA: Our final speaker is Roger Hayne. Roger Hayne is a fellow of the Casualty Actuarial Society and a member of the American Academy. He has done consulting for 12 or 13 years, I guess. He specializes in loss reserve evaluations, has done a number of interesting studies in this area for different organizations and clients, and I hope he's going to share some of his thoughts with us.

ENVIRONMENTAL LIABILITY AND ASBESTOS RELATED LOSSES

Presented by

Roger M. Hayne

Estimates of ultimate losses for environmental and asbestos related exposures are difficult due largely to the lack of available historical information upon which to base forecasts. We will discuss two types of approaches that can be used in these situations. The first approach assumes that there is scarcely little historical loss information available and considers an analysis of exposure as one approach to forecasting losses. The second approach concentrates on several unique aspects observed in the analysis of asbestos related losses.

Environmental Liability Exposure Based Loss Estimate

This approach begins with an analysis of the policies issued which have potential environmental liability loss exposure. The basic model will depend on specific assumptions regarding that exposure. For ease in identification, the major items will be set off in the text that follows.

Generally little or no actual loss information is assumed to be known; rather, we assume that losses, if they occur, will exhaust policy limits, i.e.,

Assumption 1: All claims will exhaust policy limits.

A refinement described later will relax this assumption but will require assessment of reserves set by the carrier.

1. Direct Policy Exposure

The first step, given the assumption that all policies that have claims will have policy limit claims, is to estimate the exposure of individual policies to loss. Obviously, policy provisions have a significant impact on the level of exposure to loss. For example, multiple year policies will have more exposure to loss than single year policies.

In some cases, all losses may be covered by a single aggregate policy limit, such as for products liability in many recent policies. In other cases, individual claims may be subject to separate limits.

Another area that policy provisions can have an impact on the exposure to loss is in the treatment of loss expenses within the policy. The impact of policy limits on such costs should also be considered.

Net costs are also influenced by loss expenses. Claim data, as well as experience in coverages wherein claim defense is of comparable complexity (for example Directors & Officers), may also provide useful information regarding the extent of loss expenses incurred. Hence a simple assumption that loss expenses average a percentage of policy limits may be all that can be done in a particular situation. Hence a second assumption would be

Assumption 2: Loss expenses will be x% (for example 50%) of losses.

2. Net Policy Exposure

Reinsurance protections also influence the net exposure. As with primary policies, reinsurance provisions have an impact on the net exposure of the company. As with the primary policies, questions regarding per claim as well as aggregate limits are possible. Catastrophe coverage may also limit per occurrence exposure.

Another aspect of reinsurance coverage that should be considered is the treatment of loss expenses in the reinsurance protections. Possible options include loss expenses included within retention limits, loss expenses excluded from coverage, and loss expenses shared in the same proportion as losses.

Given decisions on each of these items, we are prepared to consider individual policies. Exhibit EL-1 shows the type of information that would be required in addition to any policy provisions that are unique for an individual insured. Though a reserve amount is shown here, it does not have a direct relation to results of this basic approach. Given this information, then, we can derive estimates of the exposure of known policies. There are, however, other areas of potential exposure that should be considered. The third and fourth assumptions in the model then address the net effect of policy limits and reinsurance protection on losses as well as loss expenses.

Assumption 3: Assume a relationship between policy limits and retentions to estimate net losses for individual policies; for example, net losses will be the smaller of policy limits and retention.

Assumption 4: On the average, loss expenses will represent y% (for example 25%) of policy limits, after consideration of reinsurance.

3. Exposure for Unknown Claims

The above analysis treats only those policies known to have claims. Yet to be considered are those policies on which claims will arise in the future. Based on past emergence of claims we would estimate the emergence of future claims. This leads to the fifth of our assumptions:

Assumption 5: Assume the number of policies to have claims in each future year, for example 10 policies each year from 1990 through 1994 inclusive, 9 policies in 1995, 8 policies in 1996, ..., 1 in 2003, and 0 thereafter.

4. Exposure for Controverted Claims

It is not unusual for significant amounts to be expended in deciding whether or not coverage for a particular claim even exists. As with future claims, historical expenses on such policies can be reviewed to provide estimates for future payments.

Unlike loss expenses on other policies, reinsurance protection would not be available to offset such payments, nor would those loss expenses be expected to have a strong relationship to the amounts of policy limits involved. Thus an additional assumption would have to be made to incorporate these costs in the loss model:

Assumption 6: Make assumptions regarding the future expense costs for controverted claims. For example, $10 million per year, increased by inflation by 10% per year for the next 5 years, held constant at that rate for the next 5 years (assuming reduced emergence of policies offsets cost growth per policy).

5. Present Value of Future Payments

These claims have the potential for rather long lags from their incidence to their final payment. The

time value of money then can have a significant impact on the net worth. In addition, it is unlikely that loss expenses will be paid sooner than losses. This gives rise to the next two assumptions:

Assumption 7: Assume a pay-out for losses, for example, paid evenly over the ten years following emergence.

Assumption 8: Assume a pay-out for loss expenses, for example, paid evenly over the sixth through tenth years following emergence.

6. Base Model Forecasts

Given these specific assumptions, we could obtain an estimate of the present value of future payments by adding together loss and loss expense forecasts for known policies, those for future claims, and those for controverted claims. The pay-out assumptions (7 and 8) could then be used to estimate the present value of these amounts at any required interest rate.

7. Sensitivity Testing

The accuracy of the estimate of this "Base Model" is dependent on that of the assumptions used. By necessity many, if not most, of those assumptions are "educated guesses" at best. Testing the sensitivity of the model results to changes in underlying assumptions can provide valuable information regarding the sensitivity of the model to errors in those assumptions as well as to which assumptions are most significant to the model results.

Thus the model should be tested using modifications to the various assumptions. For example, Assumption 2 could be modified to "net losses are equal to policy limits" which would assume no protection is available from reinsurance. Another modification could be as to the lengths of pay-out for losses and expenses. Such variations in timing would impact the present value of future losses but not their nominal (undiscounted) value.

We would also test "best" and "worst" sets of assumptions. In these cases "best" and "worse" selections from each of the alternative assumptions would be selected. Model forecasts could then be calculated from these assumptions.

Exhibit EL-2 shows an example of such calculations. Here the "base" model indicates total losses of 200 (million pounds/dollars/?). Various alternative assumptions lead to losses in the range of 150 to 300. The "best", simultaneously assuming all the most favorable alternative assumptions, is 125, while the "worst", simultaneously assuming all the least favorable alternatives, results in a forecast of 500.

As an aside, alternative assumptions 6 through 8 simply vary the payment patterns. In these cases the undiscounted value is unchanged while the discounted amounts vary.

As with the base model assumptions, substantial judgment needs to be exercised in selecting "probable" alternative assumptions.

8. Potential Refinements

One rather restrictive assumption above is the first one, that all losses will be for policy limits. If additional loss data on known claims is available, this assumption could be weakened.

Incurred loss estimates on known claims could be used to estimate the average relationship between losses and policy limits resulting in

Assumption 1a: Losses will average z% (for example 40%) of policy limits.

The percentage used here would depend on the incurred losses for known claims. A sensitivity test in this case would be to assume various levels of reserve adequacy, for example over-reserved by 20%, under-reserved by 50%, and so forth.

Precautionary claims are also common in this coverage. Some of these claims eventually will develop into "real" claims. An analysis of the past emergence of these claims could be used to formulate

Assumption 1b: On the average w% (for example 25%) of precautionary claims will eventually generate losses.

As with other assumptions, the sensitivity of the model to these assumptions could be tested using "plausible" alternatives.

Development Models for Asbestos Related Losses

There are several aspects of asbestos-related losses which could cause the historical development of such losses to differ from that of other liability claims. Asbestos was used by many commercial applications before the hazards to its exposure was known. Knowledge of its hazard emerged and led to growing awareness of its danger.

Claims for damages due to asbestos exposure then started to arise. Additional time was necessary for the formation of legal theories regarding liability for loss due to asbestos. Due to the long latency period, the nature of coverage for liability was also uncertain.

Court decisions then began to set the ground rules for settlement of asbestos claims. As the theories became more developed, they also achieved wider notoriety. After such ground-work and precedent has been established, it is possible that such claims would develop similar to other liability claims.

Asbestos related property claims now appear to be emerging. These include costs for removal of asbestos already installed in buildings. Such removal costs can be substantial and, to some extent, the amount of precedent set for such claims may be similar to that of asbestos bodily injury claims several years ago. It is thus possible that we would see a "surge" or a "blip" in development due to newly emerging asbestos related property claims.

Development "Triangles"

Typically, historical development is analyzed by arranging data in the form of a development "triangle", as shown in Exhibit EL-3. Rows in that triangle relate to (incurred) losses for a single accident or underwriting year at various anniversaries of that year. For example, the amount for 1967 at 12 months represents the amount of losses incurred on 1967 accidents by the end of 1967. Similarly, the amount at 60 months represents the amount incurred on 1967 accidents by the end of 1971.

Actuaries often consider the amount of change from one stage of development to the next, as identified by development factors, or "link ratios". The factors from Exhibit EL-3 are shown in Exhibit EL-4 and are the ratios of losses at one stage of development to those at the prior stage.

One would generally expect that the factors should decrease as the age of the year increases. If it appears that development would continue after the history provided, an extrapolation from these

"known" values is often made. Another approach would be to identify other data sources which are expected to exhibit similar development.

Inherent in the use of historical data is that different underwriting (or accident) years can be expected to behave similarly at similar stages of development. This is obviously the case in Exhibits EL-3 and EL-4.

We noted above, however, that awareness of asbestos related hazards is a relatively recent phenomenon. Thus there is later reporting of such losses for older years at advanced stages of development that may not be expected of more recent years at that same age.

The hypothetical development examples in Exhibits EL-5 and EL-6 provide an example of development that would be consistent with such a pattern. Note here that the emergence of losses seems more related to calendar year evaluations (diagonals) than to the stage of development (columns).

Without going into great detail at this point, Exhibits EL-7 and EL-8 presents a synthesis of several actual development triangles for asbestos related losses. Though the patterns do not precisely match those in the hypothetical development in Exhibits EL-5 and EL-6, similar characteristics seem to exist. This may suggest that asbestos related losses seem more related to the calendar year in which they are evaluated than to the stage of development of the underwriting year to which they are attributed.

If this is actually the case, then development of the last diagonal should not depend on the individual underwriting year but rather should be uniform across all underwriting years. In the context of Exhibits EL-5 and EL-6, this would say that the 100 in losses for each underwriting year should continue develop to the same ultimate value.

What remains is to estimate the future amount of such development. For this, some of the observations and assumptions about the nature of the development of asbestos related losses above come into play. If one assumes that legal interpretations are sufficiently clear for asbestos related losses to behave similarly to other liability losses, then the development of such losses may perhaps be useful in estimating the future development of asbestos related losses.

Probably the first place to look would be to the company's own development of non-asbestos other liability losses. We would compare the development for data sorted by underwriting or accident year with that experienced by asbestos related losses. If our hypothesis is correct then the development patterns should be similar. If that is the case the other liability development may be indicative of future development on asbestos related losses.

If we were to assume that newly emerging property losses represent a second wave of asbestos related losses with development similar to earlier asbestos losses, then we could estimate the amount of such losses. For this we could compare what we would have expected to have occurred with that actually emerging. Under the assumption that the "extra" amount is due to asbestos related property claims, that "extra" amount could then be developed separately.

Exhibit EL-9 presents this possibility graphically. Analytically, if this is the case in practice, the best result would be obtained from developing the two pieces separately. Exhibits EL-10 and EL-11 show how this would appear in the development triangles.

As an example of the application of these methods, we first make the following assumptions:

1. the future development of asbestos related losses depends primarily on the calendar year valuation date of those losses,

2. development of general liability losses for an accident year can be used for future development of asbestos related losses,

3. losses in addition to expected development for recent years are due to property claims, and

4. future development of property related claims will match that of earlier asbestos related loss development.

We then consider the "real" asbestos data in Exhibits EL-7 and EL-8. Some patterns seem to be apparent that are consistent with the assumptions above. First, note that asbestos related losses do not arise in the data until calendar year 1980 and that the movement in losses seems more consistent when comparing calendar year movements (diagonals) than in comparing development at consistent stages (columns). This seems to support the first hypothesis.

We then re-arrange the data by rolling diagonals into columns. This is shown in Exhibits EL-12 and EL-13.

The drawback with arranging the data in this manner is that we have no indication of future development. As suggested above, we would next consider development of other liability losses excluding asbestos for this hypothetical company. Unfortunately, such data were not available. We did, however, consider the development of general liability losses, excluding asbestos, from the 1987 Reinsurance Association of America (RAA) development report. The comparison of development from one calendar year to the next with that of accident years from these data shown in Exhibit EL-14 is consistent with the second of the above assumptions. We will thus use that development to extrapolate future asbestos related losses.

An item of note shown in Exhibit EL-14 is that the development from 1986 to 1987 in asbestos related losses is higher than what would be expected from the RAA development. Under the third and fourth assumptions above, we conclude that this additional development is due to newly emerging property claims. We could then use the difference between actual and expected losses to quantify the magnitude of such claims.

The ultimate loss forecasts under these assumptions are presented in detail in Exhibit EL-15. From Exhibit EL-14 we estimate the amount of development expected in 1986-1987 is 13.7% of the amount incurred by 1986 (a factor of 1.137). Thus we would expect the incurred amounts shown in column (3).

The actual amounts incurred, column (4), are generally above that expected. According to the third assumption above, the additional amount, column (5), is attributable to property losses.

Using the first two assumptions, we apply accident year development derived from RAA data [column(6)] to the expected asbestos related losses to forecast ultimate losses for the first component. These loss projections are shown in column (7).

Under assumption 4 above, the "additional" amount will develop as did "regular" losses at an earlier stage of development. The resulting factor is shown in Exhibit EL-14 and in column (8). Column (9) then shows the amount of forecast losses for this "additional" portion which we assumed to be related to property losses.

Total forecast losses are shown in column (10). The resulting amount that is IBNR (including provision for further development on known claims) is shown in column (11).

If the assumptions above are true, the use of "usual" development methods may significantly

overstate ultimate asbestos related losses. Columns (12) through (14) show an example of this. The selected age-to-age factors are simply the weighted average of the factors in the various development columns from Exhibit EL-8. The factor to develop 1967 (the oldest underwriting year) to ultimate was extrapolated from the remaining factors. As shown in the exhibit, this method results in a forecast of 101,665, as compared with the forecast of 24,707 from the alternative method.

The development approach presented here is based on the critical assumptions above. The actual data seemed to be consistent with what would be expected under these assumptions. However, it is not clear whether this is due to random chance or to the validity of these assumptions. The benefit of this approach is that it does reflect the apparent unique characteristics of asbestos related claims.

Exhibit EL-1

Exposure Based Loss Estimate
Example Data

Policy Number	Exposure Years	Effective Date	Reserve	Retention	Occurrence Limit	Aggregate Limit
⋮	⋮	⋮	⋮	⋮	⋮	⋮
xxxxxx	3	3/78	150	750	300	300
yyyyyy	1	7/83	10	1,000	1,000	2,000
zzzzzz	1	5/84	1,000	650	500	N/A
⋮	⋮	⋮	⋮	⋮	⋮	⋮

Exhibit EL-2

Exposure Based Loss Estimate
Example Model Results

	Discounted Value		
Assumptions	0.0%	7.5%	10.0%
Base Model	200	80	60
Alternate Assumption 1	300	110	90
Alternate Assumption 2	220	85	65
Alternate Assumption 3	250	90	70
Alternate Assumption 4	150	60	50
Alternate Assumption 5	250	100	80
Alternate Assumption 6	200	70	50
Alternate Assumption 7	200	95	80
Alternate Assumption 8	200	85	70
"Worst" Assumptions	500	240	190
"Best" Assumptions	125	55	40

Exhibit EL-3

Example Development

Under-writing Year	Months of Development			
	12	24	36	48
1967	10	50	90	100
1968	10	50	90	
1969	10	50		
1970	10			

Exhibit EL–4

Example Development Factors

Under–writing Year	Months of Development 24/12	36/24	48/36
1967	5.000	1.800	1.111
1968	5.000	1.800	
1969	5.000		

Exhibit EL-5

Under-writing Year	...	Hypothetical Development #1 Months of Development 180	192	204	216	228	240	252
1967	...	0	0	0	10	50	90	100
1968	...	0	0	10	50	90	100	
1969	...	0	10	50	90	100		
1970	...	10	50	90	100			

Exhibit EL-6

Under-writing Year	...	Hypothetical Development Factors #1 Months of Development 92/180	04/192	16/204	28/216	40/228	52/240
1967	...	--	--	--	5.000	1.800	1.111
1968	...	--	--	5.000	1.800	1.111	
1969	...	--	5.000	1.800	1.111		
1970	...	5.000	1.800	1.111			

Example Asbestos Related Losses Exhibit EL-7

Underwriting Year	Months of Development													
	12	24	36	48	60	72	84	96	108	120	132	144	156	168
1967	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1968	0	0	0	0	0	0	0	0	0	0	0	0	4	5
1969	0	0	0	0	0	0	0	0	0	0	0	5	6	79
1970	0	0	0	0	0	0	0	0	0	0	6	14	135	404
1971	0	0	0	0	0	0	0	0	0	3	12	143	448	632
1972	0	0	0	0	0	0	0	0	4	13	30	95	263	478
1973	0	0	0	0	0	0	0	1	19	24	127	177	216	235
1974	0	0	0	0	0	0	84	25	66	64	187	265	233	327
1975	0	0	0	0	0	7	9	85	142	203	247	298	334	
1976	0	0	0	0	3	7	26	32	62	106	129	186		
1977	0	0	0	1	14	70	82	109	48	149	179			
1978	0	0	30	30	104	128	140	144	157	162				
1979	0	0	1	2	8	12	49	42	58					
1980	0	0	2	8	12	34	20	33						
1981	0	0	0	0	22	41	74							
1982	0	0	0	0	0	51								
1983	0	0	0	0	17									
1984	0	0	0	1										
1985	0	0	0											
1986	0	0												
1987	0													

	Months of Development						
	180	192	204	216	228	240	252
1967	1	94	186	342	403	454	389
1968	14	74	266	291	351	458	
1969	289	551	671	874	1,148		
1970	559	722	1,070	1,224			
1971	960	1,121	1,337				
1972	540	771					
1973	321						

Example Asbestos Related Loss Development Factors Exhibit EL-8

Under-writing Year	Months of Development													
	24/12	36/24	48/36	60/48	72/60	84/72	96/84	108/96	120/108	132/120	144/132	156/144	168/156	180/168
1967	--	--	--	--	--	--	--	--	--	--	--	--	--	1.000
1968	--	--	--	--	--	--	--	--	--	--	--	--	1.250	2.800
1969	--	--	--	--	--	--	--	--	--	--	--	1.200	13.167	3.658
1970	--	--	--	--	--	--	--	--	--	--	2.333	9.643	2.993	1.384
1971	--	--	--	--	--	--	--	--	--	4.000	11.917	3.133	1.411	1.519
1972	--	--	--	--	--	--	--	--	3.250	2.308	3.167	2.768	1.817	1.130
1973	--	--	--	--	--	--	--	19.000	1.263	5.292	1.394	1.220	1.088	1.366
1974	--	--	--	--	--	--	0.298	2.640	0.970	2.922	1.417	0.879	1.403	
1975	--	--	--	--	--	1.286	9.444	1.671	1.430	1.217	1.206	1.121		
1976	--	--	--	--	2.333	3.714	1.231	1.938	1.710	1.217	1.442			
1977	--	--	--	14.000	5.000	1.171	1.329	0.440	3.104	1.201				
1978	--	--	1.000	3.467	1.231	1.094	1.029	1.090	1.032					
1979	--	--	2.000	4.000	1.500	4.083	0.857	1.381						
1980	--	--	4.000	1.500	2.833	0.588	1.650							
1981	--	--	--	--	1.864	1.805								
1982	--	--	--	--	--									
1983	--	--	--	--										
1984	--	--	--											
1985	--	--												
1986	--													
Wtd. Avg.	--	--	1.273	4.390	2.147	1.619	1.149	1.269	1.454	1.632	1.603	1.644	1.656	1.463

	Months of Development					
	192/180	204/192	216/204	228/216	240/228	252/240
1967	94.000	1.979	1.839	1.184	1.121	1.297
1968	5.286	3.595	1.094	1.206	1.305	
1969	1.907	1.218	1.303	1.314		
1970	1.292	1.482	1.144			
1971	1.168	1.193				
1972	1.428					
Wtd. Avg.	1.410	1.378	1.245	1.263	1.206	1.297

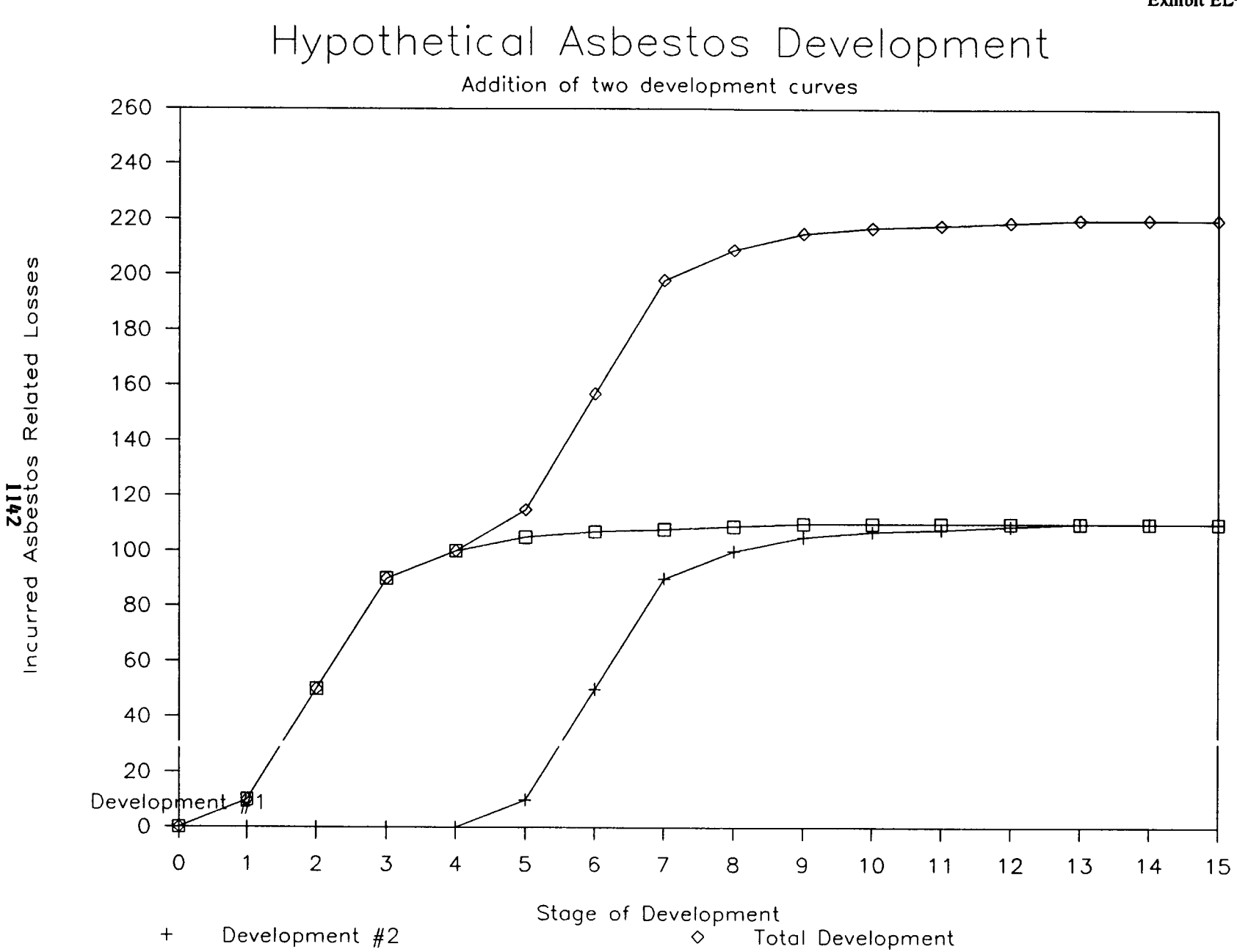

Hypothetical Asbestos Development
Addition of two development curves
Incurred Asbestos Related Losses
260
240
220
200
180
160
140
120
100
80
60
40
20
0
Development #1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Stage of Development
+ Development #2
◇ Total Development

Exhibit EL-10

Hypothetical Development #2

Under-writing Year	...	Months of Development 180	192	204	216	228	240	252	264
1967	...	0	0	0	10	50	90	100	115
1968	...	0	0	10	50	90	100	115	
1969	...	0	10	50	90	100	115		
1970	...	10	50	90	100	115			

Exhibit EL-11

Under-writing Year	...	Hypothetical Development Factors #2 Months of Development 92/180	04/192	16/204	28/216	40/228	52/240	64/252
1967	...	--	--	--	5.000	1.800	1.111	1.150
1968	...	--	--	5.000	1.800	1.111	1.150	
1969	...	--	5.000	1.800	1.111	1.150		
1970	...	5.000	1.800	1.111	1.150			

Exhibit EL-12

Example Asbestos Related Losses

Underwriting Year	Asbestos Related Losses Reported as of 12/31/								
	1979-	1980	1981	1982	1983	1984	1985	1986	1987
1967	0	1	1	94	186	342	405	454	589
1968	0	4	5	14	74	266	291	351	458
1969	0	5	6	79	289	551	671	874	1,148
1970	0	6	14	135	404	559	722	1,070	1,224
1971	0	3	12	143	448	632	960	1,121	1,337
1972	0	4	13	30	95	263	478	540	771
1973	0	1	19	24	127	177	216	235	321
1974	0	84	25	66	64	187	265	233	327
1975	0	7	9	85	142	203	247	298	334
1976	0	3	7	26	32	62	106	129	186
1977	0	1	14	70	82	109	48	149	179
1978	0	30	30	104	128	140	144	157	162
1979	0	0	1	2	8	12	49	42	58
1980		0	0	2	8	12	34	20	33
1981			0	0	0	0	22	41	74
1982				0	0	0	0	0	51
1983					0	0	0	0	17
1984						0	0	0	1
1985							0	0	0
1986								0	0
1987									0
Total for Underwriting Years 1967 through 1980:	0	149	156	874	2,087	3,515	4,636	5,673	7,127

Exhibit EL-13

Example Asbestos Related Loss Development Factors

Underwriting Year	1980 to 1981	1981 to 1982	1982 to 1983	1983 to 1984	1984 to 1985	1985 to 1986	1986 to 1987
1967	1.000	94.000	1.979	1.839	1.184	1.121	1.297
1968	1.250	2.800	5.286	3.595	1.094	1.206	1.305
1969	1.200	13.167	3.658	1.907	1.218	1.303	1.314
1970	2.333	9.643	2.993	1.384	1.292	1.482	1.144
1971	4.000	11.917	3.133	1.411	1.519	1.168	1.193
1972	3.250	2.308	3.167	2.768	1.817	1.130	1.428
1973	19.000	1.263	5.292	1.394	1.220	1.088	1.366
1974	0.298	2.640	0.970	2.922	1.417	0.879	1.403
1975	1.286	9.444	1.671	1.430	1.217	1.206	1.121
1976	2.333	3.714	1.231	1.938	1.710	1.217	1.442
1977	14.000	5.000	1.171	1.329	0.440	3.104	1.201
1978	1.000	3.467	1.231	1.094	1.029	1.090	1.032
1979	--	2.000	4.000	1.500	4.083	0.857	1.381
1980	--	--	4.000	1.500	2.833	0.588	1.650
1981		--	--	--	--	1.864	1.805
1982			--	--	--	--	--
1983				--	--	--	--
1984					--	--	--
1985						--	--
1986							--
Wtd. Avg.	1.047	5.603	2.388	1.684	1.319	1.224	1.256

Exhibit EL-14

Selection of Asbestos Related Loss Development

Calendar Year	(1) Asbestos Losses Reported	(2) Indicated Develop-ment	(3) Accident Year Develop-ment	(4) RAA Develop-ment	(5) Adjusted Asbestos Related Development Age to Age	(6) Age to Ult.
1980	149	--				
1981	156	1.047				
1982	874	5.603				
1983	2,087	2.388	12-24	2.813	2.388	14.763
1984	3,515	1.684	24-36	1.769	1.684	6.182
1985	4,636	1.319	36-48	1.347	1.319	3.671
1986	5,673	1.224	48-60	1.210	1.224	2.783
1987	7,127	1.256	60-72	1.137	1.137	2.274
			72-Ult.	2.000		2.000

NOTES:

1. Asbestos related losses the total for underwring years 1967-80.
2. The RAA factors are based on the average of the latest 4 factors for general liability excluding asbestos in the 1987 report.

Example Calculation for Asbestos Related Loss Development

Underwriting Year	(1) Incurred as of 12/31/86	(2) Expected Development in 1987	(3) Expected as of 12/31/87 (1)x(2)	(4) Incurred as of 12/31/87	(5) "Additional" Amount (4)-(3)	(6) Estimated "Normal" Development	(7) Estimated "Normal" Ultimate (3)x(6)	(8) "Additional" Development	(9) Estimated "Additional" Ultimate (5)x(8)	(10) Total (7)+(9)	(11) Indicated IBNR (10)-(4)	(12) "Traditional" Development Factor Age to Age	(13) "Traditional" Development Factor Age to Ult.	(14) Forecast (4)x(13)
1967	454	1.137	516	589	73	2.000	1,032	14.763	1,078	2,110	1,521	--	1.594	939
1968	351	1.137	399	458	59	2.000	798	14.763	871	1,669	1,211	1.297	2.067	947
1969	874	1.137	994	1,148	154	2.000	1,988	14.763	2,274	4,262	3,114	1.206	2.493	2,862
1970	1,070	1.137	1,217	1,224	7	2.000	2,434	14.763	103	2,537	1,313	1.263	3.149	3,854
1971	1,121	1.137	1,275	1,337	62	2.000	2,550	14.763	915	3,465	2,128	1.245	3.921	5,242
1972	540	1.137	614	771	157	2.000	1,228	14.763	2,318	3,546	2,775	1.378	5.403	4,166
1973	235	1.137	267	321	54	2.000	534	14.763	797	1,331	1,010	1.411	7.624	2,447
1974	233	1.137	265	327	62	2.000	530	14.763	915	1,445	1,118	1.464	11.162	3,650
1975	298	1.137	339	334	0	2.000	678	14.763	0	678	344	1.655	18.473	6,170
1976	129	1.137	147	186	39	2.000	294	14.763	576	870	684	1.639	30.277	5,632
1977	149	1.137	169	179	10	2.000	338	14.763	148	486	307	1.596	48.322	8,650
1978	157	1.137	179	162	0	2.000	358	14.763	0	358	196	1.621	78.330	12,689
1979	42	1.137	48	58	10	2.000	96	14.763	148	244	186	1.448	113.422	6,578
1980	20	1.137	23	33	10	2.000	46	14.763	148	194	161	1.260	142.912	4,716
1981	41	1.137	47	74	27	2.000	94	14.763	399	493	419	1.146	163.777	12,119
1982	0	1.137	0	51	51	2.000	0	14.763	753	753	702	1.338	219.134	11,176
1983	0	1.137	0	17	17	2.274	0	14.763	251	251	234	2.104	461.058	7,838
1984	0	1.137	0	1	1	2.783	0	14.763	15	15	14	4.317	1990.387	1,990
1985	0	1.137	0	0	0	3.671	0	14.763	0	0	0	--	--	--
1986	0	1.137	0	0	0	6.182	0	14.763	0	0	0	--	--	--
1987	0	1.137	0	0	0	14.763	0	14.763	0	0	0	--	--	--
Total	5,714		6,499	7,270	793		12,998		11,709	24,707	17,437			101,665

PRIVATE SECTOR INITIATIVES IN ESTABLISHING ENVIRONMENTAL STANDARDS AND MANAGING WASTE DISPOSAL PROGRAMS

By

William P. Gulledge
Front Royal Group, Inc.

Introduction

As Congress continues the process of amending the Clean Air Act and more attention is given to the problems implementing the Superfund and hazardous waste disposal programs, emphasis has returned on the role and responsibility of the private sector to implement effective waste minimization and environmental control programs. Members of Congress, environmental professionals, business owners and operators, and environmental regulators are increasingly responding to the need for more private sector initiatives that supplement or more effectively implement regulatory environmental standards. This trend is not new, but is steadily building on programs proposed during the 1970's and early 1980's. It is a trend that will increase as evidenced by the growing interest worldwide in market-based environmental controls and by the more active scrutiny of potential environmental exposures by insurance companies and lending institutions.

Building on the Foundation Established by Regulatory Environmental Management

What initiatives have been developed to respond to the public's call for more effective environmental controls and what forces have created these initiatives? Three new environmental management roles are evident. The first is the influence insurance and financial lending institutions are beginning to

have on the setting of additional environmental standards or in response to requirements to satisfy financial responsibility. Insurance companies are beginning to assume a more proactive risk management stance by requiring certain technologies or environmental management practices or certifications as an underwriting condition for environmental impairment liability (EIL) insurance. Lending institutions are similarly requiring site assessments and in some instances, cleanup of contaminated property as a condition of a commercial mortgage loan or extended line of credit.

The second proactive influence is the adoption by some companies of more specific, measurable environmental policies and programs. Many of these programs are based on the need to minimize waste production, and specific goals and objectives to reduce the volume of certain wastes, i.e. landfilled residuals or toxic air pollutants, have been established. The third proactive initiative incorporates the entities which have been created by pooling corporate resources to complement existing government programs. Cleanup of past land-based residual disposal sites is the best example.

Professional associations are also entering the area of environmental standards setting. Some of these efforts are indirect, such as the certification of specific disciplines of environmental professionals. Other organizations set standards directly for the testing of environmental parameters and for environmental monitoring equipment.

Insurance/Financial Underwriting and Risk Management

Traditionally, property/casualty insurers have established underwriting criteria and guidelines that insureds must meet in order to receive coverage. In some instances, active risk assessment/management programs have been included with the coverage or are used as a qualifying condition to receive

liability coverage. The Hartford Steam Boiler Inspection and Insurance Company is one of the oldest and best known insurers that actively prescribes underwriting conditions and risk management. Hartford Steam Boiler was created in 1866 and soon became the major insurer for boiler and machinery coverages in the U.S.[1] Loss control specifications and risk assessments are routinely used in providing liability and in limited instances, EIL coverage.

Loss control of environmental risks has now spread into all forms of EIL insurance and certain forms of property/casualty insurance. Using the control of releases from underground storage tanks (USTs) as an example, federal regulations have provided a baseline from which UST EIL insurers can institute proactive underwriting conditions and loss control programs. The U.S. Environmental Protection Agency (EPA) promulgated technical standards effective December, 1988, for all qualifying owners and operators of USTs.[2] Requirements for owners/operators to demonstrate financial responsibility also became effective January, 1989. The combination of baseline technical rules and financial responsibility requirements provide insurers an effective base to establish loss control programs and a market to provide EIL coverage.

Several insurers have used compliance with the UST technical standards as a condition of qualifying for EIL coverage. These standards include timetables for upgrading existing USTs to include leak detection, corrosion protection, spill and overfill prevention, and corrective action procedures. The combination of these technical criteria with site location factors such as groundwater depth, soil type, proximity to other USTs and/or residential areas, and annual rainfall leads to the development of specific underwriting criteria, risk assessment and rating, and environmental risk management.

[1]Best Insurance Reports, Property-Casualty, 1988.

[2]40 CFR Parts 280 and 281, U.S. Environmental Protection Agency.

As an example, put yourself in the position of the insurer and assume you are evaluating the acceptability of a retail petroleum outlet, a convenience store, that was constructed seven years ago. The facility including new tanks, pipes, and dispensers was constructed on the site where a gas station operated by an independent dealer, stood for over 30 years. The old tanks and contaminated soil were removed at the time of the new facility's construction. Reviewing the EIL application submitted by the site owner, you determine that the site in its current condition partially meets EPA's technical standards. The tanks are of suitable construction and age and have a working leak detection system, but spill and overfill prevention has not been installed.

At this point, you may take several actions, and in realty, UST EIL insurers differ in the degree of risk assessment and loss control procedures that are employed. You may take several actions concerning the site's previous contamination. These actions include:

1. Require a site assessment prior to accepting the site for coverage that includes limited soils sampling and analysis to determine if the site remediation was effective;

2. Decline coverage for the site based on the incident of previous contamination;

3. Accept the site for coverage based on the site's newer tank and leak detection system;

4. Conditionally accept coverage if the facility installs spill and overfill prevention devices within a certain time period; and

5. Require a precision tightness test or other monitoring condition prior to accepting the site for coverage to assess whether the UST system presently leaks.

Which of the above options would you select? EIL insurers are taking a more proactive stance to understanding the environmental risks on the specific site level, providing EIL insurance that meets financial responsibility requirements, and working with insureds to develop effective risk management programs. Using the Hartford Steam Boiler precedent for site inspections, certain EIL insurers incorporate site inspection programs into the coverage period. For USTs, the inspection program includes working with the owner/operator to understand the existing condition of the UST system, identifying the potential for future environmental exposures and making recommendations in environmental management techniques and technology to detect and control losses- gradual and catastrophic.

The overall effect of the insurer-owner/insured partnership is that the control of environmental losses is receiving more serious attention, separate and more effectively accomplished than through the regulatory process. Using environmental regulations as a base, a proactive stance to control environmental releases, independent of compliance status, is created. UST EIL exposures are not the only example of the increased role of insurers. The subject could be an asbestos abatement contractor, the operation of a hazardous waste incinerator, the management of an on-site industrial waste disposal facility or a contractor undertaking a remediation project. The insurer's role in developing and implementing risk management criteria will increase dramatically in future years.

Insurers are not the only private sector factor influencing environmental management. Lending institutions dealing in commercial mortgages and revolving lines of credit are

increasingly using environmental assessments to pre-qualify commercial and industrial properties. As with USTs, certain statutes and regulations have set a baseline for lender liability. An increasing number of statutes require landowners to conduct a due diligence inquiry related to a property's environmental condition prior to transfer of title. New Jersey's Environmental Cleanup Responsibility Act (ECRA), state "superlien" statutes, and the Clean Water and Resource Conservation and Recovery Acts address environmental requirements for landowners.

It is clear that any party to a real estate transaction can be liable for hazardous substances.[3] Under Superfund, a due diligence defense is available, but the defense requires that the landowner did not and had no reason to know of any hazardous substance on the property after conducting an inquiry consistent with good commercial or customary practices. To uncover potential Superfund liabilities, many lending organizations and their members use environmental site assessments. Typically, a Phase I site environmental assessment is performed as part of the loan underwriting process. The Federal Home Loan Bank Board's Office of Regulatory Activities (ORA) describes the site assessment process as follows:[4]

- Phase I Review- historical review of property uses and improvements; walkover of property; review of any health or environmental citations for the site; proximity to a site on the Superfund National Priorities List; review of hazardous substances storage, manufacture or discharge on-site; and other evidence indicating contamination;

[3]See Tanglewood Homeowners v. Charles Thomas, 849 F. 2d 1568 (5th Cir. 1988), and U.S. v. Maryland Bank and Trust, 632 F. Supp. 573 (D. Md. 1986).

[4]See Thrift Bulletin 16, Federal Home Loan Bank Board, Office of Regulatory Activities, February 1989.

- Phase II Review- if a high probability of contamination is revealed from the Phase I Review specific information is obtained on the type and degree of contamination, likelihood of abatement or additional disbursement, and cost estimate for remediation; limited soil and groundwater analysis is typically included with the Phase II Review;

- Phase III Review- a more detailed engineering report covering alternative remedial or preventative activities with cost estimates; normally includes significant environmental sampling activities and analysis and exposure assessment calculations and risk assessment modeling.

ORA recommends that lenders conduct Phase I reviews for the following properties:

A. Construction projects other than one to four dwellings;

B. Industrial properties, properties on land zoned as industrial and properties close to industrial areas;

C. Properties close to or on former gas station sites;

D. Properties with automotive repair or dry cleaning facilities on the premises;

E. Properties adjacent to railroad tracks and underground pipelines;

F. Properties close to or with previous history as dumps or storage sites for hazardous chemicals;

G. Properties containing friable asbestos materials;

H. Properties containing high levels of radon in the soil; and

I. Residential properties that are within a mile of a listed Superfund site, or where historic use of the property or other factors give reasons for environmental concern.

The use of Phase I environmental reviews has made lending institutions take a more proactive stance in discovering existing site environmental contamination. In many instances these actions are being undertaken independent of any specific government regulation. More importantly, discovery of contamination through the site assessment process has lead to many privately financed cleanups that have occurred outside the Superfund liability process. The acquisition and divestiture market has driven many of these cleanups. Compliance with environmental regulations and cleanup standards is only one factor considered in initiating contamination remediation. Lenders are becoming more experienced and knowledgeable on assessing environmental risks and in the process of using environmental reviews, are establishing site profile criteria for judging a site's acceptability for loan underwriting. In a manner, lenders are setting acceptable site environmental conditions and existing environmental management standards. This underwriting function is very similar to the role played by the EIL insurer, but a difference is seen in managing the risk.

While the insurer hopefully has the claims-made insurance policy as the basis for taking a proactive, go forward, risk management stance, the lender must be careful not to exercise "day-to-day management of the business or facility either before or after the business ceases operation".[5] Lenders by getting involved or perceived to be involved in day-to-day operations can be held accountable for Superfund and RCRA liability. "Potential environmental liabilities lurk in many areas of a plant site,

[5]See U.S. v. Fleet Factors Corp. et. al., 29 ERC 1011 (S.D. Ga, Cir. No. CV 687-070, 1988).

and lenders who foreclose on property, either real estate or personal, must exercise extreme caution that they, or their representatives, do not cause or contribute to a release of hazardous substances on the property which will classify them as an operator of the facility".[6] In effect, lenders must be proactive in assessing environmental risks but maintain an arms length relationship in risk management. It is usually very difficult to maintain these two opposing roles.

Corporate Waste Minimization/Reduction Programs

While Congress and the EPA have fought over implementing environmental control programs, the public's interest in environmental issues has grown steadily during the last decade. Highly publicized incidents such as the contaminated sites at Love Canal and Times Beach and the toxic air emission catastrophe in Bhopal have certainly heightened public interest. Other recent concerns include the threat of increased incidents of cancer caused by environmental exposures that are both natural (radon) and man-made (industrial emissions).

Corporate interests worldwide have responded to the public's concern in both positive and negative statements. For the most part, responsible business owners and operators have responded in a positive manner by increasing their knowledge on environmental exposures that may be caused as a result of their operations. Many companies and several trade associations have adopted policy statements backed by increased environmental management programs to understand and where necessary, reduce environmental risks. Two of the best examples of corporate risk reduction are the management of toxic air pollutants and reducing land disposal of hazardous wastes.

[6]Richard H. Mays, "Secured Creditors and Superfund: Avoiding the Liability Net", Environment Reporter, July 28, 1989.

Again, as seen by the insurer and lender examples, an environmental regulation in many cases serves as a base to initiate risk assessment data. Section 313 of the Superfund Amendments and Reauthorization Act requires manufacturers falling within certain Standard Industrial Classification Codes to report on an annual basis, toxic chemical releases to environmental media and off-site treatment. While estimates of releases into the air were widely used for the first reporting years of 1987 and 1988, these estimates do provide industrial environmental managers a baseline to work from. Monsanto provides an example of one corporation which established an air emissions reduction program using the Section 313 reporting as a base.

In June of 1988, Monsanto announced a corporate goal for their facilities worldwide of reducing air emissions reported under SARA Title III by 90 percent by the end of 1992. Monsanto is working towards the ultimate goal of zero emissions. Each of Monsanto's operating divisions created groups to assess existing emissions on the Title III emissions list, identify projects for changing industrial processes if necessary, identify changes in operations, and review new control technologies currently available. Specific emission reduction plans have been developed for plants and processes.[7]

While goals and programs are desirable, how effective has Monsanto's program been to date? "For 1987, Monsanto reported approximately 20 million ponds of Title III air emissions for its U.S. operations. For 1988, Monsanto has reported...15.9 million pounds", showing "an overall reduction of 17 percent". Reductions were reported using a combination of process changes, recycling, and "substitution to more efficient product recovery

[7]Charles D. Malloch, "Air Emissions Reduction Programs, The Right Thing To Do", Air Pollution Control Association, October 1988.

systems".[8] Like several other large manufacturers, Monsato has initiated waste reduction and elimination efforts on all organic and toxic inorganic process waste streams.

Companies such as Monsanto have voluntarily committed to reduce toxic air emissions. Using the Title III emissions list, a baseline has been established to reduce potential environmental risk. Advocates are pleased that Monsanto has responded to a large in volume, partially unregulated environmental exposure. Skeptics will contend that Monsanto acted knowing more stringent toxic air emission standards will be contained in Clean Air Act Amendments. It really doesn't matter since it is clear Monsanto proactively improved without regulatory interaction, its management of this environmental risk.

Minimizing land disposal of waste materials has also received a great deal of corporate attention. Again, the land ban requirements promulgated under RCRA have served as a base for corporate initiatives. More importantly, market factors have made land disposal prohibitively expensive. Many companies whose processes produce toxic organic wastes have turned to the use of on-site incineration as an alternative to land disposal. Processes designed to recycle process wastewater have also been initiated to reduce the volume of this high volume, generally, low toxicity waste. Effective waste minimization programs are still in the developmental stage. By design, many have been developed with a proactive focus that is independent of regulatory programs and serve an important environmental management purpose.

The Superfund Problem- How Do We Pool Our Resources

Can private sector initiatives be used to handle past disposal problems? How can the initiatives developed by large

[8]Monsanto Chemical Company, "Progress Report on Monsanto's 90 Percent Reduction Program", July 1989.

corporations be translated to the owners of smaller businesses? What incentives can be offered to all entrepreneurs that may greatly enhance environmental risk reduction? These important questions are at the center of the current debate on Superfund's effectiveness.

Most environmental professionals will agree that Superfund is not working to aggressively cleanup listed disposal sites. Many problems have been identified in the federal and state administration of Superfund. In September, 1989, The Superfund Coalition, a group of Superfund PRPs and insurers led by former EPA Administrator William Ruckelshaus, released a study of the program's effectiveness. The results discussed in the announcement of the study associated with Superfund's implementation included:

1. Extensive litigation and legal maneuvering that delays actual cleanup activities;

2. Can cost-benefit analysis be effectively used on Superfund sites;

3. There are no data or systematic study to evaluate Superfund's effectiveness during the last decade;

4. The number of PRPs and willingness to cooperate is a major factor affecting the pace of cleanup; the notoriety of the site has little effect on cleanup pace;

5. Individuals preparing corrective action plans should evaluate their confidence that remediation selected will actually achieve target cleanup goals given uncertainties in site and technology characteristics; and

6. Site by site precedents may be needed to establish effective cleanup criteria.

During the announcement by the Superfund Coalition, Senator Pete Domenici attacked Superfund as a "lawyer's relief act" inviting litigation. He advocated a return to the public works concept described in the Superfund amendment proposal advocated by the American International Group (AIG). AIG introduced the concept of the National Environmental Trust Fund in March, 1989.[9] To summarize, AIG makes the following points in support of this new public works program:

1. Companies are being held responsible for wastes disposed decades ago, when our current set of environmental laws and regulations did not exist; in most cases these companies were not acting in a deliberate or irresponsible way;

2. It may cost between $150 to $700 billion to clean up all sites requiring corrective action;

3. Too much money is being spent on trying to identify PRPs;

4. 30 to 60 percent of all funds spent since 1980 on environmental matters has gone for legal expenses;

5. In "writing general liability policies in the past, insurers did not assess any risks related to gradual pollution, nor did they include in the overall premium any charge for such risks";[9]

6. A new approach, The National Environmental Trust Fund will spread cleanup costs more broadly and reduce legal expenses;

[9]Maurice R. Greenberg, "Financing the Clear-up of Hazardous Waste: The National Environmental Trust Fund", March 2, 1989.

7. The Trust would be financed by a separate fee added to all commercial or industrial property/casualty insurance premiums with a similar mechanism for self-insureds; and

8. The U.S. Environmental Protection Agency would administer the Trust and associated cleanup activities;

Is the National Environmental Trust clearly a private sector initiative designed to effectively supplement or replace current efforts? Is AIG's proposal self-serving? Are there alternative options available that may include private initiatives for accelerating cleanups?

Certainly the existing system is flawed, and change is needed. Society needs to continue moving forward, with a minimum of legal delays, to meet obligations to finish the cleanup of past industrial disposal. However, is the creation of a new public works program the best mechanism to meet our responsibility? Creating a new National Environmental Trust Fund and corresponding cleanup program administered by EPA will not enable faster or cheaper cleanups. The private sector is not being offered any incentive to participate. In the absence of any additional reforms to the present Superfund program, the new Trust would stifle any momentum the existing cleanup program now has and serve as a disruption by creating new regulations for eligibility, corrective action, cost reimbursement, etc.

The Trust will also not relieve American industry of its financial burden or necessarily enable additional jobs to be created in America. The lessons of the construction grants program under the Water Pollution Control Act and early Superfund implementation show that the exact opposite effect occurs. Public service programs rarely create industrial jobs. Positions are created in the services sector, typically consulting engineering, to help in the administration of the public program.

The private sector has an incentive and strong interest to assist in developing cleanup technologies and to conduct cleanups faster, more effectively, and cheaper. As shown by the earlier example in this article, insurers have an important proactive risk management role in waste disposal. EIL insurers like AIG can influence through underwriting criteria and risk management, the environmental control practices used by small and medium sized industries. These industries typically are interested in protecting the environment, but may not have the knowledge or resources to develop updated environmental management procedures. Insurers can assist with environmental risk management and offer EIL coverage as needed.

More and more, public interest groups and private sector interests are forming partnerships in cleaning up past disposal practices. Placing the burden on insurance policy holders to fund and EPA to administer another massive cleanup effort is not responding to the public's strong interest in a clean environment. Clean Sites was created in 1984 primarily by private corporations pooling resources and provides "active assistance to bring about the cleanup of waste sites by those responsible for them, in the areas of mediation and cleanup cost allocation, technical review, and management of cleanup and cleanup funds".[10]

While certainly not the answer for every Superfund site, Clean Sites does represent a proactive, independent organization that supplements regulatory efforts and attempts to accelerate cleanup of selected sites. During 1988, Clean Sites was involved at 30 disposal sites including 12 final settlement agreements. The Clean Sites model is important in that it represents a public-private effort to address a serious environmental problem. Even Clean Sites has been criticized for not moving quickly enough on some sites, but similar activities on a more localized level should be encouraged.

[10]Clean Sites, Annual Report, 1988.

Private financing options have also been explored for disposal site remediation. Public-private partnerships have evolved since the Tax Reform Act of 1986 to best utilize private equity and development capacity. Various tools are available to assist the private sector including:

1. "public credit support, backed perhaps through use of a special bond issuance; applied to that purpose, rather than direct cleanup financing;

2. public contractual undertakings with the private partner of a firm ... to constitute credit support;

3. public insurance indemnification or risk adsorption;" and

4. "public financial supplement for projects privately undertaken".[11]

The main point of these efforts is, if the private sector is given an appropriate incentive to participate and exceed the environmental standards established by regulators, the market will respond to this need. New cleanup or control technology standards will not directly evolve from these efforts. Indirectly, more creative and effective environmental management practices designed to reduce environmental exposure risk will originate.

Professional Organizations: Contribution to Environmental Standards Setting

The use of standards developed by professional and trade organizations is now seen in many environmental regulations. Using the technical regulations for underground storage tanks as

[11]Roger D. Feldman, "Paying for Cleanup: Tools for Confronting Environmental Finance Issues", Air & Waste Management Association, March 17, 1989.

an example, product specifications and industry practices developed by the American Petroleum Institute, American Society for Testing and Materials (ASTM), National Fire Protection Association, and Petroleum Equipment Institute are all referenced in EPA's regulations. Most of these specifications and practices relate to tank construction and UST system and leak detection installation. ASTM has developed two new draft methods for using release detection devices with USTs and evaluating the performance of release detection systems for USTs.[12]

Other professional associations such as the Air and Waste Management Association, National Association of Environmental Professionals (NAEP), and Water Pollution Control Federation hold annual conferences and specialty meetings addressing a wide range of environmental issues. In the insurance arena, the Risk and Insurance Management Society and College of Chartered Property Casualty Underwriters address pollution issues and available insurance to address these issues. NAEP also maintains a certification program for environmental professionals which is based on professional education and experience.

Other organizations have been established to address all or a portion of the growing use of environmental risk assessments. The Institute for Environmental Auditing and the Environmental Auditing Roundtable are established organizations furthering the professional development and use of environmental audits and the qualifications of environmental auditors. ASTM is in the formative stage of establishing a subcommittee to develop standard methods for conducting property transfer environmental risk assessments.

[12]See "ASTM Guide for Using Release Detection Devices With Underground Storage Tanks", and ASTM Practice for Evaluating the Performance of Release Detection Systems for Underground Storage Tank Systems", March 1989.

All of these organizations have responded to a need to supplement environmental regulatory programs. Like Clean Sites and corporate efforts, professional and trade organizations are not always the answer to effective environmental management. Their progress in developing standards and procedures that may appear to be inadequate can be painstakingly slow; but, most professional organizations offer the desirable feature of having a best professional judgement consensus opinion represented by their products. Professional and trade organizations do contribute directly and indirectly to setting environmental regulations and supplementing those regulations where needed.

Conclusions and Recommendations

Over the last decade the private sector has played an important role in contributing to the reduction of environmental risk. Most if not all of these efforts have been designed to supplement existing environmental regulations. As such, environmental regulations provide a baseline for measuring progress. The regulations have for most environmental media become more stringent over the last two decades, and recent Congressional and regulatory proposals indicate the trend towards more stringent regulatory controls will continue. What has been lacking or clearly inconsistent is an appropriate incentive for the private sector to take a more forceful role in environmental management.

Insurance companies, lending institutions, and major corporations are assuming an active stance in environmental risk assessment and environmental risk management. Given this proactivity (admittingly commitments vary from organization to organization) what future conditions will foster increased private initiatives and accelerate the commitment to reduce environmental risk? Here are my recommendations, none of which are unique and have been advocated by others:

1. Beginning with the current amendment of the Clean Air Act, and continuing with other federal environmental statutes as they are due for amendment, introduce more market-based incentives for pollution control and environmental risk reduction. Emission credits, offsets, emission taxes and other innovative financial programs can be effective incentives to reduce the risk of exposure to criteria and toxic air pollutants. The concept should be expanded into analysis of a total environmental risk (all media) for each site presenting an environmental risk that either is well managed and marketable or should receive regulatory concern.

2. Disincentives that work against private independent proactivity must be prevented or dismantled where they currently exist. For example, a small company that voluntarily reduces toxic air emissions and overall environmental risk should not be penalized for not meeting a technology-based numerical emission standard for technology that is not commercially and cost effectively available. Similarly, an insurer or site owner that has adequately removed contaminated soil and removed all but parts per billion concentrations of contamination from groundwater should not have to continue site activities indefinitely, trying to clean the site to better than background concentrations and unnecessarily monitor the site forever.

3. It is appropriate to continue to strengthen the "baseline" environmental standards being careful not to stifle private initiatives. As environmental risks are reduced, the "baseline" regulations do foster additional proactive efforts to move toward a zero emissions goal. However, a change in CERCLA appears desirable to reduce the incentive of industry to sue insurers for past waste disposal practices. A return to more common law

principles (possibly amended to reduce the absolute causation burden) would be helpful to restore the role of insurers to help control risks from unintended pollution. This will also help alleviate the concern of insurers such as AIG and need for a new waste cleanup public works program.

4. Financial responsibility requirements should be expanded to cover all environmental exposures. "Accountability through liability is meaningless if a polluter is found to be at fault but insolvent and thus unable to compensate his victims".[13] Exposures from underground storage tanks and hazardous waste treatment, storage and disposal facilities are not all the environmental risks of concern to the public. Facilities subject to Title III emissions reporting should be required to demonstrate financial responsibility for all environmental exposures for a given site at a minimum level of $1 million. Lenders and state environmental regulations may exceed this scope and require proof of financial responsibility for other businesses and commercial development projects.

5. Using public/private partnership efforts such as loan guarantees, bond issuance, risk backing and contracts management, and tax credits and incentives, more innovative waste cleanup mechanisms must be created. Businesses wishing to assume title to waste sites and manage cleanups must not be penalized for previous disposal liability and be offered a financial incentive for assuming title and control of the property. Similarly, public monies can be better spent on rewarding innovative cleanup technologies.

[13]Richard L. Stroup, "Hazardous Waste Policy: A Property Rights Perspective", Environmental Reporter, September 22, 1989.

6. EPA must establish better management information systems to capture environmental risk reduction information and communicate that data to regulators and the public. EPA also has a responsibility to expand its basic environmental research role. Too much information is either not being obtained or is sitting in obscure data systems in which the public has no knowledge. The data system containing Title III emissions data is a good beginning. More private initiatives could be encouraged if the public knew of the available information.

Like the AIG proposal, perhaps the main purpose of this article is to generate additional discussion. My recommendations are certainly not simple and need to be extensively researched. Private initiatives have and will in the future play a critical role in environmental management. They are not the total answer. Regulators and public interest concerns also have an important pro-active role to play in reducing exposures contributing to environmental risks. To date, some environmental interests have largely focused their efforts within the halls of Congress and the courts. I, for one, would like to see them expand their efforts in working with the private sector.

1989 CASUALTY LOSS RESERVE SEMINAR

6D: INTERMEDIATE CASE STUDY

Moderator

Gregory T. Graves
Milliman & Robertson

Panel

Andrew W. Moody
Signet Reinsurance Company

MR. GRAVES: Welcome to the Intermediate Case Study. There are just a couple of preliminaries we should get out of the way. This is being recorded, so if you have a question I would ask that you please go to the middle of the room and use the mike. The other thing is, please fill out your evaluation forms and hand them in at the registration desk. If you want to leave them in the back, I'll take them.

The other thing is that both copies of the handouts and the other exhibits that you'll see on the projection screen are in the back, and we would encourage you to take both.

So, having said that, the Intermediate Case Study is supposed to be the final step in the intermediate techniques track. What we are going to try to do today is to show you illustrations of many of the techniques that they've talked about.

We'll have two case studies. The first will be a reinsurance company called Steady Re and the other will be a primary company called XYZ Insurance Company. I should also mention that the work that you'll see here is our own and it doesn't represent the opinions of the CAS, the American Academy, the Casualty Loss Reserve Seminar or our companies. So, basically, if you like what you see, we'll take all the credit and if you don't, I guess we have to take the blame, too.

So, with that, I'll introduce our first panelist. Andy Moody is an actuary with the Signet Reinsurance Company which is part of the W. R. Berkeley Group. At Signet, he is responsible for treating pricing, reserving of all lines and for statutory recording.

Before joining Signet, he held positions at Kramen Forrester and the Aetna Insurance Company. Andy holds a bachelor's degree from Central Connecticut State and is an Associate of the CAS. Andy?

MR. MOODY: Thank you, Greg. Good morning and thank you for coming. I am going to be presenting the Intermediate Case Study for a reinsurance company. As is stated in some of the handouts, Steady Re is in its ninth year of operation which, coincidentally, is the same number of year we've been offering these seminars.

In your initial information, we discover that planning is a very important part of Steady Re's operations. The part of the planning operation that they emphasize most is that of the premium. They want a steady growth of premium year to year, but not by jumps, somewhere in the range of five to ten percent.

They, through the use of this steady growth in premium, have achieved a relatively stable expense ratio at about twenty percent. Again, this premium's steady growth seems to be the company's number one priority. This premium has a particular reporting pattern.

As can often happen with a reinsurance company, when there are late traveling premiums, the premium is recorded in the year that the treaty was written; thirty percent in the next year and ten percent in the third year. Also, we've got some information from the underwriting department.

They have a preferred risk that they like to write and that includes risks with relatively high attachments, but not to be involved with loss of any more than a million dollars. This, perhaps, is an expression of the company's particular expertise. They may know something about these risks or at least more about these risks than they know about some others.

Also, in the original text, you'll see that they talk about an underwriting cycle, within which there are peaks to troughs. A good part of the cycle, as in the one in '87, and the peak, the high loss ratio part, is in '84.

(Slide)

If we go onto Exhibit 1 in the initial handout, there is one thing I particularly want to point out. This exhibit is compiled on an accident year basis. For Steady RE, this accident year basis is not too much different from a treaty year basis. Since they write the treaties primarily on the losses occurring, that is, the covering losses that occur in the coverage period of the treaty; that's opposed to covering losses for primary contracts that attach in that period.

Also, the accident year is very close to the treaty year, because the vast majority of the treaties are written on January 1st. Looking at the exhibit, you can see the manifestation of the underwriting cycle for Steady RE.

They started off with a particularly poor year, but that may be due to the start-up nature of the company, and they show relatively good results in their next few years. The results get much worse and then they improve. Note, however, that overall, their loss ratio is nearly 94 percent, which is somewhat in contrast with the 75 percent which they stated as their goal.

Column 5 gives a display of the premium. Again, except for that start-up year, they've had that relatively steady growth in premiums from year to year. The IBNR in column four that was derived from their initial analysis from the woman who heads up their accounting department, is relatively large.

It's more than half of the incurred losses that they have estimated they will have ultimately on all years combined; that may not be so, since it is a new business and it is reinsurance over a relatively high retention.

(Slide)

Moving on to Exhibit 2, we can see how their losses have developed historically. As they started out, they had a relatively stable reporting pattern of losses; however, moving from '82 to '83, there appears to be some sort of change in the pattern that perhaps shows an improvement in the loss development. Maybe management is hoping that perhaps this kind of improvement is something that they could use in a revised reserve analysis. We'll have to see about that later.

Also note the average factors toward the bottom of the exhibit there, those are factors that are calculated using the dollars by year as the weights for weighting the particular development factors in the second part of the exhibit to draw up those averages.

At the bottom part of the exhibit, you'll see that our accounting person has been relatively conservative in their selection of development factors. She attended a Casualty Loss Group Seminar and picked up the point that it is often good to be conservative in setting our reserves.

The other thing to note is the 1.4 tail factor -- again, relatively high, but probably not out of line with the fact that they write casualty business and at a relatively high layer.

(Slide)

Exhibit 3 shows you a little bit more about how that tail factor was derived. The exhibit is based on a comparison of Steady RE's development pattern to the Reinsurance Association of America's pattern. A comparison of those two patterns shows that Steady RE's -- the RAA factors are somewhat lower than Steady RE's factors, but there may be some additional information that can be gleaned that might tell you that Steady RE may not be paying out, may not be reporting losses for as long as the REA.

The woman doing the analysis did cut the tail off at twenty years and that yielded, through this calculation, a factor of 1.397, again being a little conservative, and 1.4 being not so different from 1.397. She likes the 1.4.

You may not have all heard of the Reinsurance Association of America. In some of your sessions, I'm sure it's been mentioned to some of you. If you haven't heard it before these last two days, the Reinsurance Association is kind of a trade association for reinsurers.

They compile data on various bases. They show operating results for the industry by company but they also compile, on a biannual basis, a brochure that gives loss development patterns for casualty reinsurance lines on relatively broad categories.

(Slide)

Moving onto Exhibit 4, you can see somewhat of a detailed history of the risks that Steady RE has written. On the lefthand part of the exhibit, you can see the layers that they've written. The first there is a risk where they had a limit of $400,000 in excess of $600,000. Then, if you follow across the exhibit, you can see the history of premiums for each one of those treaties.

The premium levels by treaty date would be of particular note. You can see that the general levels increased at first for some of the treaties that had been written at inception. The levels of premium actually declined through '83 and perhaps through '85. Coincidentally this does seem to coincide with the underwriting cycle.

The premiums shown on the bottom of the exhibit again demonstrate the objectives of the company. They have this staging of premiums from year to year. These premiums are slightly different than the premiums you saw in the first exhibit there. They are the treaty year premiums, inception to date, so everything collected to date for those particular treaties is what is shown at the bottom.

At this point, we have the analysis from the accounting department and she has had some help from their public accountants. Now, we have been posed with this question. We've been offered a job with Steady RE and we are particularly concerned about their reserve adequacy, primarily perceived differently than the analysis that was shown to date.

Do you have any questions or suggestions to that end? Are there particular clues that you might have picked up in the narrative?

QUESTION: My name is Paul Roland with Pilot General Insurance. I would like to make an observation and that is, looking at the treaties that they had written, there was quite a dip in the middle years in terms of the average attachment points. Certainly, some division of the data or comparison to industry development patterns for treaties with different attachment points would be in order.

ANSWER: I think that is one thing we particularly need to look at, how that mix of attachments by year might affect the analysis.

Along with that split of attachments, perhaps we might want to do something a little bit different. We might want to use different tail factors if we do something differently with high attachments.

The other thing that I think is particularly noteworthy is the premium reporting pattern. That demonstrates that perhaps the premiums have not been fully developed and we will have to do something with those premiums, as we continue through the exhibits. We do want to segment the data.

(Slide)

As we go on to Exhibit 5, we'll talk about that somewhat. There are various ways you can segment almost any data. Some might be worthwhile; some might not. For treaty reinsurance, you might consider splitting the experience by line of business, but that might not always be the most fruitful thing to do.

After some additional conversations we've had with the underwriting department, the treaties are multilined and there are no real incentives for the company to split them up in any kind of great line definition. The annual statement gives a company the ability to report things as something of a lump.

As you recall back on the list of treaties on Exhibit 4 and the underwriting guidelines, the underwriters do express a desire to write only treaties with attachments of $200,000 or greater, so perhaps this is a good measure we are using for dividing the data up.

Again, this expression of desired attachments may be a description of some particular underwriting expertise the company has, again supporting that, as it supports the data. This next statement of the exhibit has a typo in it.

It should say, "The portion of the book that is written in the lower retentions, varies from ten percent in 1980 to sixty percent in 1984." This is just exactly what you were pointing out. This also coincides with the change in the pay-out pattern and the change in the loss reporting pattern, as we saw in Exhibit 2.

So, what we should do and what we intend to do is split that data from Exhibit 2 out into its separate portions for higher and lower. When we do this splitting, any time you take data and cut it up into individual parts, there is a possibility, depending on how many splits, that we may end up with some credibility problems.

To that end, if you end up with some problems, you may have to go to some auxiliary data source. As you saw, we went to REA for tail factors and other sources that might be factors that are sometimes published.

Moving on, we can talk about some additional reasons to adjust the tail factors in Exhibit 6.

(Slide)

We've gotten some further information from discussions with the underwriting department and as it turns out, most of the steady development is from new claims, not case development, so this might give you a shorter tail than what we might get from

industry data as a whole. It has generally been observed that industry's case reserves are somewhat short.

Also, the claim count development has been negligible after five years for the lower attachments and six years for the higher attachments, geared to the type of business insured. The total development has been moderate after six years, due to the fact that the claims are reserved at the treaty limits.

Total development after six years for the lower attachments is now split out. It is now running below the development figures in the REA. Another thing about the REA data is that it is predominated by a few giant reinsurance companies, and it is believed that those reinsurance companies generally write more hazardous business at higher limits. So, it might be expected that Steady RE would have a somewhat shorter tail than the REA.

Much of what we talk about here has to be acquired judgmentally. Certainly, when we talk about a tail at 18 years below attachments and 19 years, with the higher attachments, is somewhat judgmental, but we have these supporting resources.

(Slide)

As we move on to Exhibits 7 and 8, we can see what happens when we start to split the data. Exhibit 7 shows the detailed history of the high attachment treaties. Note the change in the premium levels at the bottom of the exhibit. That level of premium declines through '84 at the (inaudible) and then it increases as we continue; that premium level increases as we continue.

Exhibit 7(b) shows the result of analysis. Note that in column 2 we are using higher development factors that we were using in Exhibit 1. This is not an unreasonable thing to have happen since now we are talking about separating out the higher attachment risks, which generally you would expect to have a longer tail.

The tail factor has not changed and the reasons for that are somewhat the reasons that we talked about in Exhibit 6. The development factors are still quite high. Another oddity to note is in Column 6. The underwriting cycle, except for that first start-up year, seems to be less marked. There are smoother results from year to year and, overall, the loss ratio, while still not the 75 percent, is closer than the (inaudible) percent.

(Slide)

Exhibit 7(c) shows the development of the reporting pattern. Now, Steady RE is living up to its name. They have the incredibly stable reporting pattern of losses and, therefore, the selective pattern is the same as the average pattern, again, using the same tail factor.

(Slide)

Moving onto Exhibit 7(d) where we see the comparison between the REA and Steady RE, you see that now there is an even greater differential between the REA factors and the Steady RE factors but we recalling the comments from Exhibit 6, we are still going to use a somewhat shorter tail even though Steady does seem to have high factors. They may just have slower reporting, I don't know, but through the calculation, a factor of 1.404, again not too different from the selective factor.

(Slide)

Going through the same exhibit for the loss estimates, making the same observation on Exhibit 8(a) as we did on Exhibit 7(a), we trace the cost of premiums at the bottom of the exhibit. We can see that there is a peak in the premium at the high loss ratio. Then, there is an upward jump, again, in the premium volumes in the less preferred kinds of risks for Steady RE, perhaps making you wonder if we're not going into another underwriting cycle.

(Slide)

On 8(b), we see again the results of the reserve analysis for this portion of the book. But now we are using lower development factors, as you can see in Column 2 and, again, the relative size of these factors makes sense. Again, we are taking out the higher attachments, leaving a book with lower attachments and leaving us to expect that we might get some lower factors, on average.

Again, looking at Column 6, when we looked at the high attachments, we saw a smoother underwriting cycle. Here, we see a somewhat more volatile underwriting cycle. That could perhaps be a bit disturbing, although we still see an improvement in the loss ratio, down to 89, an improvement, but not really a great improvement.

(Slide)

Exhibit 8(c) shows the development patterns again and wonders never cease. These factors are, again, very steady.

(Slide)

On 8(d), we developed a tail once again for this section of the book. We see that now, Steady RE's development pattern, incurred loss development pattern for this portion of the book is, indeed, lower than the REA factors, the REA factors being higher. We go through the calculation using the relativities of the two sets of factors and we come up with a tail of 1.2.

(Slide)

Combining those two reserve results, of the low attachments and the high attachments on Exhibit 9, and you see the overall result. This exhibit is pretty much just adding up the dollar amounts from the similar exhibits in Exhibit 7 and 8, with one change. That's the premiums that you see in Exhibit 5 -- I mean, in Column 5.

What we did with these premiums is that instead of expressing them on a calendar year basis, we were expressing them now on an accident year basis and pushing premiums back to more close to in the years so that they are matched to the years in which the losses occurred.

In the first exhibit, Exhibit 1, you saw that for 1980, there was $300,000 of premium earned, or there was $300,000 reported, only sixty percent of the 500,000. There was really more actually confirmed in that period but the company just hadn't received it, so now we are pushing those premiums back to be more closely associated with the corresponding losses.

Also, we are developing those premiums for the accident years of '86 and '87 because the premiums reported to date for those two years have not been reported as of the ending date, so we need to add those premiums back in to produce a more accurate picture of the operating result in those years.

If we look on down Column 6, we'll see that, again, the underwriting cycle seems to have lessened somewhat than the cycle that was exhibited on Exhibit 1. Also, now, the loss ratio in Section C is much more in line with the plan, roughly 78 versus the 75 that we talked about in the initial handout.

Also, we have reduced the IBNR. We have lowered the tail factor for a section of the business. We have applied more appropriate, or hopefully more appropriate, development patterns for the two segments of the business, and this has resulted in a reduced indicator of IBNR, a reduction of about a half a million dollars.

(Slide)

Going on to 10, we wanted to develop a second opinion on the needed reserve analysis. To do that, we apply the Ferguson method. Again, the premiums in Column 1 are the same as the premiums that we displayed in Exhibit 9, as those development premiums pushed that to the appropriate accident years.

As is necessary for the Bornhuetter-Ferguson method, we calculated some initial expected loss ratios for the different accident years. These loss ratios were perhaps derived from ISO data or some of the REA data that I alluded to earlier. Working through the Ferguson calculation, we get the expected losses as being a product of the year-in-premium times the initial expected loss ratio, and the expected percentage unreported. Those factors are derived directly from the factors that we calculated in Exhibit 9.

Again, this test shows a lower indicator of IBNR now and, also, if we look at the underwriting cycle displayed in Exhibit 8, again, it is more smooth, still a definite cycle, but more smooth than we saw in our first exhibit.

Combining these two reserve analyses, we want to try to use the strengths of each of the two tests. The Bornhuetter-Ferguson method is perhaps a little more appropriate for years that are less mature, loss development to date. It doesn't hold as much information for the '88 and '87 years as it does for some of the prior years.

So, if I use the weighting of these two methods, we are heavily weighting the Bornhuetter-Ferguson method in '88 and those weights are declining as we go back into the older years. Again, we have that reserve redundancy as compared to the initial indicated IBNR amount. We've reduced the IBNR need by more than half a million dollars, again.

The one oddity that this exhibit presents is that you may note that the selected ultimate losses, in total, are less than either the totals in Column 1 or Column 2. That comes from combining the two tests and the relative weights across the years.

In particular, in '88 and somewhat in '84, we are giving a relative higher weight to the Bornhuetter-Ferguson method which actually shows lower results in those two years than does the regular triangulation method; that kind of weighting gives rise to this anomaly of the sum of the two or the total of the two being less than the sum of the parts. It is a little unusual.

At this point, if you have any questions, please feel free. If you have questions, please step up to the mike so that we can record you. Also, if you have any suggestions about what else might have been done in this analysis, please let us know.

(No response.)

In that case, I guess we'll move on. Greg Graves will be presenting a case study for a primary company. Greg is a consulting actuary with Milliman & Robertson in their New York Office. His clients include both primary and reinsurance companies with projects dealing with such areas as reserving, pricing, litigation support and new product development.

Prior to M&R, he held positions with St. Paul Reinsurance, Beneficial Insurance Group, John Hancock Reinsurance and Hansen (phonetic) Reinsurance Company. He holds a bachelor's degree in mathematics from the Massachusetts Institute of Technology and is a fellow of the CAS and a member of the American Academy of Actuaries. Greg?

MR. GRAVES: Good morning, Andy. Thanks for coming. I am going to be talking about the XYZ Insurance Company. I will start by reviewing the materials you have in your handout and then go forward from there to see what kinds of things you want to look at.

As the handout says, XYZ Insurance Company is a self-insurance company which writes general liability policies. It has been in business for 26 years and has had a very stable book of business. In fact, it says there that in recent years, it has virtually the same group of insureds year after year.

It is perceived in the industry to be a well managed company with a healthy balance sheet. Initially, you were given four exhibits.

(Slide)

The first exhibit is the balance sheet. This is the balance sheet with the IBNR reserves, I should point out. You will notice what appears to be a fairly well managed and strong company. The assets are approximately $529 million; liabilities are approximately 445 million, resulting in a surplus of roughly 85 million.

I have listed some key ratios and some information at the bottom to kind of illustrate the strength of the company. You will notice that five out of the six are best tests. Premiums and surpluses are under three; agents' balances, the surplus is healthy.

Reserve surplus is not a best test, but it's an important thing to consider and for a company such as this, I would like to see something under four so this qualifies there. Liquid assets is under one, so that's very good, and the chain surplus and one year reserve surplus are also very good. So, we have a fairly strong company here.

We also have a little bit more information. You know that in the past, XYZ had its own in-house actuary who was responsible for doing the reserve studies, but this individual recently left the company so XYZ has employed you, a consulting actuary, to conduct their reserve review and give them an opinion on the appropriate IBNR reserve they need.

You also are told that XYZ's former actuary calculated reserves using both a paid and incurred loss development method and he did this to study all the business combined. Management, however, was a little bit concerned about the last couple of years of loss development, as we'll see in Exhibit 2.

(Slide)

Exhibit 2 is a basic loss development study using incurred losses and ALAE, and I'd just like to take a moment to show you how this is laid out. In the top half of the exhibit, you see the dollar development by accident year. In the bottom half of the exhibit, you see the loss development factors along with the selected factors. Resulting from this, in the upper right hand corner, you see the projected ultimate losses in ALAE.

I'd like to call your attention to the last two diagonals of the loss development factors. The second to the last shows factors that look a little low relative to prior years, while the latest diagonal shows factors that look a little high relative to prior years. Therein lies the concern. The company thinks there may be something going on there but doesn't know exactly what it is, and that's certainly one thing they'd like you to comment on.

(Slide)

Exhibit 3 is laid out precisely the same way but it is based upon paid losses and ALAE. Here, if you look at the last two diagonals, you don't see any real differences from prior years. The second diagonal doesn't look particularly lower than any of the prior and the latest diagonal doesn't look particularly higher. You don't see the same kinds of patterns there, and that's of concern to them, as well.

(Slide)

Exhibit 4 is the company's selections which aren't as high as the reserves held on Exhibit 1's balance sheet. You will see the first column is a paid basis answer; the second is the incurred basis; and, those come directly from Exhibits 2 and 3. We notice that for the last few years, in 1987 and '88 in particular, the paid basis answer is much higher than the incurred basis answer. For the years before that, you don't really see a great deal of difference.

So, there is definitely something going on here. It certainly appears that there is, and this is something that we need to take into account. Now, I'll also mention that they told you that prior to the years '86, they gave equal weights to the paid and incurred basis to come up with the selected ultimate, but being the conservative group that they are for '87 and '88, they gave a 75 percent weigh to the higher paid basis answer.

So, they think that there is something going on. They think that they have done something reasonable to react to that but they really want to understand why that looks the way it does. Now, at this point, I know you all spent many hours looking at this handout, so I'm sure you all have many comments, anything that hits anybody in terms of what you might suspect might be driving the differences in those numbers. Anybody?

QUESTION: (Inaudible)

ANSWER: That's a good point. Why would you suspect that?

QUESTION: Just to see a sudden change in curves.

ANSWER: Okay, that seems reasonable. Anybody else?

(Inaudible)

GRAVES: That would relate to that point, as well. So, we think there might be something with the reserve adequacy, okay? After you receive additional information, you arrange to speak with company personnel because, obviously, you don't have enough knowledge about what is going on here.

Your first stop is in the claims department. As was mentioned, there is a new claims manager who started in 1987. This manager is a very cautious fellow. He believes in waiting for complete facts on a case before setting up a reserve. He doesn't believe in setting up low initial reserves.

He also tells you that he just completed work on a new report. He is relatively new, so he is trying to impress and he's trying to do the best job he can. This new reporting of the data base has never been used before to do any analysis; it was really completed after the in-house actuary left. You certainly don't have any data yet. You know it exists now, but that may be something that will be helpful in determining whether or not there is a case reserve adequacy problem.

Your next step is the underwriting department. Maybe you are a little skeptical, but they are so good and they are such a good servicing carrier that they can keep every single client year after year; that's something you want to make sure that someone else tells you.

The underwriters do say yes, indeed, we do have a very stable client base. Basically, we insure manufacturing and contracting type risks. We insure manufacturers of machines and that's our niche; that's what we understand; that's what we do well.

There are basically two categories for these manufacturers. One concentrates on the heavy duty variety of components, which are used by the larger industrial plants, while the others make a less heavy duty version that's used by smaller plants. They also tell you these companies are very healthy; they have very steady growth and, particularly in the last couple of years, very fast growth in that large industrial plant has been noted.

So, again, let's recap what we know so far. As was pointed out, the curve triangulation yields significantly lower answers than the paid for the last two years. You have a new claims manager. You have a stable client base, but they do different things.

Given this, do any other things come to mind that we might want to look at?

QUESTION: You'd like to segment your data based on your type of client.

ANSWER: Why would you want to do that?

QUESTION: Probably (inaudible). Then all of these different liabilities (inaudible).

ANSWER: I see, okay, so they have a different reporting pattern. Yes?

(Inaudible)

QUESTION: So you think we should do something separately by ALAE. Those are very good ideas. In fact, the consulting actuary decides to act on two of them.

First of all, he is concerned about case reserve adequacy. He thinks maybe he can use that new reporting data base for some good. He thinks maybe the Fisher-Lang method might be helpful. The other thing that was pointed out was segmenting the data; that seemed to make some sense. It may not yield anything, but it is something that we should consider.

Let's talk a little bit about the Fisher-Lang method, looking at Exhibit 5.

(Slide)

I'm not going to go into great detail on the Fisher-Lang method. I'm assuming that you are familiar with that somewhat. I will mention some of the more important aspects which you should keep in mind when reviewing these next four exhibits. First of all, most of the parameters can be estimated using paid data only, which is kind of nice because we are trying to do something to determine whether case reserves are adequate and using data which included them would complicate things.

The next thing is that you have two projections to make here, one for average claim costs and one for a settlement rate. The top portion of this shows the average claim costs. Now, these are actual results. These are not projections or estimates. This is what you get out of the data base directly.

You can see there that it is laid out by report year and by age. The zero would imply, for example, that an accident which occurred in 1985 was recorded in 1985 and would have a lag of zero and so on and so forth. So, we see the average claim cost in the top.

The bottom shows the settlement rates. We know we are going to get a number of claims reported. We'd like to know when those will settle up. You can see here that the actual experience is pretty stable. It seems to run its course three years out from the report year, and it looks like we have something like 37 percent after the first -- at the end of the first accident year; 85 percent out to the end, after 24 months, essentially; and, so on and so forth. Now, those are report years and I'd like you to keep that in mind.

(Slide)

Exhibit 6 shows our consultant's estimates to complete those triangles. There are several ways that you can do this. Fisher-Lang has a couple of them, one for the average claim costs and one for the settlement patterns.

I would point out, though, that you want to make sure you do something which makes sense in the context of the situation that you are working in and the data information that you have to work with. Basically, as long as you do something that does make sense and which addresses all of the information you have at that point, that's probably a good method to use to estimate.

So, let's assume that that is the case here, that it is either the Fisher-Lang or something that makes sense. You can see the completed triangles here.

(Slide)

Exhibit 7 shows the report year reserve positions. Let me just outline this. By the way, I designed these exhibits to look exactly like some of the ones found in the Fisher-Lang

paper, so if you are going through that paper later, you will find these verbatim later and I hope that will be helpful if any of you have the need to do that.

This is by report year, as well, obviously. The top row is actual average incurred; that's the actual carried incurred on the cases at the year end '88 valuation point. The next is the estimated average incurred; that's from Exhibit 6; that's the estimate of what data will ultimately look like. Taking the difference of those gives you a margin per claim.

We can see in '85 and '86, there are no real problems. Things look right on the head. In '87, there is a little slippage there of $288, but '88 looks to be a real problem with over $7,000 per case in adequacy, so it appears that there is something really going on there. It's a good thing we had this data to look at.

The next row shows the number of claims incurred. It is just what you received in each report year, and the product of those last two is the report year reserve. So, again, '85 and '86, no problems there; '87, we've got over a million dollars of deficiency which is a lot of money but it's not terribly much a problem; '88, though, is horrendous with $42 million.

So, definitely, there is something going on. At this point, if we want to continue to do anything with incurred losses, we really have to make that adjustment or we are going to get biased answers.

(Slide)

Finally, Exhibit 8 shows the reserve adequacy position. I'll just go through the top block and tell you a little bit about what these things are. Again, this is right out of the Fisher-Lang papers, so you have a source if you want to revisit it.

The December 31, 1985 reserve, that's the calendar year ending '85 reserve, and we have that split by report year components. The outstanding reserve at 12/31/85, which is the first column there, shows the actual held at the end of '85 year for those reports years for the case.

The savings at 12/31/88 shows what has happened to date; that's actually run-off. It doesn't have anything to do with the estimates that we made. You can see that there was a problem with the '85 year. The rest of them looked okay. Because everything is expected to be settled at this point, there are zeros in the current position but that would basically reflect the Exhibit 7 results.

In fact, if you review this, you'll see those numbers in the appropriate places. The reserve position in the next column is simply the sum of those, so this is an exhibit which shows where we think we're going versus where we were initially at the end of -- when we had reported cases, as well.

If you take successive differences between these calendar year points, you get a measure of the strengthening or the slippage in the overall reserve position. So, you can see, going to '86, there's not too much going on there. In '87, there's a relatively large effect, $28 million, and in '88, there's an additional 11 million.

Now, you might say, "Well, where is the 41 million or the 42 million? I don't see that." You will see that if you look. You've got to realize that that was all the report year. This is amalgamations of report years and calendar periods, so you have to be careful

when you are trying to reconcile these exhibits to keep that in mind, but they do tie together.

So, definitely, reserve adequacy is an issue and we have to address that, and that's probably why the incurred method yielded lower results, and the paid was pretty consistent. How do you do this? Well, I'm not going to go into that, either, but I will mention a couple of things.

One of them is similar to the Fisher-Lang, which is in any of these kind of projection situations, you have to do something which makes sense given all the information you have at that point. If you do that and you still come up with something that doesn't look right, you've missed something and that's additional information that you didn't have before.

Basically, as long as you do something that makes sense actuarially, given the information that you have, you'll be all right. The other thing I'll say is that the Berkeley-Sherman (phonetic) paper which some of you may or may not have read, has one probability to do this. It is not the only method but it is a method that you can start with, at least. So, that's one thing. It's a good thing we looked at that reserve adequacy issue.

The other thing is the segmentation of data. Now, first of all, you can decide you agree with our participants here that it would make some sense to segment data into the lighter and heavier risks. Why is that? Well, basically, one cardinal rule to always keep in mind when you're doing reserves is: If there is no change, you probably will capture things; if there is change, you have to make an adjustment.

Obviously, there is change. What is the change? One could say, "It's the same client base. It's the same exact people. Why do I have to worry about?" There is a certain amount of logic to that, but when you think about the fact that the growth is much larger for the heavier duty segment of the book in later years, you might have the same group of clients but you definitely don't have the same book of business.

So, this is one case where you might dismiss that off the cuff to begin with. Be careful. Never assume anything until you have some data to back it up. Now, how are we going to get this data? Do they have this? Well, the claims department manager again is able to actually give you restated triangles and, furthermore, he is actually able to help you in terms of doing something consistent with the reserve adequacy, so he is able to give you some input in addition to recognized methodologies you might want to try. That's probably the best of both worlds. It is probably not very realistic, but it is my example.

So, anyway, we have, in the next four exhibits, the results of that analysis.

(Slide)

Exhibit 9 shows for the lighter risks, the incurred loss development study. Now, this reflects the adjustment for reserve adequacy so, hopefully, you should see a correction or a partial correction, anyway, of those two diagonals.

Indeed, if you look at the second to the last diagonal, those don't look particulary lower than any of the prior ones; in fact, some of them look a little higher The last diagonal doesn't look particularly higher than any of the others. They look more in line.

There is still some noise there and you aren't going to avoid that. The key, when you are doing reserving, obviously, is there is a pattern and there is noise. If you are interested in the pattern and you want to get rid of the noise, this is not too bad. If you had factors that looked like this for your priority assignment, you'd probably have a fairly happy career. So, there is noise there, but there is nothing that makes you suspect something is up.

(Slide)

Exhibit 10 is paid losses. We haven't made any adjustment in the data itself, but we have segmented it, so this won't tie in directly to the other exhibit but if you add this one and the heavier triangle together, you should get the composite that we looked at earlier.

Again, in the latest couple of diagonals, you don't see anything out of order. In fact, you wouldn't expect to because we didn't really make any adjustments to it, unless, of course, there was something else going on in separating the lighter and the heavier. If that happened, maybe you need some more information or maybe you need to make some additional adjustments. That did happen to us in this case, so that's one point for us.

(Slide)

Exhibit 11 shows the heavier risks. This is the incurred basis as well, again adjusted for reserve adequacy. Again, if you look at the last couple of diagonals, there is nothing really much going on there. Some are a little high and some are a little low, but not of the magnitude that we saw before.

(Slide)

Exhibit 12 shows the paid triangles. Again, things look fairly reasonable, fairly stable there. The consulting actuary has made projections on all four of these new sets of data, if you will, and the results are shown in Exhibit 13.

(Slide)

This is laid out in blocks. The line of business one is what we are calling the lighter industry and line of business two is the heavier. Now if you look at the data on an incurred basis, even in the latest couple of years, things don't look all that different, so apparently, we did a fairly good job in making the adjustments for reserve adequacy; that's true in both cases and if you take a look at those, you'll see that that is true.

As a result, we have decided that it makes sense to give equal weight for all accident years in both cases, so the selective is an average of the data incurred. What about that change in the mix of business? Can we see anything there? Well, it is pretty obvious, actually. If you look at the last couple of years, you'll see the ultimate losses are much, much higher than the others, so it seems that it was a good decision that we made to take a look at that, as well.

Finally, all lines are simply the sum of the other two selective ultimates. When we deduct out the incurred to date, we get a needed IBNR reserve of $280 million. The parallel is 239, so it appears that we are short $41 million. That doesn't sound like too much fun. What is the effect of that?

Well, we have a restated balance sheet in Exhibit 14, which is exactly the same data as in Exhibit 1, with the exception that the loss reserves indicated IBNR. Now, you can see that the key ratios don't look all that good; in fact, they look pretty bad. All of the best tests were passes and not failures, and let's run through some of those.

The paid surplus is over five so they are very heavily leveraged there. The agents' balances is very high. Reserves-to-surplus is almost eighty so their leverage is very, very high. Liquid assets is now a fail. Paid surplus, they dropped 43 percent; it doesn't look too good. The one-year reserve development is almost forty percent.

So, here is a company that looked very good. It had been in business for 26 years, had a line of business they know and understand, good underwriters, a claims manager that is gung-ho to do a good job. They were fairly conservative when they did their review and yet, we see now a definitely troubled company and one that really is in need of some attention at this point.

You might wonder, "What is the relative effect between these two things, the reserve adequacy and the mix of business?" I have an exhibit, a final exhibit, which attempts to measure that.
The top section, the paid methodology, says it's paid data and will not have any reserve adequacy effect, so that should give us some measure of what the effect of changes in mix of business is.

In fact, if you look at the bottom half of that top part, you'll see the difference is roughly $19 million, which is six percent above reserves, so that is a fairly large number. It is not forty some odd million dollars, but it is 19, roughly speaking. We'll get into that in a little bit. It's not additive.

What about the other? Well, we went to the incurred methodology and there it will have a bold effect, so maybe we can do something with that data to measure both. One thing we can do for the change in the mix of business is to analyze with the adjustment for reserve adequacy both combined and separately by line of business. That should give us some measure of that.

Since we've corrected for the reserve adequacy, what is left should probably be mostly the mix of business. In this case, you'll see it is also around $19 million, which is also about six percent of reserves, so what is left should be the Reserve ADequacy. Now, there is a typo here.

The difference, change in mix of business, should not be repeated there. It should be "difference due to reserve adequacy." You can see that's very large at $73 million. Both effects are worth approximately thirty percent of held reserves.

Now, again, you say, "I thought you said it was 41 and I don't see 41 here." You have got to remember that these are based upon paid only and incurred only. What you really will have, because we used both in the selection to have something in between the two and, furthermore, since originally, there was more weight given to the page, it should be worded that way.

In fact, if you look at this, you'll see that it is something like seventy percent. If you weighted those two together, seventy percent paid and thirty percent incurred, you would get the 41 million. So, again, when you are working through these things, you have to be careful when you try to reconcile things, to make sure you interpret the information properly.

So, let's recap. What we found was that reserve adequacy and mix of business have a very material effect in our reserve estimates. In this particular case, it may mean the difference between a company going on and going what it has been doing for 26 years or a company having a lot of insurance examiners in there on a regular basis.

So, you might say, "Well, he probably rigged this to make it look really bad." Yes, I made it up. It is not a real company, but I've seen worse, to be honest with you. These things do happen and they can happen regularly. Reserve adequacy -- this is a very extreme case.

First of all, if you had a new claims manager, that would be the red flag if there is a change. Obviously, that's a definite possibility. Probably you would have done something similar to this if you were the in-house actuary at that time. So, this may be a little extreme in relative proportions, but it is something that if you don't monitor and you don't have a system in place at your company, it can get away from you.

The problem is: By the time you detect it, sometimes it can get away from you a lot, and that shows up here. So, at this point, does anyone have any questions or comments about this case?

One other thing I wanted to pick up on is this gentleman's comment about ALAE. I chose not to do something with ALAE, primarily because -- well, first of all, some background. Probably, it is reasonable to expect that there is a possibility that the relative proportions of ALAE and losses for the heavier risks might be higher.

You have the larger industrial plants, which may involve more people, maybe more litigation. It is a good bet that there could be some difference there. If you assume, however, that that ratio remains relatively constant, it might not be a bad thing to treat it this way, so that's what we did.

One thing I will mention, though, in a session I was in yesterday on ALAE, in the later couple of years, there was a definite increase in ALAE as a percent of incurred, so that might be a problem and probably you would want to do something separately on ALAE. It might make some sense to do that.

QUESTION: Why is that GL? That's got a fair amount of tail on it.

ANSWER: One thing is that it's primary. His is reinsurance and mine is primary, so I'm a lot closer to the first dollar. It's not as much of a problem there. The other thing is that I have enough years here so that it is fairly evident in the tail there that things are dying out.

QUESTION: Could you put a tail back on that exhibit, for example?

ANSWER: Yes, you could. You could probably make a case for that. I elected not to, but it is something that I want to make sure that it is clear that it's an issue. I didn't treat it here because I picked two things that I wanted to demonstrate, but it is an issue. It is something you will always consider.

You will have the same concomitant problems as in Andy's case. What could you use for industry data in this case? Probably, you could look at some ISO studies. They do things by the line. Most companies can et their hands on that. That might be a way to go. We

can do some curve fitting; that works well in some of these cases. There are a lot of things to do. But, please, I encourage you to do something.

Any other questions on either of our cases or maybe in how they might be related or how they might be different?

(No response.)

In that case, thank you very much. I hope that we've been helpful. Thank you for coming. Have a good day.

(Applause)

1989 CASUALTY LOSS RESERVE SEMINAR
INTERMEDIATE CASE STUDY
ANDREW W. MOODY, ACAS

In 1989 the Steady State Reinsurance Company of Old Bed Rock entered its ninth year. Steady Re is a company that takes pride in planning their operations for each upcoming year and then meeting those plans. Premium growth is the top priority in these plans. In this fashion Steady Re is always increasing their volume and keeping their expense ratios level at 20%, unlike other reinsurers who are more subject to the whims of the market. As their President says "We chart a steady course and maintain that rock solid heading." This steady course is exemplified in their 5% - 6% growth each underwriting year. It should be noted that an underwriting year's premium is reported 60% in the year written, 30% in the following year, and 10% in the second subsequent year.

Steady Re writes only one line of business, casualty excess and only on higher working layers. At the company's inception in 1980 underwriting standards state that the company will write business with attachments of no less than $300,000 and will participate only up through $1,000,000 of first dollar loss. A maximum limit of $500,000 is also adhered to. Some lower working layer contracts may be written but only for exceptional business.

The senior underwriter for Steady Re feels confident that the underwriting staff has been able to follow Steady Re's underwriting guidelines. Part of these guidelines is that a treaty should have an expected loss ratio of 75% or better to be acceptable. Exhibit 1 shows the results of the latest reserve review for year end 1988; this exhibit seems to contradict his feelings. The inception to date loss ratio is nearly 95% and only two years have loss ratios that are less than 75%. Concern over Steady Re's historical results is particularly strong since their results seem to be even more volatile than the underlying market cycle that had a trough in 1984 and peaks in 1981 and 1987.

However, some optimism has been expressed that results may be better than their latest analysis states. This optimism is due to a change in development factors starting with accident year 1983. Historical development patterns are shown in Exhibit 2. The optimism stems from the possibility that the reporting pattern has undergone some permanent change and that the latest calculation of required reserves may be overstated. One area where a fair amount of judgment has been applied is in the selection of the tail factor (Exhibit 3). Steady Re has assumed that their business is somewhat shorter tailed than the industry in general, as represented by the RAA. This seems may not be justified since Steady Re's development is on average 12% larger than the RAA's for each period.

To date reserve analyses have been performed by the head of Steady Re's accounting area. She has had some guidance from their independent auditors and has attended the CLRS once.

You have been offered the position of Actuary for Steady Re and have said that you will accept the position if you are permitted to do a reserve analysis and find the reserves to be adequate. You have also agreed to provide the analysis to Steady Re whether or not you take the position.

Steady Re has agreed to permit you to do your analysis. You have conferred with the head of the EDP department who tells you that data by treaty is available from inception of the company. However, due to a system conversion in 1985 individual loss data may not be available prior to that date.

How do you proceed and do you accept the position?

Any resemblance between the organizations or individuals described above to any actual reinsurance company or its personnel is purely coincidental.

Exhibit 1

STEADY STATE REINSURANCE COMPANY OF OLD BED ROCK

Casualty Excess

Calculation of IBNR Carried at 12/31/88

Acc. Year	(1) Losses Reported as of 12/31/88	(2) Loss Development Factor	(3) Ultimate Losses (1) x (2)	(4) IBNR as of 12/31/88 (3) - (1)	(5) Calendar Year Earned Premium	(6) Ultimate Loss Ratio (3) / (5)
1980	272,321	1.4000	381,250	108,929	300,000	127.08%
1981	249,900	1.4910	372,601	122,701	465,000	80.13%
1982	250,654	1.5879	398,017	147,363	543,500	73.23%
1983	289,524	1.7785	514,908	225,384	580,500	88.70%
1984	378,000	1.9741	746,208	368,208	614,000	121.53%
1985	262,417	2.7637	725,250	462,833	651,000	111.41%
1986	173,063	3.5929	621,788	448,726	690,000	90.11%
1987	85,000	5.9282	503,898	418,898	730,000	69.03%
1988	54,706	13.6349	745,908	691,202	776,000	96.12%
	2,015,584		5,009,829	2,994,244	5,350,000	93.64%

Exhibit 2

STEADY STATE REINSURANCE COMPANY OF OLD BED ROCK

Incurred Loss & Allocated Expense Incurred Development

Casualty Excess

Accident Year	1	2	3	4	5	6	7	8	9
1980	26,103	60,714	103,125	134,559	193,750	214,286	239,784	255,000	272,321
1981	25,581	59,500	101,063	131,868	189,875	210,000	234,988	249,900	
1982	27,286	63,467	107,800	140,659	202,533	224,000	250,654		
1983	43,765	96,000	156,000	196,706	264,000	289,524			
1984	77,824	162,000	252,000	306,353	378,000				
1985	64,208	135,595	213,563	262,417					
1986	48,551	106,500	173,063						
1987	36,544	85,000							
1988	54,706								

Age to Age Development Factors

Accident Year	1	2	3	4	5	6	7	8
1980	2.3260	1.6985	1.3048	1.4399	1.1060	1.1190	1.0635	1.0679
1981	2.3260	1.6985	1.3048	1.4399	1.1060	1.1190	1.0635	
1982	2.3260	1.6985	1.3048	1.4399	1.1060	1.1190		
1983	2.1935	1.6250	1.2609	1.3421	1.0967			
1984	2.0816	1.5556	1.2157	1.2339				
1985	2.1118	1.5750	1.2288					
1986	2.1935	1.6250						
1987	2.3260							
1988								
Average	2.2355	1.6394	1.2700	1.3791	1.1037	1.1190	1.0635	1.0679
Cum.	12.6047	5.6383	3.4392	2.7081	1.9636	1.7792	1.5900	1.4951	1.4000

Selected Loss Development Factors

	2.3000	1.6500	1.3000	1.4000	1.1100	1.1200	1.0650	1.0650	
Cum.	13.6349	5.9282	3.5929	2.7637	1.9741	1.7785	1.5879	1.4910	1.4000

Exhibit 3

STEADY STATE REINSURANCE COMPANY OF OLD BED ROCK

Comparison of Casualty Age to Age Development Factors

From 1987 RAA Study With Steady Re Casualty Excess Factors

Time in Years	(1) RAA Weighted Factor		(2) Steady Re Factor	(3) % Diff [(1) - (2)]/[(2) - 1]
2:1	2.605		2.236	29.9%
3:2	1.588		1.639	-8.0%
4:3	1.300		1.270	11.1%
5:4	1.190		1.379	-49.9%
6:5	1.109		1.104	5.1%
7:6	1.090		1.119	-24.4%
8:7	1.055		1.063	-13.3%
9:8	1.038		1.068	-44.1%
10:9	1.047	*		
11:10	1.038	*		
12:11	1.035	*		
13:12	1.022	*		
14:13	1.019	*		
15:14	1.027	*		
16:15	1.020	*		
17:16	1.029	*		
18:17	1.014	*		
19:18	1.019	*		
20:19	1.030	*		
. . .				
30:29	0.993			
31:30	1.002			
Average % difference				-11.7%

Notes: RAA factors are average of latest 10 years of factors, separately by line. Then the lines are weighted, using Steady Re losses as weights. RAA Med Mal factors beyond 18 were extrapolated.
Indicated Steady Re tail factor from 9 to 20 years equals
product of asterisked RAA factors, adjusted for the RAA to Steady Re differential: [(1 / 0.883) * .047 + 1] * [(1 / 0.883) * .038 + 1] * . . . = 1.397
A tail to 20 years was selected.

Exhibit 4

STEADY STATE REINSURANCE COMPANY OF OLD BED ROCK

List of Casualty Treaties by Year

Treaty	Reinsured Layer	Earned Premium By Treaty Year - as of 12/31/88 1980	1981	1982	1983	1984	1985	1986	1987	1988
001	400,000 xs 600,000	98,000	102,000							
002	250,000 xs 750,000	195,000	207,500	205,000	176,000					
003	250,000 xs 250,000	50,000	52,500	56,000	55,000	54,000				
004	200,000 xs 800,000	60,000	64,000	68,000	57,000	54,000	59,000	66,000		
005	400,000 xs 600,000	97,000	99,000	105,000	84,000	89,000	90,000	99,000	141,000	93,000
006	250,000 xs 500,000			126,000	103,000	109,000	107,000	119,000	162,000	84,000
007	150,000 xs 250,000				125,000	112,000	118,000			
008	400,000 xs 100,000					61,000	62,000			
009	250,000 xs 250,000					76,000	79,000	110,000		
010	350,000 xs 150,000					75,000	76,000	103,000	67,500	59,000
011	350,000 xs 650,000						79,000	88,000	131,500	71,000
012	300,000 xs 700,000							125,000	173,000	88,000
013	300,000 xs 200,000									85,000
Total Earned Premium by Treaty		500,000	525,000	560,000	600,000	630,000	670,000	710,000	675,000	480,000

Note: Written premiums are reported 60% in the year written 30% in the following year and 10% in the next year

Segmenting Data

It is not possible to segment the data by line of business because most treaties are multi-line and because the underwriters have no incentive to properly allocate the premium.

A look at the treaty list in Exhibit 4 along with the underwriting guidelines suggest segmenting treaties by attachment level (e.g. lower working vs higher working).

- Steady Re's underwriting guidelines indicate a definite preference toward treaties with retentions that are greater than $300,000
  This may imply that these treaties receive differing treatment for underwriting acceptence.

- The portion of the book that is written in the higher retentions varies from 10% in 1980 and 1987 to 60% in 1984. This seems to coincide with the change in loss reporting patterns displayed in Exhibit 2.

- The data in Exhibit 2 could be separated into two historical patterns, one for the lower attachment treaties, one for the higher treaties. Data credibility may become a problem.

- If credibility does become a problem then an alternative might be to use ISO excess limits loss development for the appropriat lines.

- Exhibits 7-a through 7-d and Exhibits 8-a through 8-d show the separated data.

Exhibit 6

Additional Reasons for Selection of Tail Factors

- Most of Steady Re's development is from new claims, not case development. This implies a shorter tail than the industry as a whole.
- Claim count development has been negligible after year 5 (low attachments) or 6 (high attachments) due to the type of business reinsured and to treaty provisions.
- Total development has been moderate after year 6, due to many claims reserved near the treaty limit.
- Total development after 6 years (low attachments) is running below the RAA's.
- The RAA is predominantly based on a few giant reinsurers, who are believed to write much more hazardous and much higher limit business than Steady Re.

The lengths of the two tails 18 years (low) and 19 years (high) are judgmental. However, the above reasons support shorter tail factors than the RAA in both cases while maintaining a longer tail for the treaties with higher attachments.

1196

Exhibit 7-a
(High Attachments)

STEADY STATE REINSURANCE COMPANY OF OLD BED ROCK

List of Casualty Treaties by Year

Treaty	Reinsured Layer	Earned Premium By Treaty Year - as of 12/31/88 1980	1981	1982	1983	1984	1985	1986	1987	1988
001	400,000 xs 600,000	98,000	102,000							
002	250,000 xs 750,000	195,000	207,500	205,000	176,000					
003	250,000 xs 250,000									
004	200,000 xs 800,000	60,000	64,000	68,000	57,000	54,000	59,000	66,000		
005	400,000 xs 600,000	97,000	99,000	105,000	84,000	89,000	90,000	99,000	141,000	93,000
006	250,000 xs 500,000			126,000	103,000	109,000	107,000	119,000	162,000	84,000
007	150,000 xs 250,000									
008	400,000 xs 100,000									
009	250,000 xs 250,000									
010	350,000 xs 150,000									
011	350,000 xs 650,000						79,000	88,000	131,500	71,000
012	300,000 xs 700,000							125,000	173,000	88,000
013	300,000 xs 200,000									
Total Earned Premium by Treaty		450,000	472,500	504,000	420,000	252,000	335,000	497,000	607,500	336,000

Note: Written premiums are reported 60% in the year written 30% in the following year and 10% in the next year

Exhibit 7-b
(High Attachments)

STEADY STATE REINSURANCE COMPANY OF OLD BED ROCK

Casualty Excess

Calculation of IBNR Carried at 12/31/88

Acc. Year	(1) Losses Reported as of 12/31/88	(2) Loss Development Factor	(3) Ultimate Losses (1) x (2)	(4) IBNR as of 12/31/88 (3) - (1)	(5) Calendar Year Earned Premium	(6) Ultimate Loss Ratio (3) / (5)
1980	241,071	1.4000	337,500	96,429	270,000	125.00%
1981	220,500	1.5000	330,750	110,250	418,500	79.03%
1982	220,500	1.6000	352,800	132,300	489,150	72.13%
1983	186,667	1.8000	336,000	149,333	450,450	74.59%
1984	126,000	2.0000	252,000	126,000	327,600	76.92%
1985	94,917	3.0000	284,750	189,833	318,600	89.38%
1986	93,188	4.0000	372,750	279,563	423,900	87.93%
1987	67,500	7.0000	472,500	405,000	587,600	80.41%
1988	24,706	17.0000	420,000	395,294	588,200	71.40%
	1,275,048		3,159,050	1,884,002	3,874,000	81.54%

Exhibit 7-c
(High Attachments)

STEADY STATE REINSURANCE COMPANY OF OLD BED ROCK

Incurred Loss & Allocated Expense Incurred Development

Casualty Excess

Accident Year	1	2	3	4	5	6	7	8	9
1980	19,853	48,214	84,375	112,500	168,750	187,500	210,938	225,000	241,071
1981	19,456	47,250	82,688	110,250	165,375	183,750	206,719	220,500	
1982	20,753	50,400	88,200	117,600	176,400	196,000	220,500		
1983	19,765	48,000	84,000	112,000	168,000	186,667			
1984	14,824	36,000	63,000	84,000	126,000				
1985	16,750	40,679	71,188	94,917					
1986	21,926	53,250	93,188						
1987	27,794	67,500							
1988	24,706								

Age to Age Development Factors

Accident Year	1	2	3	4	5	6	7	8
1980	2.4286	1.7500	1.3333	1.5000	1.1111	1.1250	1.0667	1.0714
1981	2.4286	1.7500	1.3333	1.5000	1.1111	1.1250	1.0667	
1982	2.4286	1.7500	1.3333	1.5000	1.1111	1.1250		
1983	2.4286	1.7500	1.3333	1.5000	1.1111			
1984	2.4286	1.7500	1.3333	1.5000				
1985	2.4286	1.7500	1.3333					
1986	2.4286	1.7500						
1987	2.4286							
1988								
Average	2.4286	1.7500	1.3333	1.5000	1.1111	1.1250	1.0667	1.0714
Cum.	17.0000	7.0000	4.0000	3.0000	2.0000	1.8000	1.6000	1.5000	1.4000

Selected Loss Development Factors

	2.4286	1.7500	1.3333	1.5000	1.1111	1.1250	1.0667	1.0714	
Cum.	17.0000	7.0000	4.0000	3.0000	2.0000	1.8000	1.6000	1.5000	1.4000

Exhibit 7-d
(High Attachments)

STEADY STATE REINSURANCE COMPANY OF OLD BED ROCK

Comparison of Casualty Age to Age Development Factors

From 1987 RAA Study With Steady Re Casualty Excess Factors

Time in Years	(1) RAA Weighted Factor		(2) Steady Re Factor	(3) % Diff [(1) - (2)]/[(2) - 1]
2:1	2.605		2.429	12.4%
3:2	1.588		1.750	-21.6%
4:3	1.300		1.333	-10.0%
5:4	1.190		1.500	-62.0%
6:5	1.109		1.111	-1.9%
7:6	1.090		1.125	-28.0%
8:7	1.055		1.067	-17.5%
9:8	1.038		1.071	-46.8%
10:9	1.047	*		
11:10	1.038	*		
12:11	1.035	*		
13:12	1.022	*		
14:13	1.019	*		
15:14	1.027	*		
16:15	1.020	*		
17:16	1.029	*		
18:17	1.014	*		
19:18	1.019	*		
20:19	1.030			
. . .				
30:29	0.993			
31:30	1.002			
Average % difference				-21.9%

Notes: RAA factors are average of latest 10 years of factors, separately by line. Then the lines are weighted, using Steady Re losses as weights. RAA Med Mal factors beyond 18 were extrapolated.
Indicated Steady Re tail factor from 9 to 19 years equals
product of asterisked RAA factors, adjusted for the RAA to Steady Re differential: [(1 / 0.781) * .047 + 1] * [(1 / 0.781) * .038 + 1] * . . . = 1.404
Tail to 19 years chosen as 10 years beyond current development.

Exhibit 8-a
(Low Attachments)

STEADY STATE REINSURANCE COMPANY OF OLD BED ROCK

List of Casualty Treaties by Year

Treaty	Reinsured Layer	Earned Premium By Treaty Year - as of 12/31/88 1980	1981	1982	1983	1984	1985	1986	1987	1988
001	400,000 xs 600,000									
002	250,000 xs 750,000									
003	250,000 xs 250,000	50,000	52,500	56,000	55,000	54,000				
004	200,000 xs 800,000									
005	400,000 xs 600,000									
006	250,000 xs 500,000									
007	150,000 xs 250,000				125,000	112,000	118,000			
008	400,000 xs 100,000					61,000	62,000			
009	250,000 xs 250,000					76,000	79,000	110,000		
010	350,000 xs 150,000					75,000	76,000	103,000	67,500	59,000
011	350,000 xs 650,000									
012	300,000 xs 700,000									
013	300,000 xs 200,000									85,000
Total Earned Premium by Treaty		50,000	52,500	56,000	180,000	378,000	335,000	213,000	67,500	144,000

Note: Written premiums are reported 60% in the year written 30% in the following year and 10% in the next year

Exhibit 8-b
(Low Attachments)

STEADY STATE REINSURANCE COMPANY OF OLD BED ROCK

Casualty Excess

Calculation of IBNR Carried at 12/31/88

Acc. Year	(1) Losses Reported as of 12/31/88	(2) Loss Development Factor	(3) Ultimate Losses (1) x (2)	(4) IBNR as of 12/31/88 (3) - (1)	(5) Calendar Year Earned Premium	(6) Ultimate Loss Ratio (3) / (5)
1980	31,250	1.2000	37,500	6,250	30,000	125.00%
1981	29,400	1.2500	36,750	7,350	46,500	79.03%
1982	30,154	1.3000	39,200	9,046	54,350	72.13%
1983	102,857	1.4000	144,000	41,143	130,050	110.73%
1984	252,000	1.5000	378,000	126,000	286,400	131.98%
1985	167,500	1.7000	284,750	117,250	332,400	85.66%
1986	79,875	2.0000	159,750	79,875	266,100	60.03%
1987	17,500	3.0000	52,500	35,000	142,400	36.87%
1988	30,000	6.0000	180,000	150,000	187,800	95.85%
	740,536		1,312,450	571,914	1,476,000	88.92%

Exhibit 8-c
(Low Attachments)

STEADY STATE REINSURANCE COMPANY OF OLD BED ROCK

Incurred Loss & Allocated Expense Incurred Development

Casualty Excess

Accident Year	1	2	3	4	5	6	7	8	9
1980	6,250	12,500	18,750	22,059	25,000	26,786	28,846	30,000	31,250
1981	6,125	12,250	18,375	21,618	24,500	26,250	28,269	29,400	
1982	6,533	13,067	19,600	23,059	26,133	28,000	30,154		
1983	24,000	48,000	72,000	84,706	96,000	102,857			
1984	63,000	126,000	189,000	222,353	252,000				
1985	47,458	94,917	142,375	167,500					
1986	26,625	53,250	79,875						
1987	8,750	17,500							
1988	30,000								

Age to Age Development Factors

Accident Year	1	2	3	4	5	6	7	8
1980	2.0000	1.5000	1.1765	1.1333	1.0714	1.0769	1.0400	1.0417
1981	2.0000	1.5000	1.1765	1.1333	1.0714	1.0769	1.0400	
1982	2.0000	1.5000	1.1765	1.1333	1.0714	1.0769		
1983	2.0000	1.5000	1.1765	1.1333	1.0714			
1984	2.0000	1.5000	1.1765	1.1333				
1985	2.0000	1.5000	1.1765					
1986	2.0000	1.5000						
1987	2.0000							
1988								
Average	2.0000	1.5000	1.1765	1.1333	1.0714	1.0769	1.0400	1.0417
Cum.	6.0000	3.0000	2.0000	1.7000	1.5000	1.4000	1.3000	1.2500	1.2000

Selected Loss Development Factors

Average	2.0000	1.5000	1.1765	1.1333	1.0714	1.0769	1.0400	1.0417	
Cum.	6.0000	3.0000	2.0000	1.7000	1.5000	1.4000	1.3000	1.2500	1.2000

Exhibit 8-d
(Low Attachments)

STEADY STATE REINSURANCE COMPANY OF OLD BED ROCK

Comparison of Casualty Age to Age Development Factors

From 1987 RAA Study With Steady Re Casualty Excess Factors

Time in Years	(1) RAA Weighted Factor		(2) Steady Re Factor	(3) % Diff [(1) - (2)]/[(2) - 1]
2:1	2.605		2.000	60.5%
3:2	1.588		1.500	17.6%
4:3	1.300		1.176	70.0%
5:4	1.190		1.133	42.5%
6:5	1.109		1.071	52.6%
7:6	1.090		1.077	17.0%
8:7	1.055		1.040	37.5%
9:8	1.038		1.042	-8.8%
10:9	1.047	*		
11:10	1.038	*		
12:11	1.035	*		
13:12	1.022	*		
14:13	1.019	*		
15:14	1.027	*		
16:15	1.020	*		
17:16	1.029	*		
18:17	1.014	*		
19:18	1.019			
20:19	1.030			
. . .				
30:29	0.993			
31:30	1.002			
Average % difference				36.1%

Notes: RAA factors are average of latest 10 years of factors, separately by line. Then the lines are weighted, using Steady Re losses as weights. RAA Med Mal factors beyond 18 were extrapolated.
Indicated Steady Re tail factor from 9 to 18 years equals
product of asterisked RAA factors, adjusted for the RAA to Steady Re differential: [(1 / 1.361) * .047 + 1] * [(1 / 1.361) * .038 + 1] * . . . = 1.200
Tail to 18 years chosen as 9 years beyond current development.

Exhibit 9

STEADY STATE REINSURANCE COMPANY OF OLD BED ROCK

Casualty Excess

Calculation of IBNR Carried at 12/31/88

Acc. Year	(1) Losses Reported as of 12/31/88	(2) Loss Development Factor	(3) Ultimate Losses (1) x (2)	(4) IBNR as of 12/31/88 (3) - (1)	(5) "Accident" Year Earned Premium	(6) Ultimate Loss Ratio (3) / (5)
1980	272,321	1.3770	375,000	102,679	500,000	75.00%
1981	249,900	1.4706	367,500	117,600	525,000	70.00%
1982	250,654	1.5639	392,000	141,346	560,000	70.00%
1983	289,524	1.6579	480,000	190,476	600,000	80.00%
1984	378,000	1.6667	630,000	252,000	630,000	100.00%
1985	262,417	2.1702	569,500	307,083	670,000	85.00%
1986	173,063	3.0769	532,500	359,438	710,000	75.00%
1987	85,000	6.1765	525,000	440,000	750,000	70.00%
1988	54,706	10.9677	600,000	545,294	800,000	75.00%
	2,015,584		4,471,500	2,455,916	5,745,000	77.83%

Note: (5) "Accident" year earned premiums obtained by triangulation.

Exhibit 10

STEADY STATE REINSURANCE COMPANY OF OLD BED ROCK

Casualty Excess

Bornhuetter-Ferguson Technique - as of 12/31/88

Acc. Year	(1) "Accident" Year Earned Premium	(2) Initial Expected Loss Ratio	(3) Initial Expected Losses (1) x (2)	(4) Expected Percentage Unreported Losses	(5) Expected Unreported Losses (3) x (4)	(6) Incurred Losses To Date	(7) Ultimate Losses (5) + (6)	(8) Ultimate Loss Ratio (7) / (1)
1980	500,000	75.00%	375,000	27.38%	102,679	272,321	375,000	75.00%
1981	525,000	72.50%	380,625	32.00%	121,800	249,900	371,700	70.80%
1982	560,000	72.50%	406,000	36.06%	146,394	250,654	397,048	70.90%
1983	600,000	75.00%	450,000	39.68%	178,571	289,524	468,095	78.02%
1984	630,000	90.00%	567,000	40.00%	226,800	378,000	604,800	96.00%
1985	670,000	92.50%	619,750	53.92%	334,179	262,417	596,596	89.04%
1986	710,000	80.00%	568,000	67.50%	383,400	173,063	556,463	78.38%
1987	750,000	72.50%	543,750	83.81%	455,714	85,000	540,714	72.10%
1988	800,000	72.50%	580,000	90.88%	527,118	54,706	581,824	72.73%
	5,745,000		4,490,125		2,476,655	2,015,584	4,492,239	78.19%

9024

Notes:

(1) obtained by trangulating earned premium.
(2) obtained by estimating the premium adequacy level for each year.
(4) = 1-1/Cumulative age-to-ultimate factors from Exhibit 9.

Exhibit 11

STEADY STATE REINSURANCE COMPANY OF OLD BED ROCK

Casualty Excess

Comparison of Carried Versus Required IBNR as of 12/31/88

Acc. Year	(1) Triangle Ultimate Losses	(2) Bornhuetter-Ferguson Ultimate Losses	(3) Selected Ultimate Losses	(4) Losses Incurred as of 12/31/88	(5) Indicated IBNR (3) - (4)	(6) Carried IBNR as of 12/31/88
1980	375,000	375,000	375,000	272,321	102,679	108,929
1981	367,500	371,700	367,516	249,900	117,616	122,701
1982	392,000	397,048	392,039	250,654	141,386	147,363
1983	480,000	468,095	479,814	289,524	190,290	225,384
1984	630,000	604,800	629,213	378,000	251,213	368,208
1985	569,500	596,596	571,193	262,417	308,777	462,833
1986	532,500	556,463	535,495	173,063	362,433	448,726
1987	525,000	540,714	528,929	85,000	443,929	418,898
1988	600,000	581,824	590,912	54,706	536,206	691,202
	4,471,500	4,492,239	4,470,111	2,015,584	2,454,527	2,994,244

IBNR Redundancy: 539,717

1989 CASUALTY LOSS RESERVE SEMINAR
INTERMEDIATE CASE STUDY

GREGORY T. GRAVES, FCAS, MAAA

BASIC INFORMATION FOR
XYZ INSURANCE COMPANY

XYZ Insurance Company is a stock insurance company writing general liability policies. It has been in business for 26 years, and has had a very stable book of business; in fact, in recent years XYZ has continued to insure virtually the same group of insureds. It is a well-managed company, and has a healthy balance sheet (Exhibit 1).

XYZ had employed its own in-house actuary in the past who was responsible for conducting reserve reviews. This individual has recently left the company, and XYZ has employed you, a consulting actuary, to conduct its December 31, 1988 reserve review.

XYZ's actuary calculated reserves using both paid and incurred loss development factor methods, using data for the entire general liability book.

XYZ is a bit concerned about the last two years of loss development. Exhibits 2 and 3 show incurred and paid loss development, respectively, for the past ten accident years, along with loss development factors. XYZ's selected loss development factors are also displayed. In Exhibit 2, the latest diagonal of incurred factors is higher than for prior years, while the diagonal prior to the latest is lower than earlier years. The latest paid diagonal (Exhibit 3) is somewhat higher than for prior years, but the diagonal prior to the latest doesn't seem to be much different from earlier years.

The resulting estimate of ultimate losses using the paid method is higher than the incurred method for the last few years. Wishing to be conservative, XYZ management's selected ultimate loss gives a 75% weight to the paid methodology and 25% to the incurred for accident years 1987 and 1988, as shown in Exhibit 4.

XYZ hired a new claims manager in 1987. The new manager is a cautious fellow who believes in waiting for complete facts concerning injuries before setting reserves for claims. He also believes in aggressively pursuing claims to insure that XYZ ultimately pays only what is necessary, when it is necessary, rather than simply setting a conservative reserve and waiting for cases to close. He has also just completed work on a new database which allows development on individual claims to be tracked by report date.

The underwriting department reiterates the fact that their client base has remained constant in the recent past. Their clients are companies who manufacture a variety of machine components; some of their clients concentrate on the more heavy-duty versions of these components which are used by large industrial corporations. Their clients have seen steady revenue growth over the past few years; those companies manufacturing the heavy-duty components have realized faster growth in revenues due to increased demand by the large industrial market segment.

CONSIDERATIONS

Issues that you may want to consider when analyzing XYZ's reserves include:

1) claims handling practices used in the claims department

2) characteristics of XYZ's client base

X Y Z I N S U R A N C E C O M P A N Y EXHIBIT 1

BALANCE SHEET AT 12/31/88
(in thousands)

A S S E T S		L I A B I L I T I E S / S U R P L U S	
BONDS	$373,512	LOSS/LAE RESERVES	$306,754
STOCKS	$67,511	UNEARNED PREMIUM RESERVE	$104,432
CASH	$9,050	OTHER LIABILITIES	$33,355
INVESTED ASSETS	$450,073		
AGENTS BALANCES	$29,300	TOTAL LIABILITIES	$444,541
OTHER ASSETS	$50,125	POLICYHOLDER SURPLUS	$84,957
TOTAL ASSETS	$529,498	TOTAL LIABILITIES / SURPLUS	$529,498

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****

KEY RATIOS:	SCORE:	BEST'S TEST RESULT:
PREMIUM-TO-SURPLUS:	2.89	PASS
AGENTS BALANCES TO SURPLUS:	34.5%	PASS
RESERVES-TO-SURPLUS:	3.61	
LIABILITIES/LIQUID ASSETS:	0.99	PASS
CHANGE IN SURPLUS:	10.0%	PASS
ONE-YR RESERVE DEVELOPMENT TO SURPLUS:	15.0%	PASS

XYZ INSURANCE COMPANY

EXHIBIT 2

ALL LINES COMBINED

CUMULATIVE CASE INCURRED LOSSES AND ALAE (000's omitted)

ACC YR	12	24	36	48	60	72	84	96	108	120	PROJECTED ULTIMATE LOSSES & ALAE
1979	11,961	24,624	31,112	36,315	37,447	38,862	40,060	40,185	40,185	40,185	40,185
1980	13,674	27,825	35,777	42,438	43,779	45,149	46,519	46,663	46,663		46,663
1981	16,357	33,012	40,944	48,570	50,119	52,006	53,003	53,403			53,403
1982	18,482	37,978	47,477	56,639	58,782	59,925	61,373				61,655
1983	22,633	44,538	55,101	64,311	66,228	68,314					70,420
1984	24,312	50,724	63,534	72,022	77,087						81,970
1985	28,766	57,440	69,667	83,515							92,382
1986	33,828	61,870	86,283								112,220
1987	31,595	77,793									128,441
1988	40,408										137,997

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LOSS DEVELOPMENT FACTORS

ACC YR	12 24	24 36	36 48	48 60	60 72	72 84	84 96	96 108	108 120	
1979	2.059	1.264	1.167	1.031	1.038	1.031	1.003	1.000	1.000	
1980	2.035	1.286	1.186	1.032	1.031	1.030	1.003	1.000		
1981	2.018	1.240	1.186	1.032	1.038	1.019	1.008			
1982	2.055	1.250	1.193	1.038	1.019	1.024				
1983	1.968	1.237	1.167	1.030	1.031					
1984	2.086	1.253	1.134	1.070						
1985	1.997	1.213	1.199							
1986	1.829	1.395								
1987	2.462									
SELEC	2.068	1.269	1.176	1.040	1.032	1.026	1.005	1.000	1.000	1.000
CUM S	3.415	1.651	1.301	1.106	1.063	1.031	1.005	1.000	1.000	1.000

XYZ INSURANCE COMPANY

EXHIBIT 3

ALL LINES COMBINED

CUMULATIVE PAID LOSSES AND ALAE (000's omitted)

ACC YR	12	24	36	48	60	72	84	96	108	120	PROJECTED ULTIMATE LOSSES & ALAE
1979	5,036	16,398	25,839	31,117	34,687	37,134	38,785	39,666	40,060	40,185	40,185
1980	5,758	18,610	29,406	35,854	40,342	43,268	45,130	46,091	46,519		46,664
1981	6,887	22,146	34,423	41,366	46,283	49,625	51,803	52,844			53,518
1982	7,782	25,309	39,695	47,985	53,981	57,865	60,192				62,262
1983	9,529	30,163	46,439	55,359	61,635	65,926					71,120
1984	10,237	33,614	53,029	63,831	71,526						82,668
1985	12,112	38,688	60,557	73,553							95,262
1986	14,243	46,791	74,793								116,645
1987	17,738	58,999									144,450
1988	22,685										180,558

LOSS DEVELOPMENT FACTORS

ACC YR	12 24	24 36	36 48	48 60	60 72	72 84	84 96	96 108	108 120
1979	3.256	1.576	1.204	1.115	1.071	1.044	1.023	1.010	1.003
1980	3.232	1.580	1.219	1.125	1.073	1.043	1.021	1.009	
1981	3.216	1.554	1.202	1.119	1.072	1.044	1.020		
1982	3.252	1.568	1.209	1.125	1.072	1.040			
1983	3.165	1.540	1.192	1.113	1.070				
1984	3.284	1.578	1.204	1.121					
1985	3.194	1.565	1.215						
1986	3.285	1.598							
1987	3.326								
SELEC	3.251	1.570	1.201	1.121	1.071	1.042	1.021	1.010	1.003
CUM S	7.959	2.448	1.560	1.295	1.156	1.079	1.034	1.013	1.003

XYZ INSURANCE COMPANY

EXHIBIT 4

SUMMARY OF ULTIMATE LOSSES AND CARRIED RESERVES
LOSS DEVELOPMENT METHOD (000's omitted)

ALL LINES COMBINED

ACC YR	PAID BASIS	INCURRED BASIS	SELECTED
1979	40,185	40,185	40,185
1980	46,664	46,663	46,663
1981	53,518	53,403	53,461
1982	62,262	61,655	61,958
1983	71,120	70,420	70,770
1984	82,668	81,970	82,319
1985	95,262	92,382	93,822
1986	116,645	112,220	114,433
1987	144,450	128,441	140,448
1988	180,558	137,997	169,918
TOTAL	893,332	825,335	873,976

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LESS: INCURRED TO DATE (635,024)

XYZ HELD IBNR RESERVE: 238,953

NOTE: PAID AND INCURRED WEIGHTED EQUALLY FOR AYs 1986 + PRIOR;
PAID WEIGHTED 75% FOR AYs 1987, 1988.

XYZ INSURANCE COMPANY EXHIBIT 5

AVERAGE CLAIM COST FOR CLAIMS SETTLED IN INTERVAL INDICATED

ACTUAL RESULTS

AGE OF CLAIMS IN YEARS FROM START OF REPORT YEAR:

AGE (YEARS)	1985	1986	1987	1988
0	18,778	20,565	22,646	24,853
1	18,797	20,585	22,671	
2	19,129	20,948		
3	20,094			

PERCENTAGE OF REPORT YEAR TOTAL CLAIMS INCURRED SETTLED IN INTERVAL INDICATED

ACTUAL RESULTS

AGE OF CLAIMS IN YEARS FROM START OF REPORT YEAR:

AGE (YEARS)	1985	1986	1987	1988
0	37.3%	37.3%	37.4%	37.4%
1	84.6%	84.5%	84.9%	
2	97.3%	97.3%		
3	100.0%			

XYZ INSURANCE COMPANY EXHIBIT 6

AVERAGE CLAIM COST FOR CLAIMS SETTLED IN INTERVAL INDICATED

PROJECTED RESULTS

AGE OF CLAIMS IN YEARS FROM START OF REPORT YEAR:

AGE (YEARS)	1985	1986	1987	1988
0	18,778	20,565	22,646	24,853
1	18,797	20,585	22,671	24,881
2	19,129	20,948	23,116	25,370
3	20,094	21,992	24,483	26,868

PERCENTAGE OF REPORT YEAR TOTAL CLAIMS INCURRED SETTLED IN INTERVAL INDICATED

1215 PROJECTED RESULTS

AGE OF CLAIMS IN YEARS FROM START OF REPORT YEAR:

AGE (YEARS)	1985	1986	1987	1988
0	37.3%	37.3%	37.4%	37.4%
1	84.6%	84.5%	84.9%	84.8%
2	97.3%	97.3%	97.4%	97.4%
3	100.0%	100.0%	100.0%	100.0%

XYZ INSURANCE COMPANY
CALCULATION OF REPORT YEAR RESERVE POSITIONS

EXHIBIT 7

	1985	1986	1987	1988
ACTUAL AVERAGE INCURRED (12/31/88)	18,867	20,662	22,477	17,791
ESTIMATED AVERAGE INCURRED	18,867	20,662	22,765	24,983
MARGIN PER CLAIM INCURRED	0	(0)	(288)	(7,193)
NUMBER OF CLAIMS INCURRED	4,227	4,385	4,932	5,787
REPORT YEAR RESERVE POSITION (in thousands)	0	(0)	(1,420)	(41,624)

XYZ INSURANCE COMPANY - RESERVE EQUITY POSITION EXHIBIT 8
(in thousands)

DECEMBER 31, 1985 RESERVE

REPORT YEAR	OUTSTANDING RESERVE @12/31/85	EMERGED SAVINGS @12/31/88	CURRENT POSITION	RESERVE POSITION	STRENGTHENING /(SLIPPAGE)
1982 AND PRIOR	(0)	0	0	0	
1983	1,698	0	0	0	
1984	10,798	0	0	0	
1985	46,098	(4,050)	0	(4,050)	
TOTAL	58,594	(4,050)	0	(4,050)	

DECEMBER 31, 1986 RESERVE

REPORT YEAR	OUTSTANDING RESERVE @12/31/86	EMERGED SAVINGS @12/31/88	CURRENT POSITION	RESERVE POSITION	
1982 AND PRIOR	(0)	0	0	0	
1983	0	0	0	0	
1984	2,019	0	0	0	
1985	12,576	0	0	0	
1986	52,397	(4,602)	(0)	(4,602)	
TOTAL	66,993	(4,602)	0	(4,602)	(552)

DECEMBER 31, 1987 RESERVE

REPORT YEAR	OUTSTANDING RESERVE @12/31/87	EMERGED SAVINGS @12/31/88	CURRENT POSITION	RESERVE POSITION	
1982 AND PRIOR	(0)	0	0	0	
1983	0	0	0	0	
1984	0	0	0	0	
1985	2,301	0	0	0	
1986	14,340	0	(0)	(0)	
1987	38,147	(30,911)	(1,420)	(32,332)	
TOTAL	54,788	(30,911)	(1,420)	(32,332)	(27,729)

DECEMBER 31, 1988 RESERVE

REPORT YEAR	OUTSTANDING RESERVE @12/31/88	EMERGED SAVINGS @12/31/88	CURRENT POSITION	RESERVE POSITION	
1982 AND PRIOR	(0)		0	0	
1983	0		0	0	
1984	0		0	0	
1985	0		0	0	
1986	2,640		(0)	(0)	
1987	16,024		(1,420)	(1,420)	
1988	49,137		(41,624)	(41,624)	
TOTAL	67,802	0	(43,044)	(43,044)	(10,713)

XYZ INSURANCE COMPANY EXHIBIT 9

LINE OF BUSINESS 1: LIGHTER M&C

CUMULATIVE CASE INCURRED LOSSES AND ALAE (000's omitted)

ACC YR	12	24	36	48	60	72	84	96	108	120	PROJECTED ULTIMATE LOSSES & ALAE
1979	5,612	13,167	17,541	19,695	20,201	20,222	20,222	20,222	20,222	20,222	20,222
1980	6,752	15,063	19,920	22,679	23,371	23,401	23,401	23,401	23,401		23,401
1981	7,642	17,781	23,087	26,078	26,869	26,903	26,903	26,903			26,903
1982	9,187	20,575	26,531	29,978	30,891	30,931	30,931				30,931
1983	10,611	24,031	31,013	34,567	35,456	35,493					35,493
1984	11,775	27,397	35,982	40,251	41,284						41,333
1985	13,600	30,933	41,048	46,724							48,093
1986	15,388	36,104	48,098								55,818
1987	18,143	41,739									63,609
1988	21,383										74,791

LOSS DEVELOPMENT FACTORS

ACC YR	12 24	24 36	36 48	48 60	60 72	72 84	84 96	96 108	108 120
1979	2.346	1.332	1.123	1.026	1.001	1.000	1.000	1.000	1.000
1980	2.231	1.322	1.138	1.031	1.001	1.000	1.000	1.000	
1981	2.327	1.298	1.130	1.030	1.001	1.000	1.000		
1982	2.240	1.289	1.130	1.030	1.001	1.000			
1983	2.265	1.291	1.115	1.026	1.001				
1984	2.327	1.313	1.119	1.026					
1985	2.274	1.327	1.138						
1986	2.346	1.332							
1987	2.301								
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CUM S	3.498	1.524	1.160	1.029	1.001	1.000	1.000	1.000	1.000

XYZ INSURANCE COMPANY

EXHIBIT 10

LINE OF BUSINESS 1: LIGHTER M&C

CUMULATIVE PAID LOSSES AND ALAE (000's omitted)

ACC YR	12	24	36	48	60	72	84	96	108	120	PROJECTED ULTIMATE LOSSES & ALAE
1979	3,150	10,114	15,608	18,107	19,404	20,052	20,222	20,222	20,222	20,222	20,222
1980	3,790	11,732	17,751	20,683	22,338	23,165	23,401	23,401	23,401		23,401
1981	4,290	13,689	20,816	23,988	25,749	26,630	26,903	26,903			26,903
1982	5,158	16,007	23,966	27,564	29,599	30,616	30,931				30,931
1983	5,957	18,638	28,017	32,028	34,137	35,191					35,535
1984	6,611	21,093	32,246	37,153	39,703						41,454
1985	7,635	23,963	36,546	42,622							47,716
1986	8,639	27,733	42,798								55,370
1987	10,185	32,233									63,462
1988	12,004										74,666

LOSS DEVELOPMENT FACTORS

ACC YR	12 24	24 36	36 48	48 60	60 72	72 84	84 96	96 108	108 120	
1979	3.210	1.543	1.160	1.072	1.033	1.008	1.000	1.000	1.000	
1980	3.095	1.513	1.165	1.080	1.037	1.010	1.000	1.000		
1981	3.191	1.521	1.152	1.073	1.034	1.010	1.000			
1982	3.104	1.497	1.150	1.074	1.034	1.010				
1983	3.129	1.503	1.143	1.066	1.031					
1984	3.191	1.529	1.152	1.069						
1985	3.139	1.525	1.166							
1986	3.210	1.543								
1987	3.165									
SELEC	3.159	1.522	1.156	1.072	1.034	1.010	1.000	1.000	1.000	1.000
CUM S	6.220	1.969	1.294	1.120	1.044	1.010	1.000	1.000	1.000	1.000

XYZ INSURANCE COMPANY EXHIBIT 11

LINE OF BUSINESS 2: HEAVIER M&C

CUMULATIVE CASE INCURRED LOSSES AND ALAE (000's omitted)

ACC YR	12	24	36	48	60	72	84	96	108	120	PROJECTED ULTIMATE LOSSES & ALAE
1979	3,359	8,291	11,949	15,320	16,963	18,286	19,538	19,931	19,962	19,962	19,962
1980	3,504	9,224	13,869	18,094	20,072	21,406	22,775	23,226	23,262		23,262
1981	4,626	11,067	15,874	20,586	22,863	24,632	26,076	26,501			26,542
1982	4,675	12,529	18,571	24,371	27,355	28,972	30,442				31,061
1983	6,363	15,031	21,447	27,441	30,658	32,820					35,512
1984	6,459	16,724	24,350	31,620	35,803						41,462
1985	7,975	19,338	28,261	36,790							47,570
1986	9,983	25,321	38,185								64,014
1987	13,452	36,054									88,499
1988	19,025										118,131

LOSS DEVELOPMENT FACTORS

1220

ACC YR	12 24	24 36	36 48	48 60	60 72	72 84	84 96	96 108	108 120	
1979	2.468	1.441	1.282	1.107	1.078	1.068	1.020	1.002	1.000	
1980	2.632	1.504	1.305	1.109	1.066	1.064	1.020	1.002		
1981	2.393	1.434	1.297	1.111	1.077	1.059	1.016			
1982	2.680	1.482	1.312	1.122	1.059	1.051				
1983	2.362	1.427	1.279	1.117	1.071					
1984	2.589	1.456	1.299	1.132						
1985	2.425	1.461	1.302							
1986	2.536	1.508								
1987	2.680									
SELEC	2.530	1.464	1.297	1.117	1.070	1.060	1.018	1.002	1.000	1.000
CUM S	6.209	2.455	1.676	1.293	1.158	1.082	1.020	1.002	1.000	1.000

XYZ INSURANCE COMPANY EXHIBIT 12

LINE OF BUSINESS 2: HEAVIER M&C

CUMULATIVE PAID LOSSES AND ALAE (000's omitted)

ACC YR	12	24	36	48	60	72	84	96	108	120	PROJECTED ULTIMATE LOSSES & ALAE
1979	1,886	6,284	10,231	13,010	15,283	17,082	18,563	19,443	19,837	19,962	19,962
1980	1,967	6,878	11,655	15,171	18,004	20,103	21,729	22,690	23,118		23,264
1981	2,597	8,457	13,607	17,378	20,533	22,995	24,900	25,942			26,616
1982	2,624	9,301	15,729	20,422	24,382	27,249	29,261				31,357
1983	3,572	11,525	18,422	23,330	27,499	30,736					35,608
1984	3,626	12,522	20,782	26,677	31,823						41,214
1985	4,477	14,725	24,010	30,931							47,460
1986	5,605	19,058	31,994								63,027
1987	7,552	26,766									86,936
1988	10,681										117,728

LOSS DEVELOPMENT FACTORS

ACC YR	12 24	24 36	36 48	48 60	60 72	72 84	84 96	96 108	108 120	
1979	3.332	1.628	1.272	1.175	1.118	1.087	1.047	1.020	1.006	
1980	3.496	1.694	1.302	1.187	1.117	1.081	1.044	1.019		
1981	3.257	1.609	1.277	1.182	1.120	1.083	1.042			
1982	3.544	1.691	1.298	1.194	1.118	1.074				
1983	3.226	1.598	1.266	1.179	1.118					
1984	3.453	1.660	1.284	1.193						
1985	3.289	1.631	1.288							
1986	3.400	1.679								
1987	3.544									
SELEC	3.394	1.649	1.284	1.185	1.118	1.081	1.044	1.020	1.006	1.000
CUM S	11.022	3.248	1.970	1.534	1.295	1.159	1.072	1.026	1.006	1.000

XYZ INSURANCE COMPANY

EXHIBIT 13

SUMMARY OF ULTIMATE LOSSES AND RESERVES
LOSS DEVELOPMENT METHOD (000's omitted)

ACC YR	LINE OF BUSINESS 1 LIGHTER M&C PAID BASIS	LINE OF BUSINESS 1 LIGHTER M&C INCURRED BASIS	LINE OF BUSINESS 1 LIGHTER M&C SELECTED	LINE OF BUSINESS 2 HEAVIER M&C PAID BASIS	LINE OF BUSINESS 2 HEAVIER M&C INCURRED BASIS	LINE OF BUSINESS 2 HEAVIER M&C SELECTED	ALL LINES SELECTED ULTIMATE
1979	20,222	20,222	20,222	19,962	19,962	19,962	40,185
1980	23,401	23,401	23,401	23,264	23,262	23,263	46,664
1981	26,903	26,903	26,903	26,616	26,542	26,579	53,482
1982	30,931	30,931	30,931	31,357	31,061	31,209	62,140
1983	35,535	35,493	35,514	35,608	35,512	35,560	71,074
1984	41,454	41,333	41,394	41,214	41,462	41,338	82,731
1985	47,716	48,093	47,905	47,460	47,570	47,515	95,419
1986	55,370	55,818	55,594	63,027	64,014	63,520	119,114
1987	63,462	63,609	63,535	86,936	88,499	87,717	151,253
1988	74,666	74,791	74,728	117,728	118,131	117,929	192,658
TOTAL	419,659	420,593	420,126	493,170	496,015	494,592	914,719

1222

LESS: INCURRED TO DATE	(635,024)
NEEDED IBNR RESERVE:	279,695
HELD IBNR RESERVE:	238,953
SHORT/(OVER):	40,742

NOTE: PAID AND INCURRED WEIGHTED EQUALLY FOR ALL AYs

X Y Z I N S U R A N C E C O M P A N Y EXHIBIT 14

RESTATED BALANCE SHEET AT 12/31/88
(in thousands)

A S S E T S		L I A B I L I T I E S / S U R P L U S	
BONDS	$373,512	LOSS/LAE RESERVES	$347,496
STOCKS	$67,511	UNEARNED PREMIUM RESERVE	$104,432
CASH	$9,050	OTHER LIABILITIES	$33,355
INVESTED ASSETS	$450,073		
AGENTS BALANCES	$29,300	TOTAL LIABILITIES	$485,283
OTHER ASSETS	$50,125	POLICYHOLDER SURPLUS	$44,215
TOTAL ASSETS	$529,498	TOTAL LIABILITIES / SURPLUS	$529,498

****

KEY RATIOS:	SCORE:	BEST'S TEST SCORE:
PREMIUM-TO-SURPLUS:	5.55	FAIL
AGENTS BALANCES TO SURPLUS:	66.3%	FAIL
RESERVES-TO-SURPLUS:	7.86	
LIABILITIES/LIQUID ASSETS:	1.08	FAIL
CHANGE IN SURPLUS:	-42.6%	FAIL
ONE-YR RESERVE DEVELOPMENT TO SURPLUS:	38.5%	FAIL

EXHIBIT 15

XYZ INSURANCE COMPANY

RELATIVE EFFECTS OF:

CHANGES IN RESERVE ADEQUACY LEVELS
CHANGES IN MIX OF BUSINESS
(000'S omitted)

I. PAID METHODOLOGY

NO "CHANGE IN RESERVE ADEQUACY" EFFECT

ULTIMATE LOSSES, ALAE - ALL ACCIDENT YEARS

SUBGROUPS ANALYZED SEPARATELY	$912,829
SUBGROUPS ANALYZED TOGETHER	$893,332
DIFFERENCE (CHANGE IN MIX OF BUSINESS)	$ 19,497
AS PERCENTAGE OF HELD RESERVES	6.4%

II. INCURRED METHODOLOGY

ULTIMATE LOSSES, ALAE - ALL ACCIDENT YEARS

SUBGROUPS ANALYZED SEPARATELY WITH ADJUSTMENT FOR RESERVE ADEQUACY	$916,608
SUBGROUPS ANALYZED TOGETHER WITH ADJUSTMENT FOR RESERVE ADEQUACY	$898,017
DIFFERENCE (CHANGE IN MIX OF BUSINESS)	$ 18,591
AS PERCENTAGE OF HELD RESERVES	6.1%
SUBGROUPS ANALYZED TOGETHER, NO ADJUSTMENT FOR RESERVE ADEQUACY	$825,335
DIFFERENCE (CHANGE IN MIX OF BUSINESS)	$ 72,682
AS PERCENTAGE OF HELD RESERVES	23.7%
BOTH EFFECTS AS PERCENTAGE OF HELD RESERVES	29.8%

1989 CASUALTY LOSS RESERVE SEMINAR

6E: WORKERS' COMPENSATION LOSS RESERVES

Moderator

Aaron Halpert
KMPG Peat Marwick

Panel

Mark E. Fiebrink
Wausau Insurance Companies

Harvey A. Sherman
The Home Insurance Company

MR. HALPERT: My name is Aaron Halpert. I am a senior manager with KPMG Peat Marwick's actuarial group in New York. I have been asked to make a couple of announcements, first to tell you that this is Session 6E, entitled Workers' Compensation Loss Reserves, and to tell you that the entire session will be recorded.

It is quite important towards the end of the session when we'll have a period for questions, that those of you with questions approach the microphone, since it will be important for that all questions are recorded.

During the next hour and 15 minutes, we will be discussing various issues and perspectives regarding the evaluation of loss and loss expense reserves for Workers' Compensation. With me on the panel are two company actuaries who have addressed many of these issues as part of their analyses of their own company's Workers' Compensation reserves.

On my far left is Mark Fiebrink. Mark received his BA degree in math and physics from the University of Wisconsin, Whitewater, in 1973. He became a fellow of the Casualty Actuarial Society in 1977, and he is also a member of the American Academy of Actuaries. He has been with Wausau Insurance for 16 years in various positions, leading to his current position of senior vice president and chief actuary.

In addition to managing the actuarial function, Mark is also responsible for the financial services and reinsurance functions at his company. Mark has served on the Examination Committee and Educational Committee of the CAS, and he has served extensively on federal/industry actuarial committees regarding Workers' Compensation and other commercial lines of insurance.

Sitting to Mark's right is Harvey Sherman. Harvey is an assistant vice president with The Home Insurance Company. His current responsibilities include both Workers' Comp pricing and reserving. Previously, Harvey was with the ISO, where he had rate-making responsibilities for both commercial and personal lines. Harvey is an FCAS and a member of the American Academy.

As an introduction to the topics we will cover, let me briefly review some of the general reserving methodologies and point out what makes Workers' Comp somewhat unique in the way these methodologies are applied. There are three groups of hand-outs in the back and I would stress that it would probably be easier for many of you to get a copy rather than trying to read the slides.

First of all, Workers' Compensation benefits, as you probably know, are generally defined by statute. This can be contrasted to other casualty lines where, ultimately, the amounts awarded are either the result of a jury decision or a negotiated settlement between plaintiff and defendant.

Secondly, these statutory benefits vary by state. Later on, Mark will discuss the effect these state-by-state variations can have on the loss reserve analysis.

Thirdly, even within a single state, the Workers' Compensation laws are not stagnant. They change over time, and these changes many have a material effect on both the frequency and severity of Workers' Compensation claims.

The statutory benefits also help to define the data base necessary to support a Workers' Compensation loss reserve analysis. Benefits are generally related to either indemnity or medical payments. Indemnity payments would include compensation for lost wages, generally subject to a weekly maximum, as well as other scheduled benefits appearing on the slide.

(Slide)

Medical benefits include compensation for various physical and surgical procedures as well as hospitalization required as a result of a work-related injury. Harvey will present a more detailed discussion of these and other splits of the data base that are helpful in the analysis of Workers' Comp reserves.

Finally, loss adjustment expenses are playing an increasingly important role in Workers' Comp and Harvey will discuss various ALAE reserve tests that he's done at his company.

Now, the general methods used to evaluate reserves are covered in many of the other sessions so I will only highlight these methods here. Most Workers' Compensation reserve analyses are based on an extrapolation of either paid or incurred loss experience, not that different from what you would apply in many of the other lines of insurance.

There are a few quirks, though, in how these methods apply and in some of the issues that pertain to Workers' Comp. With regard to incurred losses, one of the paramount issues to be addressed in Comp is the selection of a tail factor. We will address various issues related to this selection later in the session.

Also important in dealing with incurred projections is the mix of states that a company chooses to write. Mark will more fully discuss the impact a change in this mix can have on the reserve analysis. Given that the flow of compensation payments are often dictated by statute, the settlement patterns for this line tend to be relatively stable and, thus, a paid projection technique lends itself quite well.

To summarize, we will present five issues related to Workers' Comp reserving. Harvey will first discuss issues related to data classification and then present points related to Workers' Compensation expense reserves. After that, Mark will address special state situations and discuss what happens when a company experiences a dramatic change in the mix of states in which it writes Workers' Compensation.

Finally, we all will discuss matters related to the selection of a tail factor. We've left a good amount of time at the end for questions. Again, I would ask you to approach the microphone to ask questions.

Finally, one more point. Jack Burns' charge notwithstanding, we are not quite ready to show you how to convert the Workers' Compensation reserving process into a tabular exercise -- maybe next year.

WORKERS COMPENSATION

LOSS RESERVES

1989 CLRS

SESSION 6E

2

WORKERS COMPENSATION

- STATUTORY BENEFITS
- VARY BY STATE
- LAW CHANGES

WORKERS COMPENSATION RESERVING DATA

- MEDICAL
- INDEMNITY
  - WAGE LOSS
  - REHABILITATION
  - SCHEDULED BENEFITS
  - PENSION/NON PENSION
    LUMP SUM SETTLEMENTS
- ALAE

WORKERS COMPENSATION
RESERVING METHODOLOGY

- INCURRED
  - CONSIDERATION OF TAIL FACTOR
  - CHANGE IN MIX OF STATES
- PAID
  - STABLE PAYMENT PATTERNS
- ALAE
  - PAID TO PAID RATIO ANALYSIS

WORKERS COMPENSATION
PENSION DISCOUNT

- STATUTORY ALLOWANCE FOR DISCOUNT
- "UNRAVELING" THE DISCOUNT
- IMPLIED TAIL FACTOR
- FUTURE PENSION CASES

DATA CLASSIFICATION

IN THE NEXT SEVERAL MINUTES I WILL DESCRIBE HOW WE AT THE HOME HAVE ORGANIZED THE WORKERS COMPENSATION EXPERIENCE WITHIN OUR RESERVE TEST.

THE CAS PUBLICATION "STATEMENT OF PRINCIPLES REGARDING PROPERTY AND CASUALTY LOSS AND LOSS ADJUSTMENT EXPENSE RESERVES" INCLUDES A LIST OF CONSIDERATIONS THE THE RESERVING ACTUARY SHOULD ADDRESS. THIS FIRST CHART (SLIDE 1) LISTS MANY OF THESE CONSIDERATIONS AND THE MANNER IN WHICH WE HAVE CLASSIFIED THE WORKERS COMPENSATION EXPERIENCE. TWO ITEMS ARE CONSISTENTLY USED: TYPE OF BUSINESS (PROFIT CENTERS) AND TYPE OF LOSS.

AS AN EXAMPLE, THE CAS PUBLICATION MENTIONS "...SUBDIVIDING EXPERIENCE INTO GROUPS EXHIBITING SIMILAR CHARACTERISTICS..." AND "...BALANCING HOMOGENEITY AND AMOUNT OF DATA IN EACH GROUPING". WE HAVE FOUND THERE TO BE DIFFERENT PATTERNS, THAT ARE CREDIBLE, IN THE EXPERIENCE WHEN SORTED BY TYPE OF BUSINESS AND TYPE OF LOSS.

THE SPECIFICS OF THIS CLASSIFICATION SYSTEM IS AS FOLLOWS: (SLIDE 2)

TYPE OF LOSS - WE ANALYZE MEDICAL AND INDEMNITY EXPERIENCE SEPARATELY AS WE HAVE OBSERVED DIFFERENCES IN THE REPORTING AND SETTLEMENT PATTERNS,

TYPE OF BUSINESS - WE FURTHER SUBDIVIDE THE EXPERIENCE BY PROFIT CENTER.
WE HAVE TWO SIGNIFICANT PROFIT CENTERS: LARGE ACCOUNTS AND STANDARD COMMERCIAL ACCOUNTS. AGAIN DIFFERENCES HAVE BEEN FOUND IN THE REPORTING AND SETTLEMENT PATTERNS

AN ADDITIONAL CLASSIFICATION CRITERIA IS TYPE OF INSURANCE. WE PERFORM THE RESERVE TEST ON DIRECT EXPERIENCE, DETERMINING LINK RATIOS AND AVERAGE SEVERITIES. WE SEPARATELY ANALYZE REINSURANCE EXPERIENCE AND MAKE SEPARATE ADJUSTMENTS FOR SALVAGE, SUBROGATION, SECOND INJURY REFUNDS AND DISCOUNTING. IN PARTICULAR FOR REINSURANCE, ANY CHANGES IN THE REINSURANCE STRUCTURE WOULD DISTORT DEVELOPMENT PATTERNS IN NET DATA. WE FEEL THE ANALYSIS IS IMPROVED BY SEPARATELY ANALYZING THE DIRECT AND CEDED EXPERIENCE.

THE FOLLOWING SLIDES DEMONSTRATE SOME OF THESE DIFFERENCES MENTIONED. (SLIDE 3) SHOWN ARE LINK RATIOS OF INDEMNITY REPORTED CLAIMS FOR LARGE ACCOUNTS AND COMMERCIAL ACCOUNTS. THERE IS A SMALL BUT CONSISTENT DIFFERENCE IN THE REPORTING PATTERN BETWEEN THE TWO PROFIT CENTERS. WHY? AT LEAST ONE REASON IS THE LARGE ACCOUNTS AREA MAKES USE OF THIRD PARTY ADMINISTRATORS. THIS INCREASES THE REPORTING TIME BY AT LEAST ONE MONTH.

(SLIDE 4) PRESENTED HERE ARE LINK RATIOS FOR INDEMNITY INCURRED DOLLARS BY PROFIT CENTER. THE DIFFERENCES ARE MORE SIGNIFICANT THEN FOR REPORTED CLAIMS. THIS DIFFERENCE IN LINK RATIOS IS DUE TO THE

DIFFERENCE IN TYPE OF INSURED (MANUFACTURING VERSUS SERVICES), AND GEOGRAPHICAL LOCATION OF THE EXPOSURES. THERE ARE PROBABLY OTHER FACTORS CAUSING THIS DIFFERENCE.

(SLIDE 5) THIS LAST SLIDE OF LINK RATIOS COMPARES MEDICAL AND INDEMNITY REPORT DEVELOPMENT FACTORS FOR COMMERCIAL LINES. INDEMNITY CLAIMS COUNTS DEMONSTRATE MORE DEVELOPMENT THAN MEDICAL COUNTS.

THERE ARE MANY OTHER CLASSIFICATION SYSTEMS THAT CAN BE USED IN ORGANIZING THE WORKERS COMPENSATION RESERVE DATA BASE. THIS NEXT SLIDE (SLIDE 6) LISTS SEVERAL POSSIBILITIES. EACH OF THESE HAVE MERIT. WE HAVE NOT AS YET EXPLORED ANY OF THESE EXCEPT FOR SOME LIMITED WORK ON STATE DIFFERENCES.

THE LAST ITEM I'D LIKE TO MENTION IS THAT OF THE TESTS WE PERFORM. WE PERFORM FOUR TESTS. FISHER-LANGE, INCURRED DEVELOPMENT, PAID DEVELOPMENT AND A FACTOR MODEL. THE PAID DEVELOPMENT TEST IS APPROPRIATE FOR WORKERS COMPENSATION. THE EXPERIENCE SHOWS CONSISTENT INCREASES IN PAID LOSSES FOR ALL ACCIDENT PERIODS FOR EACH AGE. THE FACTOR MODEL WE USE APPLIES FACTORS TO HISTORICAL EARNED PREMIUMS AND CASE RESERVES TO GENERATE RESERVE LEVELS. THE FACTORS REPRESENT ESTIMATES OF UNREPORTED CLAIMS (APPLIED TO PREMIUM) AND CASE RESERVE ADEQUACY (APPLIED TO CASE RESERVES) THE CLASSIFICATION SYSTEM USED IN THE FACTOR MODEL IS SIMILAR TO THAT PREVIOUSLY DESCRIBED (TYPE OF LOSS, TYPE OF INSURANCE, TYPE OF BUSINESS). WE USE THE FACTOR MODEL TO ASSIST IN DETERMINING RESERVE CHANGES BETWEEN RESERVE TESTS. (THE FACTOR MODEL IS UPDATED MORE FREQUENTLY THAN THE RESERVE TESTS.) WE ALSO COMPARE THE FOUR TEST TO ASSURE CONSISTENCY.

ALLOCATED LOSS ADJUSTMENT EXPENSE RESERVES

DURING THE NEXT SEVERAL MINUTES I WILL DISCUSS THE HOME'S TEST FOR ALAE. ALSO I WILL DISPLAY SOME INDUSTRY DATA PERTAINING TO RECENT TRENDS FOR LAE AND ALAE.

THE CLASSIFICATION SYSTEM (SLIDE 7) USED FOR THE ALAE TEST IS SIMILAR TO THAT USED FOR THE LOSS TESTS. WE SEPARATE THE EXPERIENCE BY TYPE OF BUSINESS, TYPE OF INSURANCE, AND TYPE OF LOSS. ADDITIONALLY, WE SEPARATELY ANALYZE TWO DIFFERENT TYPES OF EXPENSES: LEGAL EXPENSE AND ADJUSTERS EXPENSE.

JUST AS WITH LOSSES, OTHER CLASSIFICATIONS OF THE EXPERIENCE CAN BE USED. IN PARTICULAR, STATE MAY BE WORTH EXPLORING AS EACH STATE HAS DIFFERENT ADMINISTRATIVE PROCEDURES AND A DIFFERENT LEVEL OF INVOLVEMENT OF LAWYERS. WE HAVE NOT YET EXPLORED STATE AS A CLASSIFICATION VARIABLE BUT WE RECENTLY OBTAINED SOME EXPERIENCE TO BEGIN THIS EFFORT.

WE PERFORM THREE TESTS (SLIDE 8) ALONG WITH OUR FACTOR MODEL. THE FIRST TEST MAKES USE OF PAID EXPENSE DATA EXCLUSIVELY. THE SECOND TEST, RATIO METHOD, MAKES USE OF THE ULTIMATE EXPENSES DERIVED FROM THE PAID DEVELOPMENT TEST TO DETERMINE ULTIMATE EXPENSE RATIOS. EXPENSE RESERVES ARE DETERMINED FROM THE APPLICATION OF SELECTED

EXPENSE RATIOS TO ULTIMATE LOSSES. THE THIRD TEST IS A COMBINATION OF THE FIRST TWO TESTS. WE APPLY CREDIBILITY TO THE PAID DEVELOPMENT RESULT AND THE COMPLEMENT OF CREDIBILITY TO THE EXPENSE RATIO RESULT. THIS WEIGHTING IS PERFORMED BY ACCIDENT YEAR. CREDIBILITIES ARE DETERMINED BY THE PERCENT OF EXPENSES PAID.

AN ADDITIONAL STEP IS TAKEN IN THE SELECTION OF THE PAID EXPENSE DEVELOPMENT FACTORS. (SLIDE 9) WE HAVE OBSERVED THAT THERE ARE SHIFTS IN THE PAYOUT PATTERN FOR EXPENSES JUST AS THERE ARE SHIFTS IN THE PAYOUT PATTERN FOR LOSSES. FROM THE LOSS RESERVE TEST HISTORICAL DATA WE COMPARE THE HISTORICAL PERCENT PAID AND THE MOST RECENT PERCENT PAID. WE BELIEVE THAT ANY SPEED-UP IN THE LOSS PAYMENT WILL HAVE ASSOCIATED WITH IT A SPEED UP IN THE EXPENSE PAYMENT. AT THE 72 MONTH EVALUATION, THE LATEST PAID LOSSES (COLUMN 3) ARE 83.6% OF ULTIMATE VERSUS THE LONG TERM AVERAGE OF 83%. WE ADJUST THE LONG TERM AVERAGE OF EXPENSE PAYMENTS (COLUMN 1) AND THIS IS SHOWN IN COLUMN 4. WHEN WE DISCUSSED THIS PANEL WITH REGARD TO ALAE WE ALL THOUGHT THAT THE INCREASE IN ALAE RATIOS WOULD BE A GOOD SUBTOPIC.

TAKE A SURVEY OF WHAT PEOPLE THINK - ARE ALAE RATIOS INCREASING?

(SLIDE 10) THIS SLIDE PRESENTS INDUSTRY CALENDAR YEAR EXPERIENCE FOR LAE (ALL ADJUSTMENT EXPENSE). I DON'T SEE AN INCREASING PATTERN. I'VE ALSO EXAMINED INDUSTRY ACCIDENT YEAR (SCHEDULE P) RATIOS FOR LAE AND HAVE NOT FOUND AN INCREASING PATTERN. ALSO, I REVIEWED HOME EXPERIENCE FOR LEGAL EXPENSES AND ADJUSTER EXPENSES AND FOUND THERE IS NO INCREASE IN THESE RATIOS. SO WHO BELIEVES THERE IS AN INCREASED COST OF SETTLING WORKERS COMPENSATION CLAIMS? OUR UNDERWRITERS DO. POSSIBLY IN THE QUESTION AND ANSWER SESSION YOU CAN RELATE WHAT YOUR STUDIES HAVE SHOWN AND WHAT YOUR THOUGHTS ARE.

TAIL FACTOR ANALYSIS

OVER THE NEXT SEVERAL MINUTES I WILL DISCUSS HOW WE CURRENTLY DETERMINE DEVELOPMENT FACTORS FOR THE TAIL, AND DISCUSS WHAT OUR THOUGHTS ARE IN REGARD TO THESE FACTORS.

(SLIDE 11) WE CURRENTLY HAVE LIMITED INFORMATION FOR INCURRED DEVELOPMENT BUT, AS AARON MENTIONED BEFORE, WC CLAIMS REMAIN OPEN FOR MANY YEARS. WE CURRENTLY USE THE AVAILABLE INCURRED LOSS DEVELOPMENT EXPERIENCE, ALONG WITH RATIOS OF CLOSED-TO-INCURRED EXPERIENCE TO DETERMINE FACTORS APPLICABLE TO OUTSTANDING LOSSES. FROM THE INDICATED FACTORS WE SELECT FACTORS AND APPLIED THESE TO THE OUTSTANDING LOSSES IN THE TAIL.

(SLIDE 12) THE INCURRED DATA WE HAVE AVAILABLE IS THROUGH 13 YEARS OF DEVELOPMENT. FOR INDEMNITY WE HAVE OBSERVED POSITIVE BUT SMALL DEVELOPMENT IN EACH PERIOD AND ANTICIPATE THAT THIS DEVELOPMENT CONTINUES FOR SOMETIME. (SLIDE 13) AVAILABLE MEDICAL DEVELOPMENT EXPERIENCE ALSO EXHIBITS CONTINUING DEVELOPMENT. THE DEVELOPMENT RATIOS FOR MEDICAL ARE ABOVE THOSE FOR INDEMNITY AS WE MOVE FURTHER INTO THE TAIL. CLEARLY, IN PERFORMING THE RESERVE TEST IT IS IMPERATIVE THAT THE ACTUARY DEVELOP MEASURES FOR THE LENGTH OF TIME

THAT DEVELOPMENT WILL CONTINUE. MORE IMPORTANT, ONE MUST DETERMINE THE MAGNITUDE OF THE DEVELOPMENT THAT WILL OCCUR.

WE ARE CURRENTLY EXAMINING DIFFERENT IDEAS REGARDING WHAT EFFECTS THE LENGTH AND SIZE OF THE TAIL DEVELOPMENT FACTORS. OUR GOAL IS TO, JUST AS WHEN CONSTRUCTING AN ECONOMETRIC MODEL, IDENTIFY THE SOURCES (CAUSES) OF THE DEVELOPMENT AND THEN TO DETERMINE MEASURES FOR THESE CAUSES.

(SLIDE 14) FROM OUR CURRENT DISCUSSIONS WE HAVE IDENTIFIED THE FOLLOWING FACTORS AS INFLUENCING THE TAIL DEVELOPMENT PATTERN. FOR INDEMNITY, WE HAVE IDENTIFIED AND BEGAN EXPLORING THE EFFECTS OF TREND, MORTALITY, DISCOUNTING AND SECOND INJURY FUNDS. FOR MEDICAL, SIMILAR FACTORS COME INTO PLAY. I WILL REVIEW SOME OF OUR THOUGHTS REGARDING SECOND INJURY REFUNDS, TREND AND MORTALITY. AARON WILL HAVE SOME COMMENTS REGARDING RESERVE DISCOUNTING.

(SLIDE 15) RECALL FROM MY EARLIER DISCUSSION ON CLASSIFICATION THAT WE REVIEW COMPLETELY GROSS EXPERIENCE. SECOND INJURY REFUNDS, SUBROGATION DISCOUNTING AND REINSURANCE EFFECTS ARE INCLUDED AFTERWARDS. WE RECENTLY ASSEMBLED SECOND INJURY REFUND EXPERIENCE IN ACCIDENT YEAR TRIANGLE FORMAT SO AS TO DETERMINE THE IMPACT ON THE GROSS DEVELOPMENT FACTORS. SECOND INJURY REFUNDS ARE TYPICALLY RECOVERED FURTHER INTO THE TAIL.

THE IMPACT OF INCLUDING SECOND INJURY REFUNDS IN THE GROSS EXPERIENCE FOR INDEMNITY IS SUBSTANTIAL. BY 11 YEARS THE DEVELOPMENT FACTORS ARE REDUCED TO UNITY. THAT SECOND INJURY REFUNDS HAVE SUCH AN IMPACT ON INDEMNITY EXPERIENCE IS NOT ALL THAT SURPRISING AS THE PURPOSE OF THE FUNDS IS TO DEAL WITH THE MORE SERIOUS INDEMNITY INJURIES, I.E. THOSE INJURIES THAT WOULD BE OPEN FOR A LONG TIME.

FOR MEDICAL (SLIDE 16) THERE IS ALSO A REDUCTION TO THE DEVELOPMENT FACTORS WHEN SECOND INJURY REFUND EXPERIENCE IS INCLUDED. HOWEVER, THERE STILL REMAINS A CONTINUED AND SIZABLE AMOUNT OF DEVELOPMENT.

THE SECOND FACTOR WE ARE EXAMINING IS THAT OF TREND. (SLIDE 17) MEDICAL EXPENSES ASSOCIATED WITH A WC CLAIM ARE PAID ON AN UNLIMITED BASIS. ANY INCREASE IN COSTS IN THE TREATMENT WILL BE COVERED. INFLATION WILL IMPACT THE DEVELOPMENT FACTORS (A ROW EFFECT). CHANGES IN THE INFLATION RATE WILL AFFECT THE HISTORICAL DEVELOPMENT FACTORS AND THESE HISTORICAL FACTORS MAY BE INAPPROPRIATE FOR USE IN PROJECTING FUTURE LOSSES. THE EFFECT OF CHANGING RATES OF INFLATION IS PARTICULARLY IMPORTANT IN THE WORKERS COMPENSATION RESERVE TEST BECAUSE OF THE LENGTH OF TIME THAT CLAIMS REMAIN OPEN AND THE MAGNITUDE OF MEDICAL INFLATION.

AS AN ASIDE WE FEEL THE IMPACT OF CHANGING RATES OF INFLATION FOR INDEMNITY ARE NOT AS SIGNIFICANT AS JUST A FEW STATES HAVE COST OF LIVING INCREASES IN THE BENEFIT STRUCTURE.

THIS NEXT SLIDE (18) PROVIDES AN EXAMPLE OF HOW INFLATION CAN IMPACT THE DEVELOPMENT FACTORS. THE UNDERLYING ASSUMPTION IN THE EXAMPLE IS

THAT 5% INFLATION WILL OCCUR AFTER YEAR 3 AND THEREFORE ONLY IMPACT THE PAYMENT AT AGE 9. WITH NO INFLATION, THE DEVELOPMENT FACTOR FOR AGE 3 TO ULTIMATE IS 1.111 (1000/900). WITH INFLATION OF 5%, THE LAST PAYMENT IS INCREASED AND THE 3-ULTIMATE DEVELOPMENT FACTOR IS INCREASED TO 1.164.

IF INFLATION WERE CONSTANT THIS MAY NOT BE AN ISSUE. HOWEVER, ASSUME THE HISTORICAL DATA DID HAVE 5% INFLATION UNDERLYING IT AND THE OBSERVED DEVELOPMENT FACTOR WAS 1.164. FURTHERMORE, WE ANTICIPATE THAT MEDICAL INFLATION WILL INCREASE. THE HISTORICAL LOSS DEVELOPMENT FACTORS ARE UNDERSTATED. SIMILARLY, IF INFLATION WAS RELATIVELY HIGH IN THE EXPERIENCE PERIOD BUT IT IS NOW REDUCED, THE USE OF THE HISTORICAL DEVELOPMENT FACTORS WOULD OVERSTATE THE FACTOR SIZE.

NOT ONLY PAID DEVELOPMENT FACTORS ARE IMPACTED BY INFLATION AND CHANGES IN THE RATE OF INFLATION. OUR CLAIMS PEOPLE SET CASE RESERVES FOR PRESCRIBED TREATMENTS AT CURRENT COSTS. NO PROVISION IS MADE FOR FUTURE INFLATION. AS CLAIMS ARE REVIEWED ANNUALLY ANY ACTUAL INCREASE IN COSTS WILL BE REFLECTED IN THE UPDATED CASE RESERVE. FROM THE EXAMPLE IN SLIDE 17 THE INCURRED DEVELOPMENT FACTOR IS 1.048 WITH 5% INFLATION.

WE CONSTRUCTED AN EXAMPLE USING OUR PAID AND INCURRED EXPERIENCE. THIS NEXT SLIDE (SLIDE 19) PRESENTS THE PAID DEVELOPMENT FACTORS BEFORE MAKING ANY ADJUSTMENT FOR INFLATION AND THE ADJUSTED DEVELOPMENT FACTORS. THE ADJUSTED DEVELOPMENT FACTORS ARE LOWER AS WE ASSUMED IN THIS EXAMPLE THAT FUTURE INFLATION WILL BE LOWER THAN THE INFLATION IN THE HISTORICAL PERIOD. THE CUMULATIVE IMPACT OF THIS ADJUSTMENT IS TO LOWER THE PAID DEVELOPMENT BY ONE-HALF.

SLIDE 20 PROVIDES A SIMILAR COMPARISON FOR INCURRED DATA.

THE LAST FACTOR I'D LIKE TO DISCUSS IS THAT OF MORTALITY. DEVELOPMENT FACTORS OBSERVED THROUGH 13 YEARS ARE FOR A POPULATION OF RELATIVELY YOUNGER WORKERS. AT LATER, EVALUATION THE POPULATION WILL AGE AND THE EFFECT OF MORTALITY WILL INCREASE. WE BELIEVE THAT THE EFFECT OF MORTALITY NEEDS TO BE ACCOUNTED FOR. CURRENTLY, WE ARE EXPLORING WAYS TO DO THIS.

THE EXAMPLE WE CONSTRUCTED WAS FOR PAID DATA. WE DETERMINED AVERAGE DEVELOPMENT FACTORS AND FROM THIS AVERAGE DECAY FACTORS. GIVEN THE OBSERVED DECAY RATE WE SAW THAT DEVELOPMENT WOULD CONTINUE FOR MANY YEARS. CUMULATIVE DEVELOPMENT WOULD BE OVER 1% AT AGE 60. WE THEN ADJUSTED THE EXPERIENCE FOR MORTALITY. THIS WAS DONE BY DETERMINING THE AGE DISTRIBUTION OF INJURED WORKERS AND, FROM LIFE TABLES, THE FORCE OF MORTALITY (U(X)). THE DEVELOPMENT FACTORS WERE RECALCULATED WITH THE EFFECT OF MORTALITY REMOVED. WE THEN RECALCULATED THE DECAY RATE AND PLACED BACK INTO THE DEVELOPMENT FACTORS THE EFFECT OF MORTALITY. THE RESULTING FACTORS WERE LOWER. DEVELOPMENT DROPPED BELOW 1% AT AGE 40.

IN SUMMARY, DUE TO THE NATURE OF WORKERS COMPENSATION COVERAGE THERE ARE LARGE DOLLARS OF CASE RESERVES FOR CLAIMS OPEN BEYOND 10 YEARS. THERE IS CLEAR POTENTIAL FOR CONTINUED DEVELOPMENT ON THESE CLAIMS.

TO PERFORM THE RESERVE TEST ONE MUST HAVE COMFORT WITH THE ESTIMATE FOR THIS TAIL DEVELOPMENT. WE ARE TRYING TO IDENTIFY THE CAUSES FOR THIS TAIL DEVELOPMENT AND QUANTIFY THEM SO AS TO INCREASE OUR UNDERSTANDING AND COMFORT LEVEL.

(HS9-11)

STATEMENT OF PRINCIPLES REGARDING PROPERTY AND CASUALTY LOSS AND LOSS AND ADJUSTMENT EXPENSE RESERVES

CONSIDERATIONS

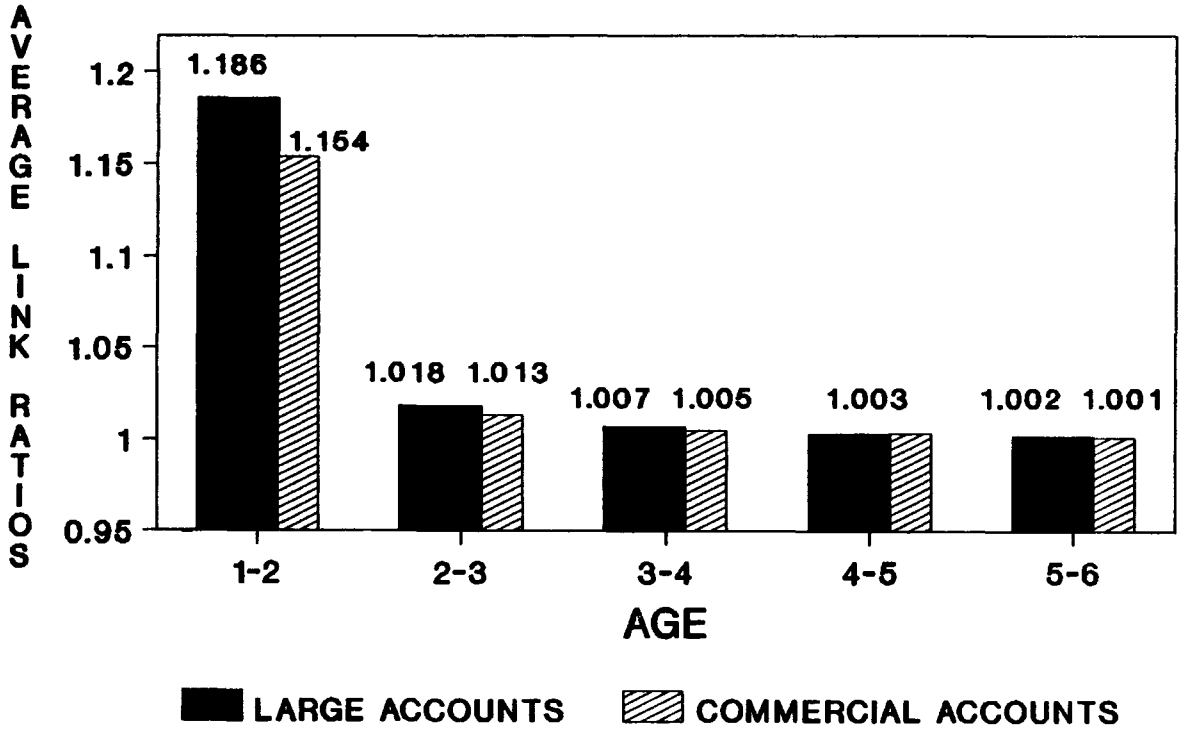
HOMOGENEITY	TYPE OF BUSINESS, TYPE OF LOSS
CREDIBILITY	TYPE OF BUSINESS, TYPE OF LOSS
EMERGENCE PATTERNS	TYPE OF BUSINESS, TYPE OF LOSS
SETTLEMENT PATTERNS	TYPE OF BUSINESS, TYPE OF LOSS
DEVELOPMENT PATTERNS	TYPE OF BUSINESS, TYPE OF LOSS
SALVAGE, SUBROGATION AND COLLATERAL SOURCES	
REINSURANCE	TYPE OF REINSURANCE
DISCOUNTING	CAUSE OF LOSS

DATA CLASSIFICATION FOR WORKERS COMPENSATION RESERVE TEST

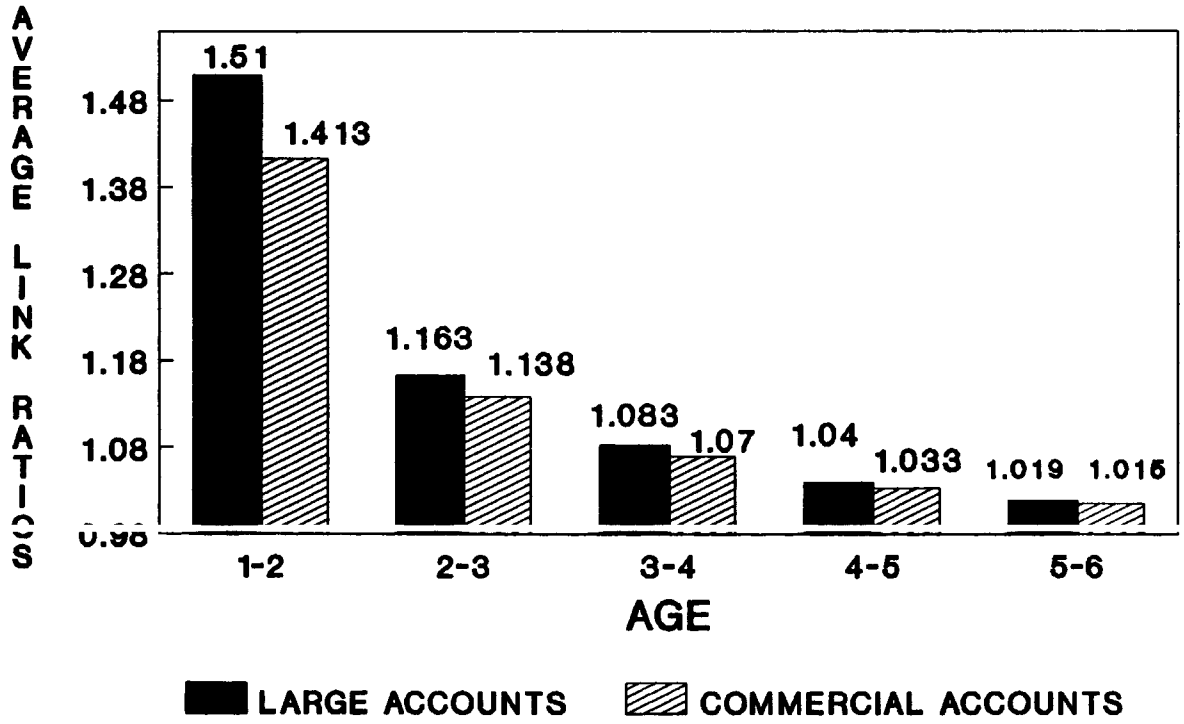
1240

1. TYPE OF LOSS	MEDICAL VERSUS INDEMNITY
2. TYPE OF INSURANCE	DIRECT VERSUS CEDED TOTAL DIRECT VERSUS, SALVAGE, SUBROGATION, REFUNDS
3. TYPE OF BUSINESS	LARGE ACCOUNTS/STANDARD COMMERCIAL ACCOUNTS/SPECIALTY ACCOUNTS

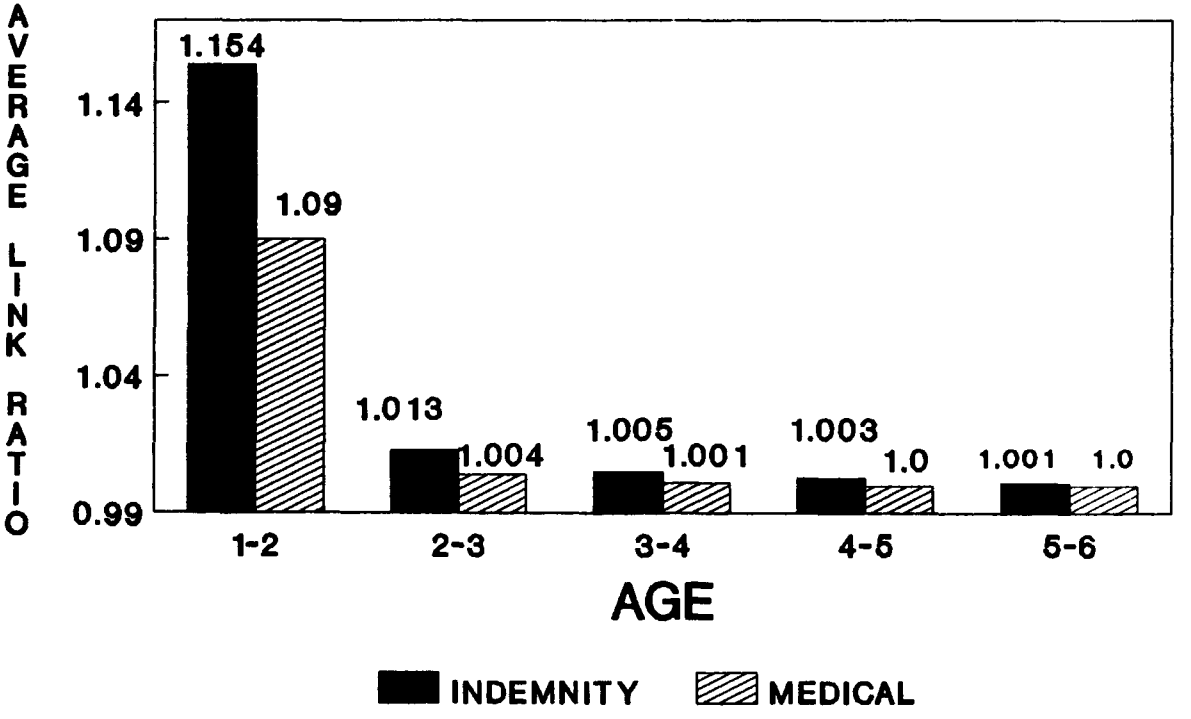
COMPARISON OF EMERGENCE PATTERNS
INDEMNITY CLAIMS REPORTED



COMPARISON OF EMERGENCE PATTERNS
INDEMNITY INCURRED DOLLARS



COMPARISON OF EMERGENCE PATTERNS
CLAIMS REPORTED



OTHER POSSIBLE CLASSIFICATION SYSTEMS

VOLUNTARY – INVOLUNTARY

IN–HOUSE – OUTSIDE CLAIM HANDLING

BENEFIT LEVELS (STATE)

INDUSTRY TYPE

LOSS TYPE – TEMPORARY TOTAL, PERMANENT TOTAL,
TEMPORARY PARTIAL, PERMANENT PARTIAL

LOSS TYPE – MEDICAL/INDEMNITY/REHABILATION

ALAE RESERVE TEST

DATA CLASSIFICATION

TYPE OF BUSINESS	LARGE ACCOUNTS/STANDARD COMMERCIAL ACCOUNTS
TYPE OF INSURANCE	DIRECT/CEDED
CAUSE OF LOSS	INDEMNITY/MEDICAL
TYPE OF EXPENSE	LEGAL/ADJUSTERS

ALAE RESERVE TEST

METHODOLOGY

- ULTIMATE EXPENSE =
  PAID EXPENSE * EXPENSE DEVELOPMENT FACTOR

- ULTIMATE EXPENSE =
  ULTIMATE LOSSES * SELECTED EXPENSE RATIO

- ULTIMATE EXPENSES =
  PROJECTED (PAID) ULTIMATE EXPENSES * (PERCENT EXPENSES PAID) +
  ULTIMATE LOSSES * SELECTED EXPENSE RATIO * (1−PERCENT EXPENSE PAID)

ALAE RESERVE TEST

METHODOLOGY

PERCENT OF EXPENSES PAID TO DATE

MATCH PAYOUT OF LOSSES TO PAYOUT OF EXPENSES
CONSIDER CHANGES IN PAYOUT RATE IN LATEST DIAGONAL

EXAMPLE EVALUATION	(1) %OF EXPENSES PAID	(2) %OF LOSSES PAID	(3) %OF LOSSES PAID	(4) %OF ADJ % OF PAID
84	0.8886	0.8800	0.8800	0.8886
72	0.8383	0.8300	0.8360	0.8443
60	0.7552	0.7700	0.7606	0.7397

(1) AND (2) ARE BASED ON SELECTION OF LINK RATIOS

(3) IS FROM LATEST DIAGONAL OF PAID LOSSES

(4) IS BASED ON INTERPOLATION

INDUSTRY LOSS ADJUSTMENT EXPENSE RATIOS
(FROM BEST'S AGGREAGATES & AVERAGES)

CALENDAR YEAR	LOSS ADJUSTMENT EXPENSE RATIO
1978	0.115
1979	0.130
1980	0.126
1981	0.136
1982	0.142
1983	0.132
1984	0.121
1985	0.117
1986	0.118
1987	0.133

TAIL FACTOR METHODOLOGY

CALCULATE DEVELOPMENT FACTORS FOR OUTSTANDING LOSSES

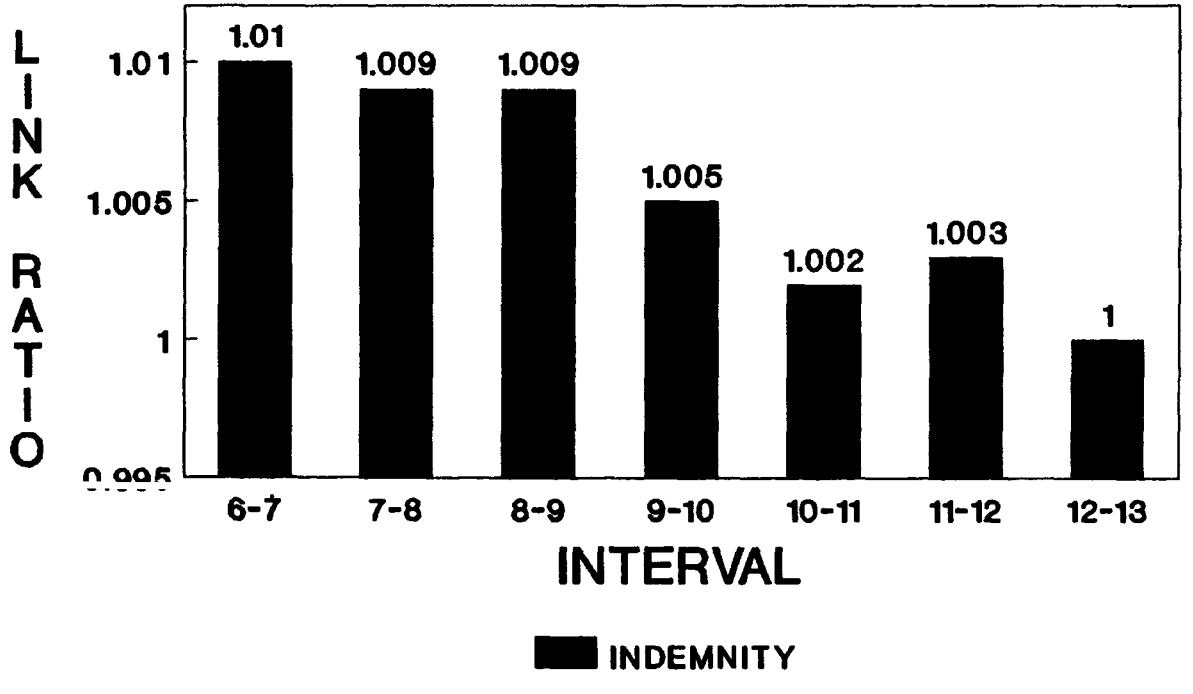
1. SELECT INCURRED DEVELOPMENT FACTORS CUMULATIVE FACTORS = A(T)

2. SELECT CUMULATIVE CLOSED/INCURRED RATIOS BY AGE = B(T)

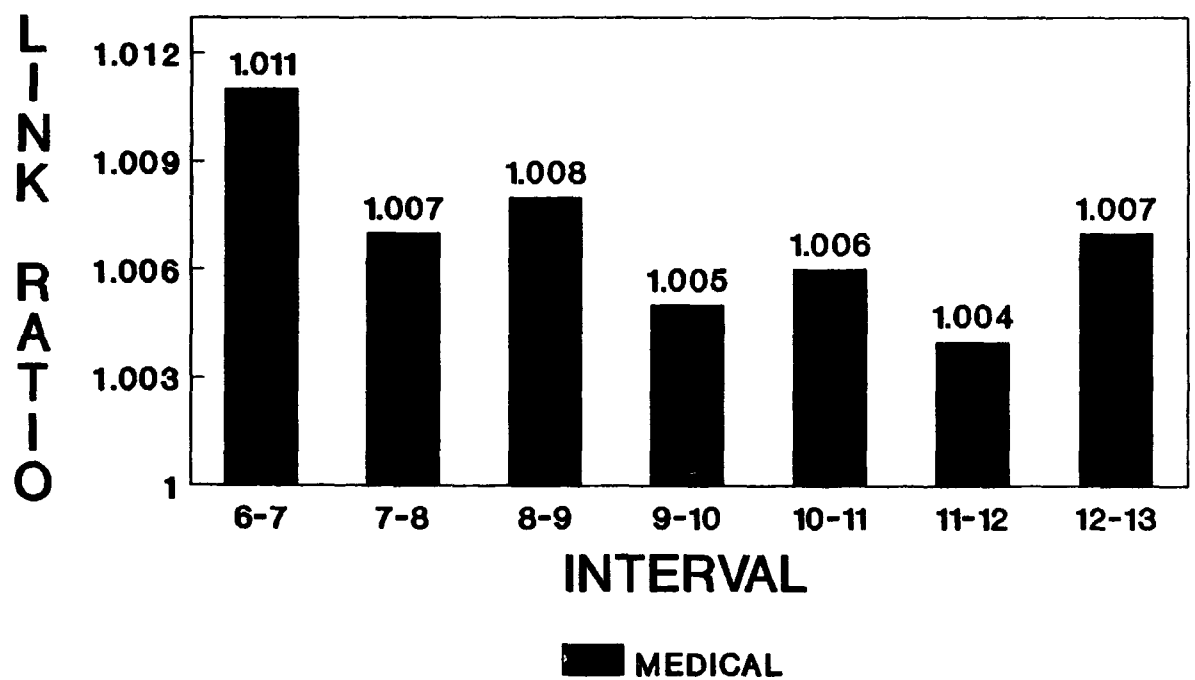
2. CALCULATE IMPLIED OUTSTANDING DEVELOPMENT FACTORS = O(T)

$$O(T) = \frac{(1 - 1/A(T))}{(1/A(T) \quad -(1/A(T) * B(T)))}$$

HISTORICAL AVERAGE INCURRED LOSS DEVELOPMENT FACTORS



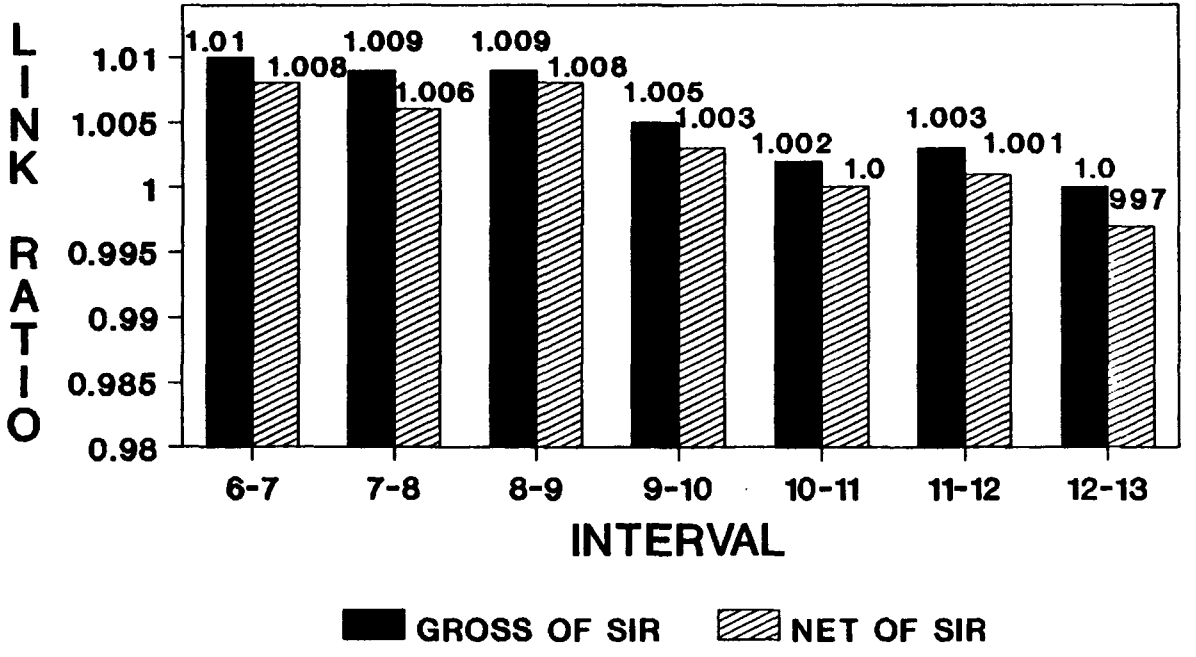
HISTORICAL AVERAGE INCURRED LOSS DEVELOPMENT FACTORS



TAIL DEVELOPMENT

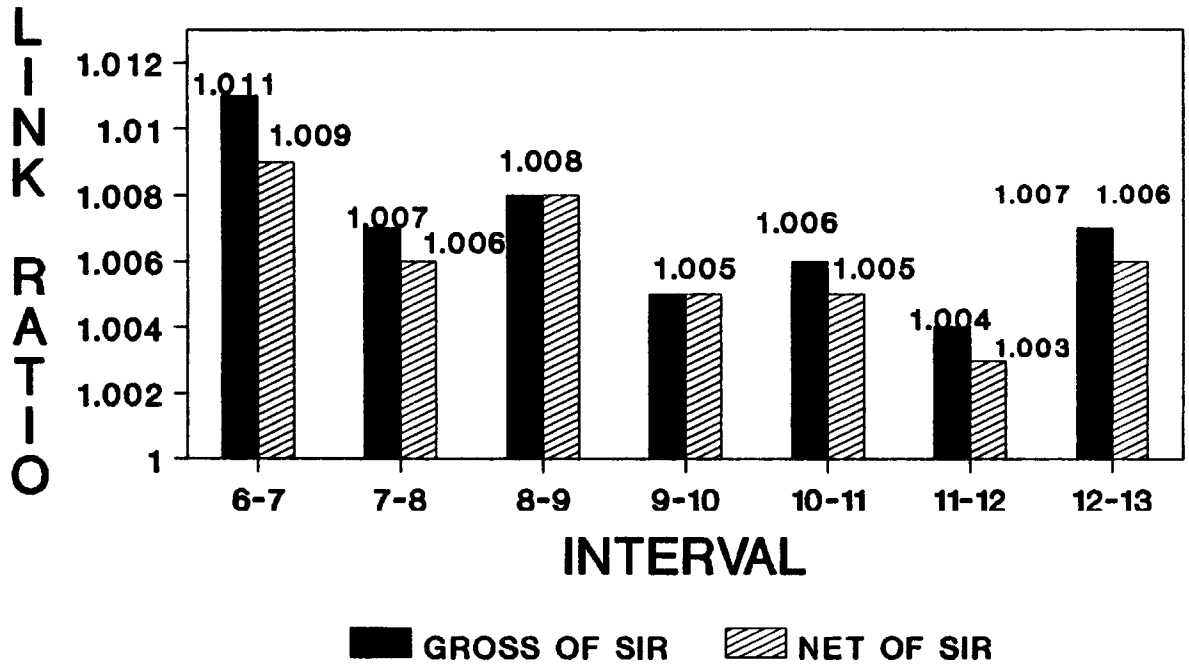
CAUSE OF LOSS	LENGTH OF BENEFIT PERIOD	FACTORS EFFECTING DEVELOPMENT PATTERNS
INDEMNITY	DISABILITY	MORTALITY, TREND, SECOND INJURY REFUNDS, DISCOUNTING
MEDICAL	UNLIMITED	MORTALITY, TREND, SECOND INJURY REFUND.

INCURRED LOSS DEVELOPMENT FACTORS WITH (WITHOUT) SIR'S REMOVED



INDEMNITY EVALUATION

INCURRED LOSS DEVELOPMENT FACTORS WITH (WITHOUT) SIR'S REMOVED



MEDICAL EVALUATION

EFFECT OF TREND ON PAID MEDICAL LOSSES

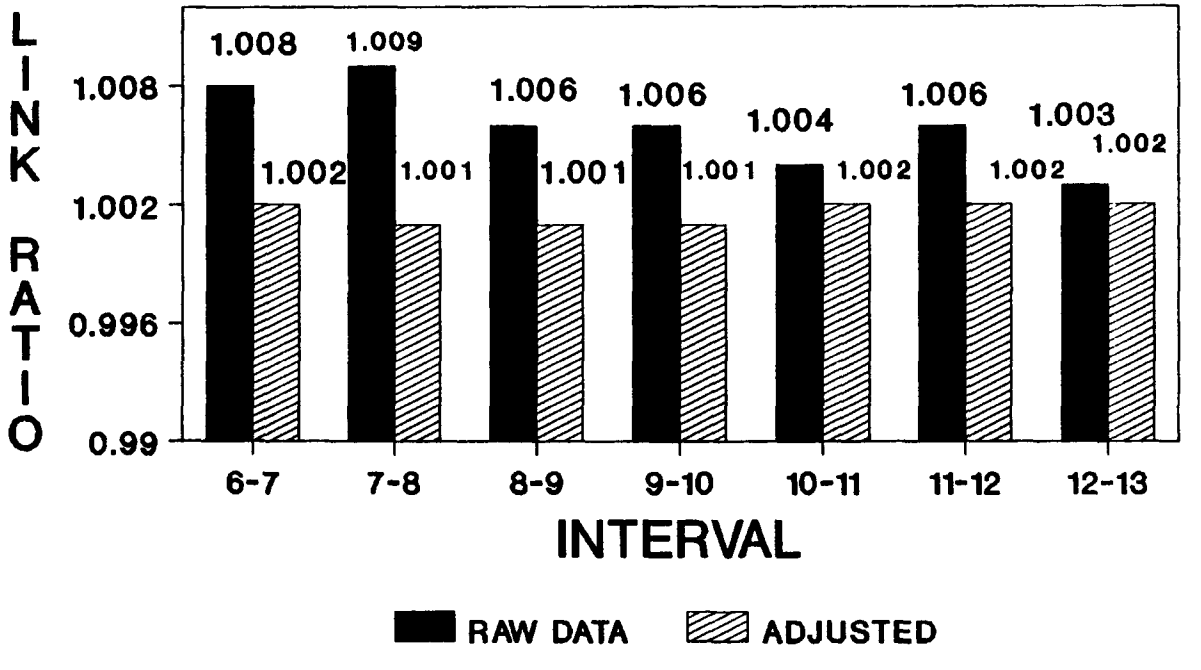
		AGE						
EVALUATION	12	24	.	.	.	120	.	.
-------	--	--				---		
12/80								
12/81								
12/82								
.		TREND IMPACT		-->				
.		|						
.		v						
12/87								
12/88								

EXAMPLE OF IMPACT OF TREND ON PAID MEDICAL COSTS

AGE	NO INFLATION	5% INFLATION*
1	400	400
2	300	300
3	200	200
9	100	148
TOTAL	1.000	1.048
DEVELOPMENT OF 3— ULTIMATE	1.111	1.164

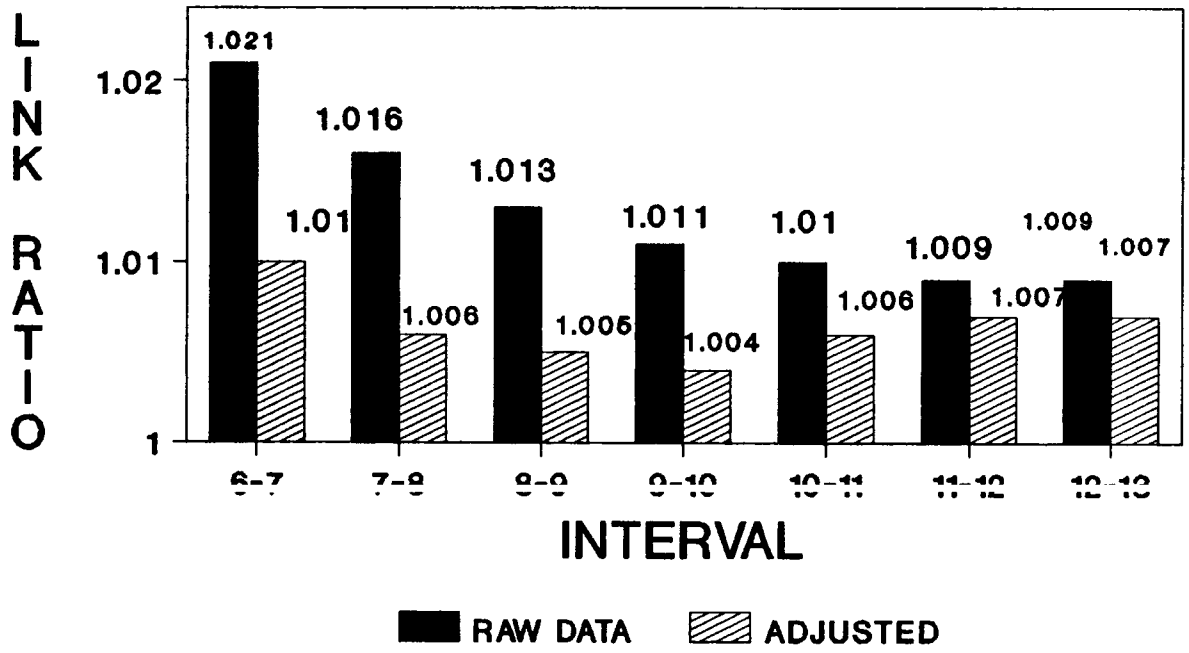
*PAID LOSSES INFLATE BY 5% AFTER AGE 3

DEVELOPMENT FACTORS REFLECTING ADJUSTMENT FOR INFLATION



INCURRED DEVELOPMENT - MEDICAL

DEVELOPMENT FACTORS REFLECTING ADJUSTMENT FOR INFLATION



PAID DEVELOPMENT - MEDICAL

EFFECT OF MORTALITY ON PAID MEDICAL LOSSES

CONSIDERATIONS

HISTORICAL DATA REFLECTS FORCE OF MORTALITY FOR 'YOUNGER' CLAIM POPULATION

FORCE OF MORTALITY INCREASES AS ACCIDENT YEAR AGES

CONCLUSION

DECAY MODELS SHOULD BE ADJUSTED FOR FORCE OF MORTALITY

SEPTEMBER 18-19, 1989 CASUALTY LOSS RESERVE SEMINAR
WORKERS COMPENSATION RESERVES

MARK E. FIEBRINK
SENIOR VICE PRESIDENT & CHIEF ACTUARY
WAUSAU INSURANCE COMPANIES

Good morning! During my part of the program, I'm going to cover three subjects with you. The first topic is how a changing mix of business by state or classification can impact average claim costs If the reserving actuary isn't aware of such changes in the book, he or she could significantly misestimate ultimate losses in the reserving or pricing process.

The first graph shows the change in ultimate claims by accident quarter for my company since the mid-1980s. Wausau Insurance experienced a significant decrease in market share in 1985 and that manifested itself in the 1985 and 1986 accident year data. Incurred claims decreased by 40 percent over this two-year period.

As we were going through this downsizing, we knew that our distribution of business by state was changing. For example, we were still writing a fair amount of workers compensation insurance in Wisconsin. As our insured exposures decreased in many other states, our concentration of business in our home state increased such that 17.5 percent of our claims were from Wisconsin by 1987.

A review of the statutory workers compensation benefits on a state-by-state basis would suggest that Wisconsin claim benefits are sort of average. There are lifetime benefits for dependents on death cases and for permanent injuries, but they are not escalated over time with the change in average wages. However, Wisconsin does have one of the very best workers compensation administration systems in the country, which allows for the payment of reasonable benefits at affordable costs and which results in lower average claim costs than countrywide.

On the other hand, we found that our relative concentration in several high severity states was decreasing. For example, in 1984, 4 percent of our claims were in Texas. This percentage dropped to 3 percent by 1987.

While our distribution of business by state was changing, we also experienced a change in our business by type of industry. We were decreasing our exposures in risks that were primarily engaged in the transportation business and that experienced fairly high average claim severities, going from 5.5 percent of our claims in 1983 to 2 percent in 1987. At the same time, we were gaining relative exposures in service business, with lower than average claim costs. We wanted to measure the impact of the change in distribution by industry as well, because those changes can be as significant as changes in the distribution by state.

Finally, we were concerned with the interaction of these two movements. We wanted to know what the severity relativities between states were, after adjusting for the industry mix of business by state. Just analyzing the relative severity of claims by state would be an insufficient indication of the impact of our change in mix because of the different distribution of business by class within state.

These considerations led us to an analysis of the situation with a technique known as the calculation of relativities with minimum bias. Imagine a matrix of average claim costs by state and industry. The minimum bias technique allows one to derive relativities for each state and industry group, in such a way that when these relativities are combined and compared to the actual average claim cost relativities for each combination of state and industry, the sum of the squared differences is at a minimum.

For a more complete description of the approach and the mathematical formula, you should read Robert Baily's paper entitled "Insurance Rates with Minimum Bias," Volume 50 of the Casualty Actuarial Society Proceedings.

I will wrap up this part of my presentation with some conclusions from our severity relativity study. Our research indicated that we should expect to see a significant decrease in the severity trend from accident year 1984 through 1987. This graph shows that we have indeed exerienced that decrease. The severity change averaged only 6 percent over that period of time. A combination of wage inflation, medical inflation and law changes over that period of time would suggest a severity change of 8 to 9 percent per year without a change in mix of business.

The second topic I want to present today continues with the theme of analyzing experience on a state-by-state basis whenever possible. California generates more workers compensation premium than any other state. In 1989, private carriers and the State Fund will write almost 8 billion dollars of workers compensation business in the state.

California is also a bellwether state regarding trends in workers compensation. For example, in 1975, it was one of the first states to mandate that certain vocational rehabilitation benefits be offered to eligible claimants. The Workers Compensation Insurance Rating Bureau of California began the collection of vocational rehabilitation loss data on individual case forms in 1978. This policy year data shows an increasing utilization of vocational rehabilitation benefits as a percent of case incurred losses. Note two things about this data:

1. A trend of increasing vocational rehabilitation benefits by policy year.

2. The vocational rehabilitation percent of loss increases as a percent of case losses with later reporting.

These two facts mean that the emergence of this benefit tends to increase case incurred development factors to ultimate. Reserving actuaries need to take this into consideration, and should separately identify and analyze this benefit in loss reserve work. Although I do not have fully developed and trended statistics at my disposal, I estimate that vocational rehabilitation benefits in California will be about 15 percent of ultimate losses on policy year 1989 experience.

In short, the size of the market and the propensity for California to lead on many workers compensation claim issues mean that it is an important state to pay attention to for loss reserving and other purposes.

Fortunately, the Workers Compensation Insurance Rating Bureau of California makes extensive use of accident year statistics in its ratemaking process. Their studies provide the reserving actuary with a wealth of information on medical and indemnity loss development patterns, as well as estimates of ultimate loss ratios by accident year for the industry that serve as useful benchmarks in the reserve selection process.

This overhead displays the accumulated incurred development factors contained in the January 1, 1989 rate revision. For small companies, or companies doing business in the state for just a few years, this information can be very helpful in selecting reasonable tail development factors.

Notice the modest indemnity loss development factors. Many California workers comp claims have their indemnity closed with a compromise and release settlement. In addition, California indemnity reserves are set without an interest discount. These factors cut down on the indemnity incurred loss development.

On the other hand, the medical losses have historically exhibited a good deal of development in the past 10 years. A special study of this was conducted last year by the WCIRB's Claims Committee. They found various reasons for this development in a claim-by-claim review, and the following reasons were cited in the rate filing: unanticipated additional surgery, unanticipated additional hospitalization, increase in prices of drugs, purchase of additional prosthetic devices, purchase of additional pairs of eyeglasses and expansion of required physical therapy.

This brings up another point. In addition to using the WCIRB data, I recommend that you also read the section of the rate filing pertaining to the development of the indicated rate level change. That narrative usually contains some helpful information for the reserving actuary, such as the explanation for the medical development that I just mentioned.

The last information from the January 1, 1989 WCIRB rate filing is the estimated ultimate loss ratios developed as part of the ratemaking process. A large benefit increase effective in 1983 that was underpriced at the time of implementation and a rate decrease effective January 1, 1984 left the California rates significantly inadequate. Several years of semiannual rate increases beginning in 1985 appear to have brought the experience close to the 65 percent ratemaking permissible loss ratio. I mention all this because this loss ratio pattern can help you understand what you may be witnessing in your own company's experience. Plus, this information can help you make better loss reserve estimations on the more recent accident years, when loss development factors to ultimate should not be solely relied on to produce central estimates of losses by accident year.

As a final comment, I also use this WCIRB data extensively when presenting loss reserve information to my top management. It has been very helpful in this regard. With this information, my recommendations on California loss reserves are improved, and my management feels more comfortable knowing that industry experience was used to supplement our own data.

The last information I want to convey during my presentation concerns incurred loss tail development factors - the estimated development to ultimate from the time when accident years are already fairly old. This is a major consideration in workers compensation reserving, since certain benefits continue as long as the recipient is alive. Regarding indemnity reserves, pension reserves may be set with a modest financial discount, and that discount will result in upward reserve development as the claims age. Regarding medical, these benefits are unlimited in nature and updated reserve estimates often result in increased cost estimates. I discussed this point when I presented the California workers compensation data, so I won't go into details again.

We rely on regression analysis at my company to estimate these tail development factors. Two functions that we have found useful in this regard are the power curve and what I refer to as a double exponential function. In these formulas, the dependent variable is the age-to-age link ratio, while the independent variable is time. Actually, I think the double exponential works better than the power curve on workers compensation tail development, and I want to focus on using that functional form on indemnity development for the rest of my presentation.

A reasonable approach we have used is to start with long-term averages of age-to-age factors. This adds some stability to the historical development pattern. Then we solve for the A and B coefficients with the following double log equation. In practice, we have found that the residuals have an increasing variance over time, or if you want to use a 25-cent term, we found that the fit displayed heteroscedasticity.

This problem was eliminated by transforming the regression by dividing both sides of the equation by the independent variable. This leaves us with the following regression equation, and it results in a better statistical fit to our data.

To arrive at our estimates of development factors to ultimate, we assume that there will be no more development after claims are 40 years old. This assumption, along with our formula, results in the following development factors to ultimate.

As you can see from these values, loss development on workers compensation claims should not be ignored 10 or even 20 years after the claims are incurred.

During my presentation, I pointed out how important it is to analyze changes in a book of business by state and industry type. I next illustrated how one can use California Workers Compensation Bureau data in reserve work. Finally, I shared some information on how my company uses regression analysis to estimate workers compensation tail loss development factors.

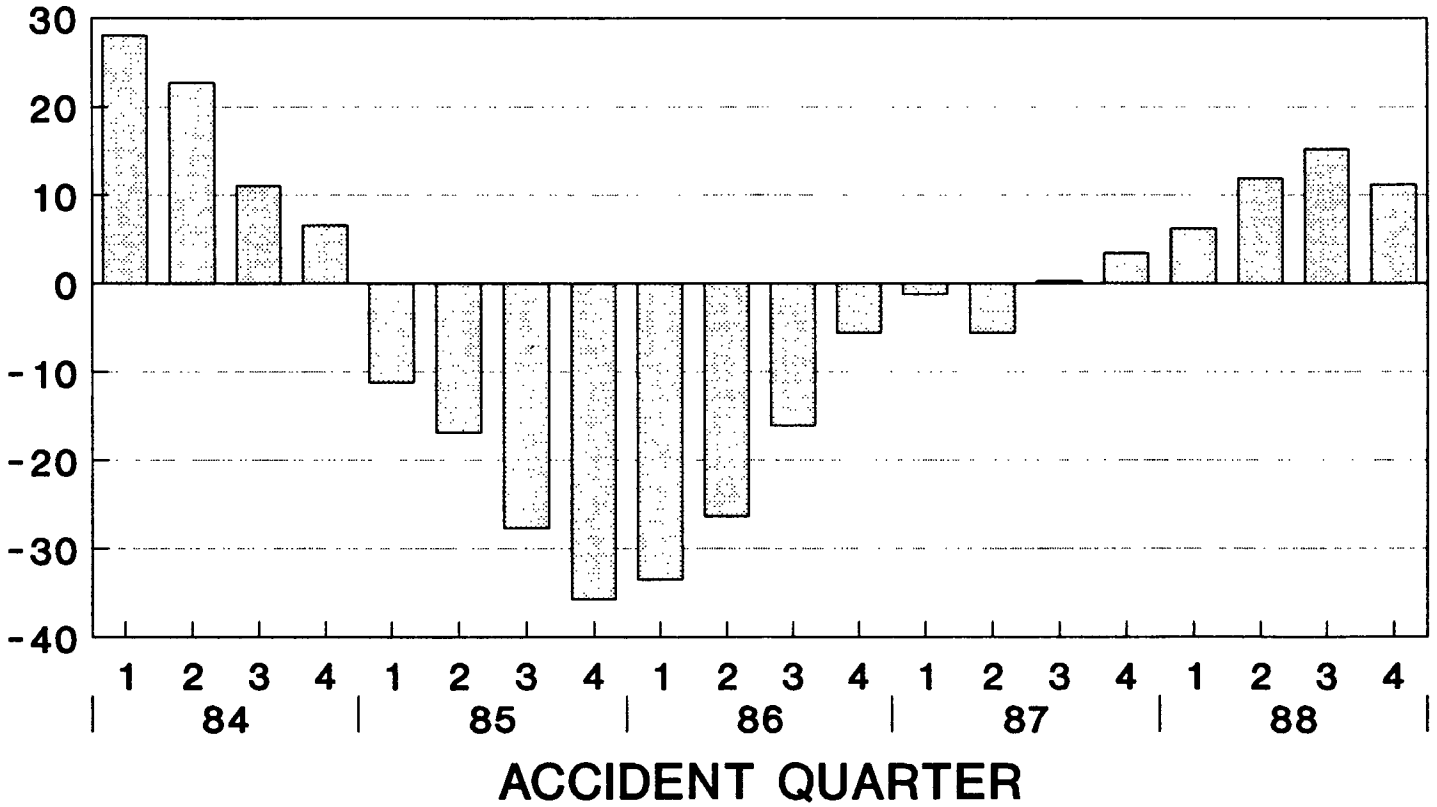
As a concluding comment, I would like to acknowledge the fine technical assistance of Renee Feathers and Tony Lundberg in the preparation of this presentation.

I hope that you have found my comments interesting and that this material will help you with your workers compensation loss reserving responsibilities. Thank you for your attention.

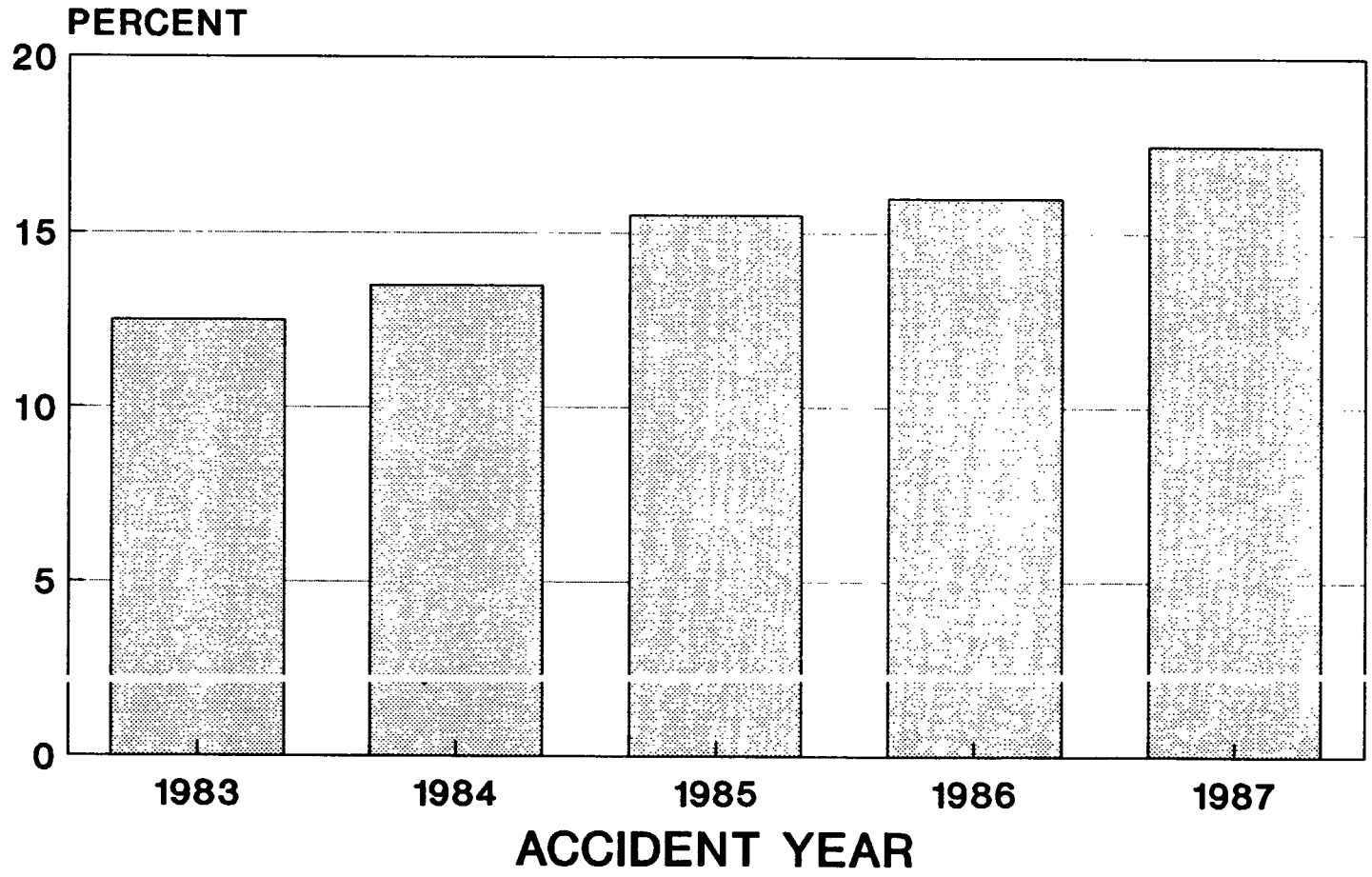
WORKERS COMPENSATION

CHANGE IN ACCIDENT QUARTER CLAIM

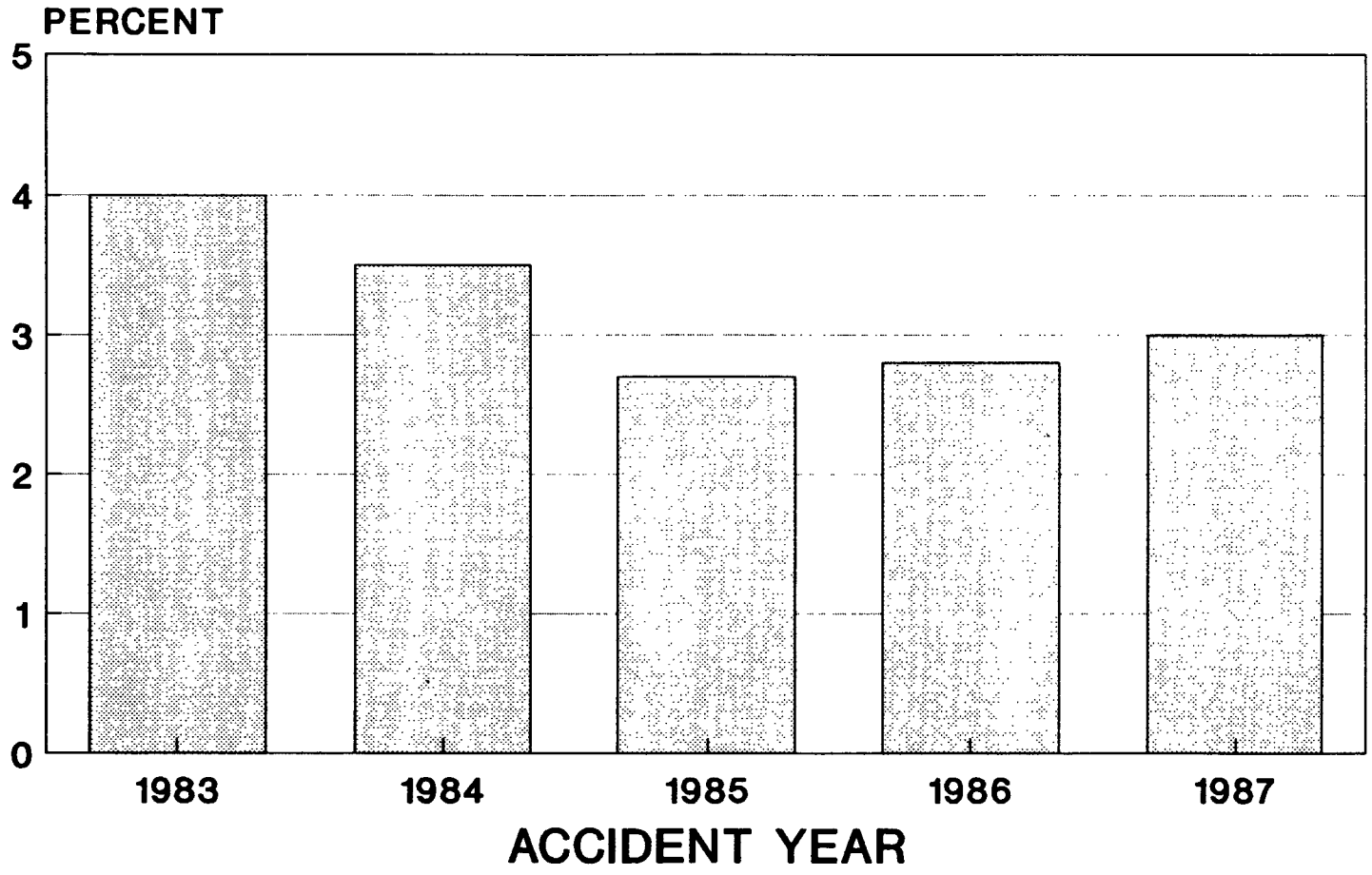
PERCENT CHANGE OVER PREVIOUS YEAR



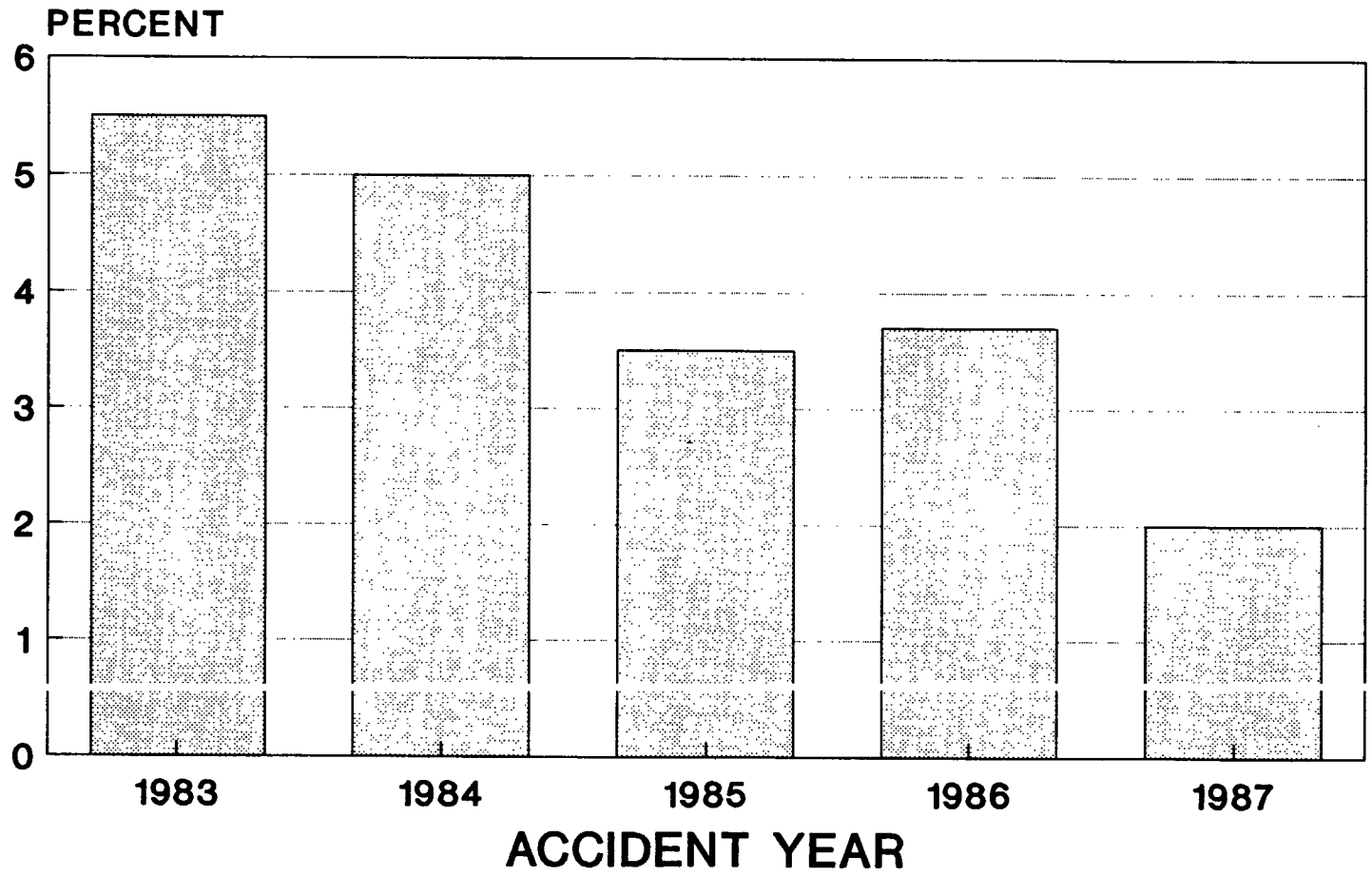
WORKERS COMPENSATION CLAIMS
PERCENT WISCONSIN



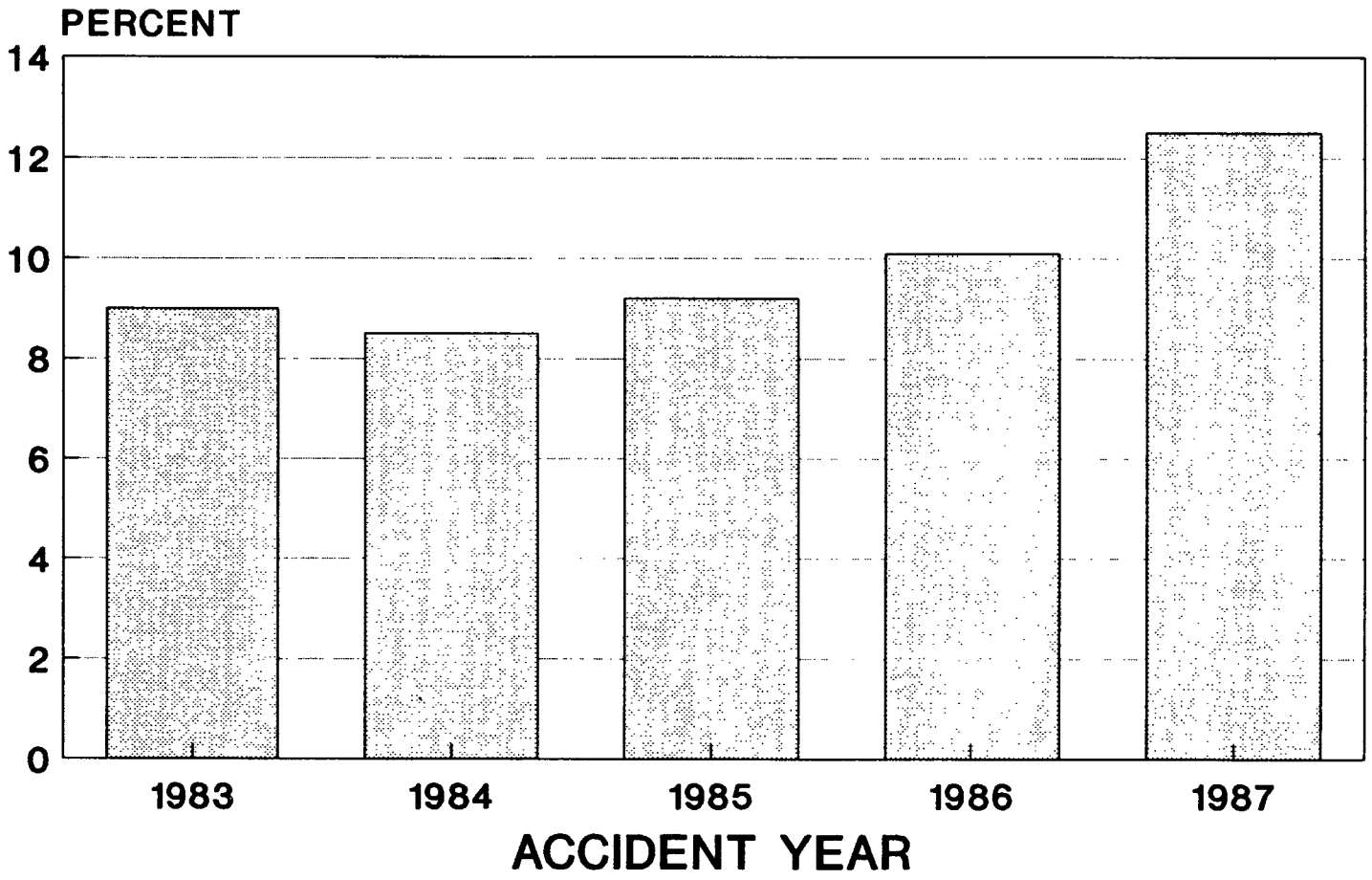
WORKERS COMPENSATION CLAIMS
PERCENT TEXAS



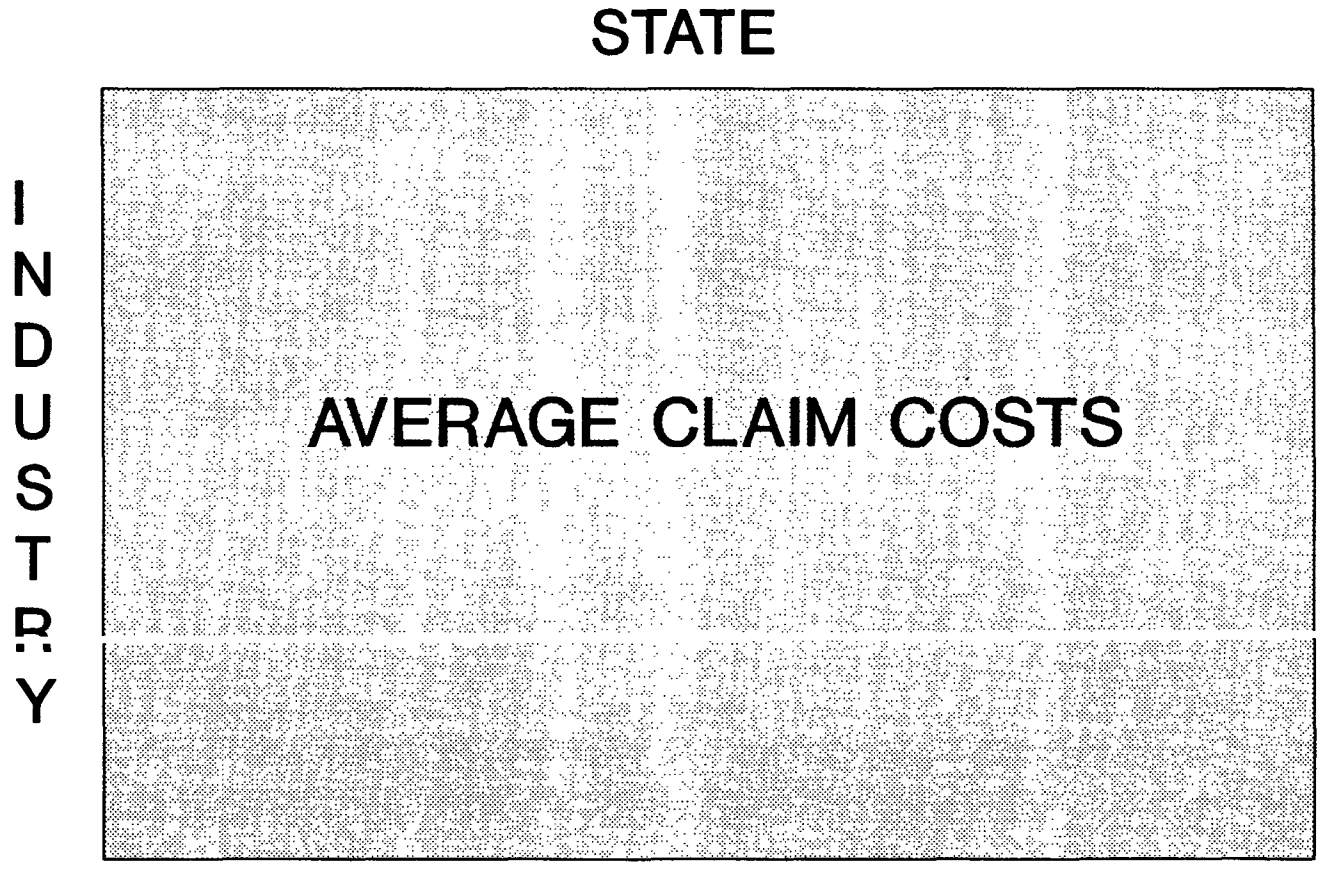
WORKERS COMPENSATION CLAIMS
PERCENT TRANSPORTATION



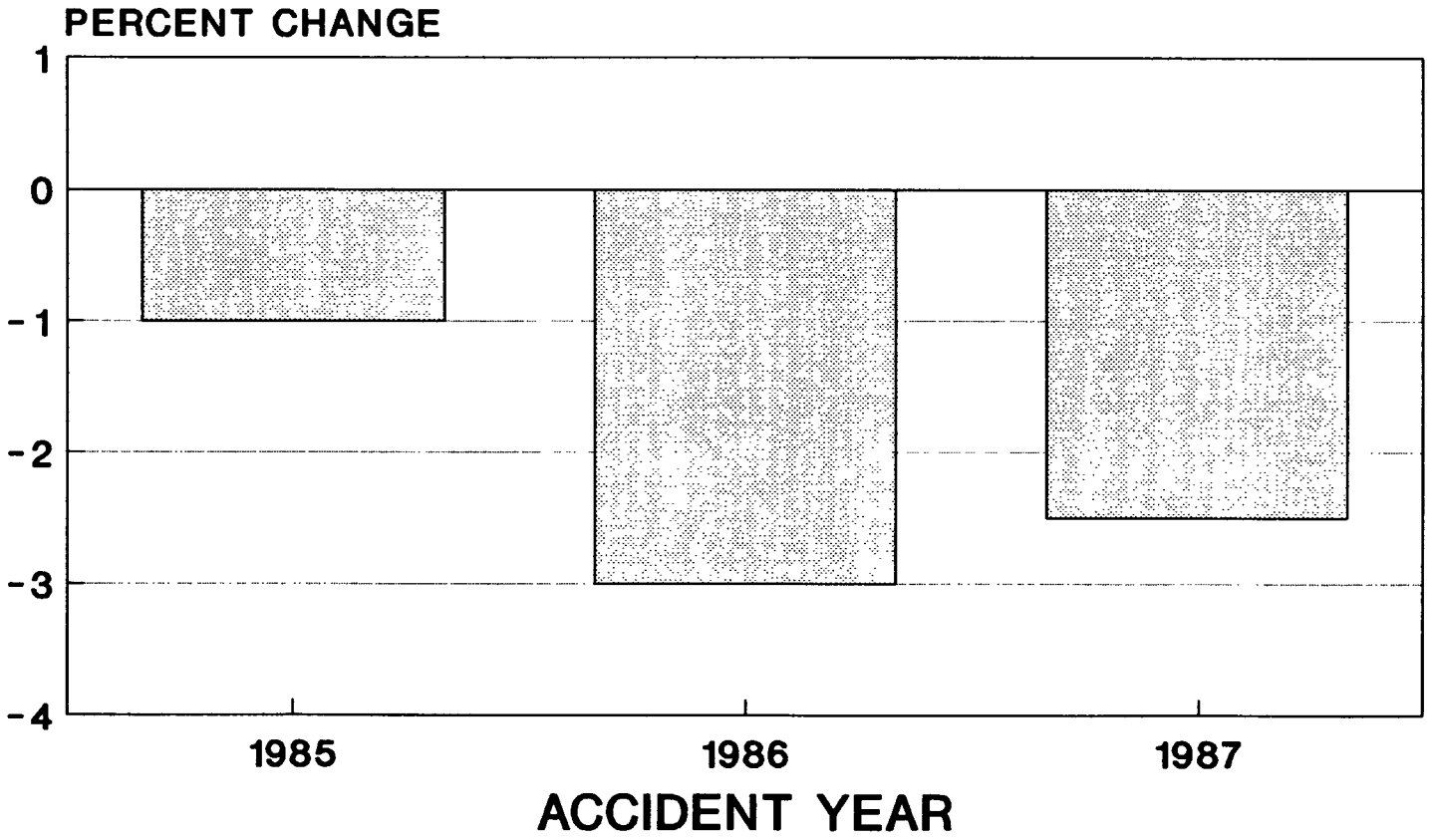
WORKERS COMPENSATION CLAIMS
PERCENT SERVICE



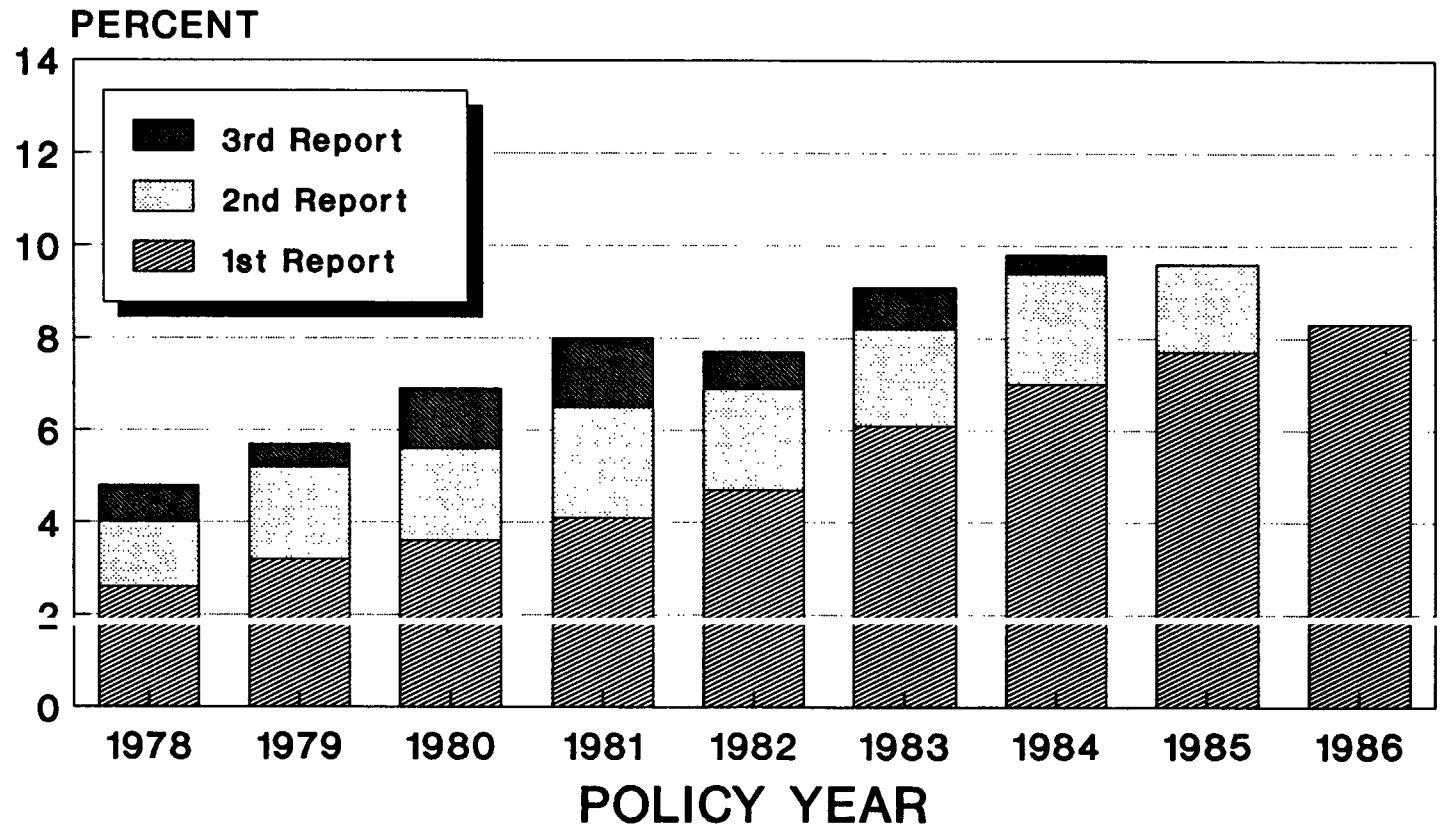
STATE AND INDUSTRY SEVERITY RELATIVITIES CALCULATED WITH MINIMUM BIAS TECHNIQUE



ADJUSTMENT TO AVERAGE SEVERITIES BY CHANGE IN DISTRIBUTION OF BUSINESS BY STATE AND INDUSTRY

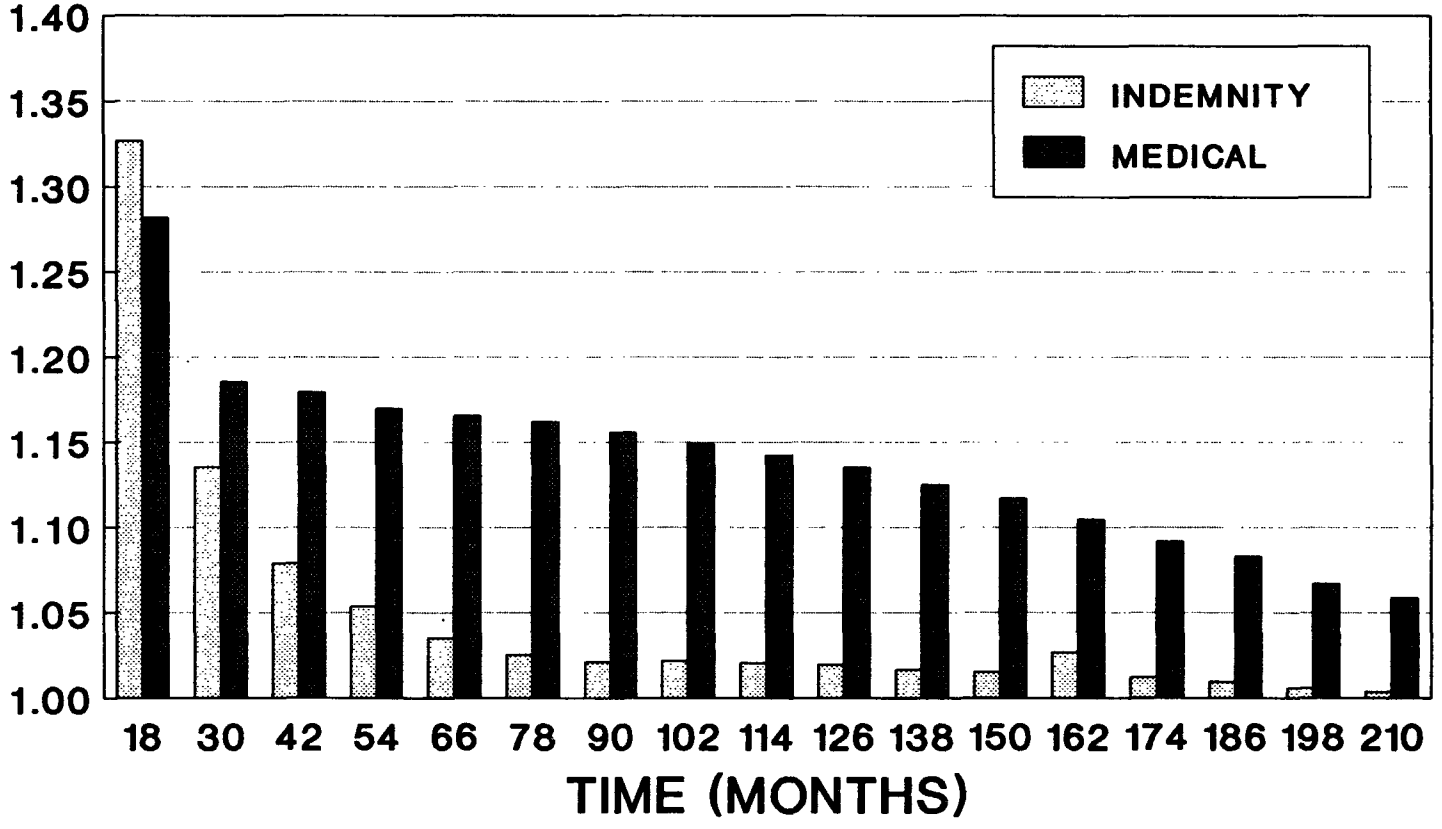


CALIFORNIA WORKERS COMPENSATION VOCATIONAL REHABILITATION BENEFITS PERCENT OF INCURRED LOSSES

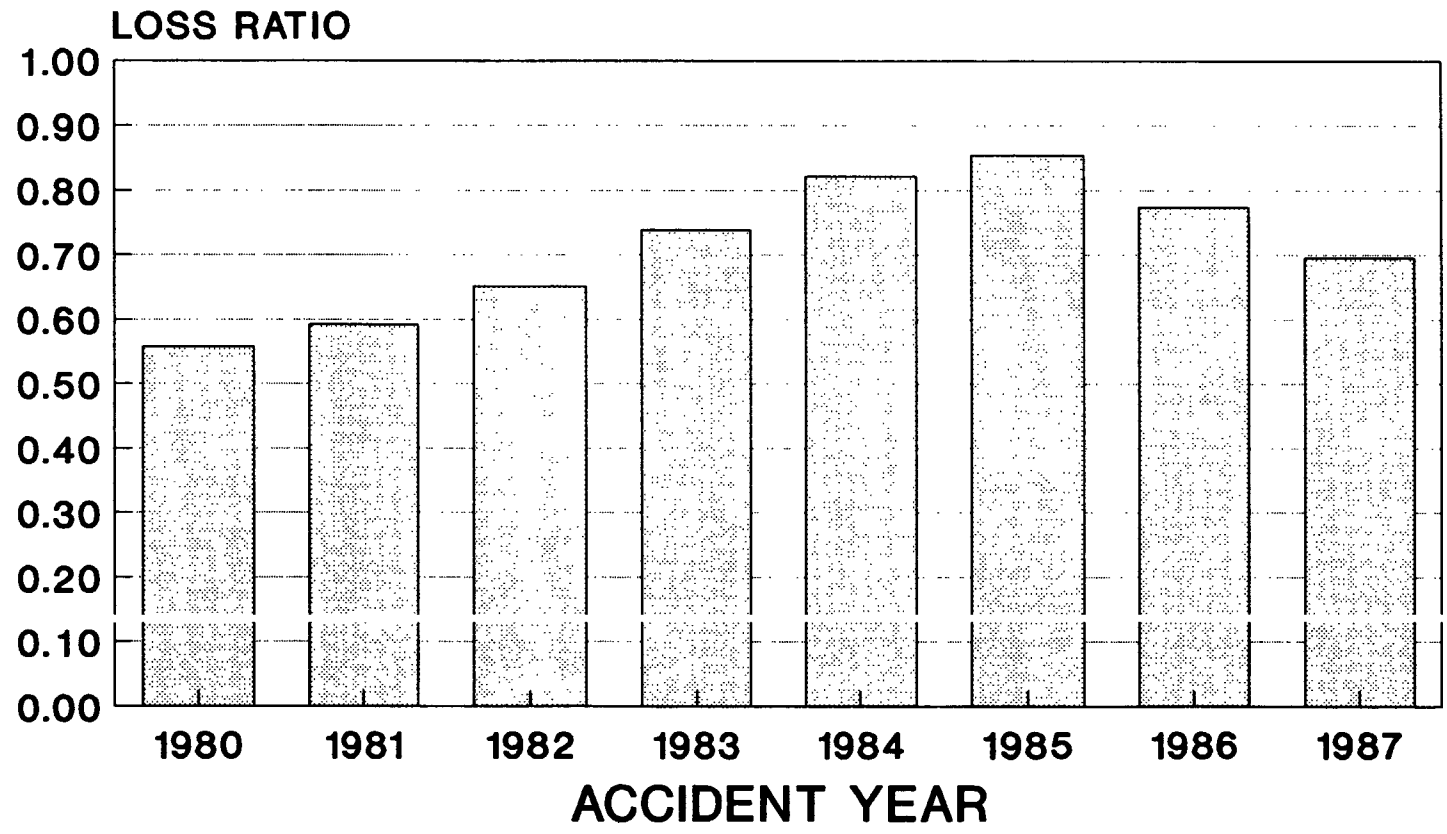


WCIRB APRIL 14, 1989 BULLETIN

CALIFORNIA WORKERS COMPENSATION INCURRED DEVELOPMENT FACTORS WCIRB JANUARY 1, 1989 RATE FILING



CALIFORNIA WORKERS COMPENSATION ESTIMATED ULTIMATE LOSS RATIOS WCIRB JANUARY 1, 1989 RATE FILING



WC LOSS DEVELOPMENT ESTIMATING TAIL FACTORS WITH REGRESSION MODELS

POWER CURVE

$$Y = A \times T^{B}$$

DOUBLE EXPONENTIAL

$$Y = EXP(-A \times B^{T})$$

DOUBLE EXPONENTIAL MODEL TO ESTIMATE TAIL FACTORS

LINEAR REGRESSION EQUATION

$$LOG\{-LOG(Y)\}=LOG(A)+LOG(B)xT$$

TRANSFORMED EQUATION

$$LOG\{-LOG(Y)\}/T=LOG(B)+LOG(A)x(1/T)$$

WORKERS COMP LOSS DEVELOPMENT
ESTIMATED FACTORS TO ULTIMATE

AGE (YEARS)	INDEMNITY	MEDICAL
10	1.041	1.053
15	1.020	1.031
20	1.009	1.019

MR. HALPERT: Well, I also want to talk about the tail factor. I guess you can tell by the fact that we've each discussed this as one of the major issues in making selections for Workers' Comp, both on paid and on an incurred bases. In fact, the one choice that probably has the greatest dollar effect in estimating the reserves is the selection of the tail factor.

The final issue I want to talk about with regard to tail factors is the effect of interest discount on pension cases. As many of you know, statutory accounting in several states allows companies to present reserves for long-term pension cases on a discounted basis. The interest rate varies by state, but it is generally modest in the range of three and a half to five percent.

Thus, any evaluation of reserves for these types of cases should, in some sense, give recognition to the fact that the case reserves may be stated on a discounted basis. Unfortunately, traditional actuarial reserve projection techniques will not provide that recognition.

This happens because, as an accident year matures, generally two things are going to happen. First of all, an increasing proportion of the losses are converted from reserves to actual loss payments. Secondly, as Harvey has alluded to, the average age of the claimant population grows as the accident year matures.

For each of these reasons, the amount of discount in the reserves tends to decrease to zero as the accident year matures to ultimate. If you view this analytically, this decrease in the amount of discount appears as adverse development, meaning if you look at the incurred losses over time, even if the case reserves are perfectly correct, the interest discount will unwind and the incurred losses will exhibit an upward development.

If this issue is ignored, then what is viewed as a reserve deficiency, meaning you project the losses out to ultimate, compare it to the amount that has been paid to date, and then you compare that reserve to what is actually being held, which is on a discounted basis, what is actually viewed as a reserve deficiency is nothing more than the difference between discounted and undiscounted reserves.

How do you address the issue if, in fact, you want to call this by some other name than a reserve deficiency, which it clearly is not? To address this issue, several approaches are possible. Let me just review one of them briefly. First of all, the selected tail factor must be reviewed.

If, for the oldest accident year -- meaning the oldest year for which you have experience -- there are many cases reserved on a discounted basis -- meaning there are still some pension cases that are open, and those are typically the cases that are still open for the oldest accident year -- then the tail factor to be applied to that year, all else being equal, should at least be equal to the ratio of incurred losses on an undiscounted basis to losses on a discounted basis.

In this way, all losses for that year and for subsequent years will be projected to an ultimate, undiscounted basis. From these undiscounted ultimate losses, an amount will be subtracted to account for the discount. This amount can be calculated by tabulating all pension cases that are discounted for interest and measuring the difference in the value of these cases when discounted at an interest rate of zero, versus the actual discount rate that's used in the case reserving process.

The sum total of all these differences for all pension cases currently recognized is subtracted from the undiscounted ultimates to yield to discounted ultimates which, in turn, yield discounted reserves. In this sense, if you then compare it to the reserves that are held, you are not biasing the result simply because of the difference between undiscounted and discounted results.

As a final thought, you must recognize that the approach I just mentioned will implicitly provide recognition for the pension discount only for those cases that currently carry a discounted case reserve. Part of the IBNR, undoubtedly reflects the fact that some cases that are currently categorized as nonpension cases and, therefore, are carrying an undiscounted case reserve, will ultimately shift to the pension category.

They may have a higher reserve, but once they are recatagorized from the nonpension to the pension category in the future, the case reserve will be discounted. There is no clear consensus currently as to whether statutory accounting allows for discounting these cases, meaning future pension cases that are currently not considered pension cases, whether statutory accounting allows for discounting these cases, as well.

Well, that's the end of the formal presentation. We've left a considerable amount of time for questions. I would invite the audience at this point to participate. I would just ask, since some people may be leaving early, that there are forms to fill out and I ask all of you to fill out those forms to review this session before you leave.

Are there any questions?

QUESTION: Janet Kappers, Commercial Union. I have a question for Mark. On page 6, you have a state and industry severity relativity matrix. The average claim costs, are those ultimate? Are those calendar year?

ANSWER: We used accident year case values and we looked at a series of accident years to give us an indication of the various relativities. We did not try to develop our data to ultimate before going through this process, because we didn't have enough information about different development patterns by state or industry to do that sort of development process justice.

QUESTION: By doing that, then, I guess one of the concerns that I have that I think I've run into is that, at some point, we decide something has changed and we decide how much of an adjustment ought to be made. But, as the actual development comes in, that adjustment is no longer operating; it's too high, because now you've got some real facts coming in.

So, by doing this on an accident year development basis, so that everything -- you could have it at the first year, the second year, the third year, then you would know how to adjust it, based on those?

ANSWER: Yes, if I understand what you're saying. Let me tell you how we were using this. We were using this early in the life of the accident year to supplement any incurred development or paid development indications we might be deriving, with more traditional methods.

As we gained more confidence in the more traditional methods, we would give less and less weight to this analysis to set the average values for the current accident year. Then, of course, as we would finish one year, we would be going right into the next

accident year and, again, starting over and relying upon these indications to supplement our reserve work early in the life of the accident year.

QUESTION: Thank you.

QUESTION: Alan Currant, Fireman's Fund. I have a question for Mark about the same state industry matrix. You used it to measure severity differentials Should there not also be some corresponding measurement of frequency effects? They may or may not be present by state, but certainly by industry class, severity and frequency ought to be moving and corresponding in opposite directions, shouldn't they?

ANSWER: That's a good point. We did not analyze that. Maybe if we had good payroll information that we could correspond to these severity indications by state and industry, we could pursue that. Maybe you could pursue that if you have something at your company.

QUESTION: Kathleen Weiss of Liberty Mutual. This question is for Mr. Sherman. I was pretty surprised or amazed at the change in the development factors when you adjusted for inflation. I have two questions.

One is: How do you measure the historical inflation rates, given that inflation moves in a diagonal direction and not in an accident year or development fashion? Number two, what are you using for future inflation rates in that example?

ANSWER: To answer the second question first, our projected rate of inflation was approximately between seven and five percent, significantly lower than what has occurred in the past.

As far as how we measured the inflation that had occurred in our historical data, what we looked at was the amount of dollars being paid in each interval for each accident year and the number of claims that were being paid on in those intervals. Then we tried to calculate calendar year average severities, sort of averaging between current diagonals, and we came up with a calendar year type rate of inflation. It's not easy.

QUESTION: Question for Mark. You mentioned the effects of line of business on reserve indications by examining the mix of business by state. I wonder about the effects of contraction on reserve indications regardless of change of mix of business.

I will mention the problem we've seen at our company and see whether you see the same effects in Wausau. When the line of business contracts, you have fewer policies renewed during the year than you had in force at the beginning of the year.

This means that you have to reach the effective date of your claims earlier than it would otherwise be. In other words, the emergence of claims after the accident year should be lower than, if there were no contraction of business, so both your incurred development and your paid development should be lower than the historical factors.

My question is to what extent this is true and how does one quantify it? If the line of business contracts, should your development be lower than otherwise and to what extent?

ANSWER: Excellent point. I didn't address that in this presentation but to the extent that you were using more traditional methods like incurred or paid development, you would definitely have to be on the look-out for changes in the development patterns as the relative age of your claims might be changing over time.

In fact, we did see what you are suggesting, that the development factors did change. The same thing would occur, of course, if you were growing very rapidly after a period of stability. That's another reason why we felt it would be very important to develop some alternative estimates of average costs because we made some judgmental adjustments to these development factors, but we wanted to supplement that with some other information.

Now, thinking back, I believe there is at least one paper that has been written on this subject. I think Chuck McLenahan wrote a paper a couple of years ago on this subject, as I recall. Someone might be able to give you the data, but I think it did address this very question that you've brought up.

QUESTION: Steve Herman, Continental. A question for Mark. The tail development factors for California medical, okay, were explained away by the number of changes, the number of unanticipated items. Why would you expect your tail factors that you show to be much less than California, given that those unanticipated items should be throughout the country, not just for California?

ANSWER: Good question. First of all, the California data was industry data. The development factors that I was using later on the tail factors were my company only data. If I were to take a look at my company's California experience, I would not see the magnitude of those development patterns in my company only data.

In addition, there were a couple of years where there were some latent exposures that caused part of the increase in the medical costs, in the development factors. Specifically, there was some identification of some asbestos claims. By no means were they causing the majority of this development but they were a particular problem in the California experience data that I don't think is quite as prevalent in other jurisdictions.

QUESTION: I also have a question for Harvey. To what degree have you tested some of the assumptions you made in terms of inflation and mortality? You would expect that some of that would come through as your losses develop over time. Have you tested for that?

ANSWER: Well, today, as far as the inflation, which I think we've done more work on, we've developed our measures of historical inflation, tracked them against changes in the medical indices to see if they match and if they make sense, and also to compare those patterns and the calendar year trend in our data to what efforts our claims department is making to control medical costs, just to see if our measurement is realistic, and we're pretty satisfied with that.

More important is projecting future medical inflation and then building that into our model and that we need to do more work on.

MR. HALPERT: Any other questions? Let me exercise some prerogative here as the moderator and ask one more question to both panelists, as well as to anyone in the audience that wants to comment.

I alluded to earlier -- for those of you who were here for lunch yesterday, Jack Burns suggested that perhaps, long term, we should be converting I think it was fifty percent of all reserves into a tabular mechanism, meaning you basically look up not only the case reserves but the total financial reserve from a table.

Anticipating that I'd be presenting this panel today, I said, "Well, okay, but at least Workers' Comp is not in that fifty percent." Well, his very next sentence was, "And I would definitely include all of Workers' Compensation in that fifty percent."

I wonder, Mark or Harvey, if you had any comments. On a relative basis, is Workers' Comp more amenable to converting it to a tabular reserve than other commercial lines?

MR. FIEBRINK: Well, it may be to a certain extent because I think some of the development patterns are more stable because of the aspect of pension benefits but, no, I would not advocate a tabular approach to the reserving process for any long-tail line of business; that would include Workers' Compensation.

MR. SHERMAN: My first thoughts on that is that it seems to have some merit in that most of the IB&R in Workers' Comp is on the case development side and, therefore, if something could be developed to allow that, it seems like it would have some merit.

MR. FIEBRINK: Aaron, I'd like to ask the audience, especially those who raised their hand in response to Harvey's small survey, what thoughts they have about the ratio of allocated loss adjustment expenses to losses, and whether they see any trends or not in their own data. Any observations on that?

MR. BRADY: Kevin Brady from the PMA Group. We've seen some growth in our allocated paid to paid loss ratios over the last four years and it is starting to level off right now. We've kind of had two reasons for that, at least that I attribute to it, one being the state mix, which you talked about earlier.

Over that four-year period, we have grown tremendously in states that we weren't a big player in earlier. We do have state-by-state data and the states that we got into seem to have a larger paid-to-paid ratio than the states we were primarily in before.

I think the second reason we attribute it to is when we increased dramatically in premium volume, in the other states that we went into, we had used a lot more outside adjusters as opposed to in-house adjusters at that time. I think that's why we saw the increase. Now that we've set up shops in these various states, we are starting to get away from the outside adjusters more to in-house adjusters, so it is being trimmed back some.

MR. ROSENBERG: I'm Shelly Rosenberg with Continental. This is more of an observation in response to your point, Mark, that I picked up in an earlier panel I attended on allocated loss adjustment expense, where there was a presentation by John Kollar of the ISO.

He showed in a chart data from '77 to '88 from a Schedule P but with his own adjustment, that he adjusted allocated loss adjustment expense, as far as I understood his exhibit, to ultimate, as well as losses to ultimate, and then showed the ratio of allocated to loss for Workers' Comp.

He had it relatively flat, trying to read it off the graph, from '77 to 85 and then rising from '86 to '88, and underlying that, it seems to me, is his own calculation that the allocated loss adjustment reserves, he stated, for Workers' Comp, were eighty percent of adequate.

The implication that I got from his remarks were that they were less adequate than the loss reserves, so I would say he concluded in that initial presentation that it is rising in the last several years in Workers' Comp.

MR. SHERMAN: Shelley, just a question, since I wasn't at that panel. Did John look at any paid experience and did it show something similar?

MR. ROSENBERG: I believe his development technique was a paid technique; I think that's the source of data.

MR. HALPERT: We have time for a couple of more questions.

QUESTION: I'd like to comment on Aaron's question about Jack Burns' question about tabular reserves, especially Workers' Compensation. Kevin Ryan has often written about the adequacy of reserving for Workers' Compensation in the underwriting cycle. When results are bad, insurance companies underreserve; to smooth out the results when results are good. Insurance Companies strengthen reserves to make up for the deficiencies in other years.

Jack Burns' point is that tabular reserves would not allow the actuary or the company's management to adjust the reserve estimates to smooth their earnings year by year. In Workers' Compensation, this is particularly true since the claim counts are much less affected by company reserving techniques or case adjuster reserve estimates, nor the severities of each individual claim.

Jack Burns was saying that although the tabular nature of the reserves may not allow actuaries the freedom to quantify the reserves themselves, the historical experience has been that actuaries or companies have adjusted reserves in relation to their earnings, which should not be allowed by tabular reserves.

ANSWER: Thank you for your comment. If the tabulated reserve would come about, I still don't think it would mean that actuaries would abrogate their responsibility to calculate and advise management on loss costs and losses and costing out the product, because even if it doesn't find its way into the annual statement in such a form, it certainly should be done to help to understand the cost of Workers' Compensation and to help guide management in making pricing decisions.

If that would come about, I really don't think there would be less of a demand for actuaries to do their reserve studies on the Workers' Compensation data. I do appreciate your comment about what Mr. Burns' objective is.

ANSWER: I would just like to add that if one used tabular reserves, it would still be necessary to adjust those factors or amounts for any inflation over time; otherwise, the adequacy would continue to slip.

MR. HALPERT: Are there any more questions? If there are none, again, I would ask you to fill out the review forms on the session and help me give a round of applause for the panelists.

(Applause)

1989 CASUALTY LOSS RESERVE SEMINAR

6F: LOSS RESERVE DATABASES

Moderator & Panelist

Edward W. Weissner
Prudential Reinsurance Company

Panel

Linda P. Mitchell
Prudential Reinsurance Company

SESSION 6F - LOSS RESERVE DATABASES

ED WEISSNER: Welcome, this is Session 6F, Loss Reserve Databases. My name is Ed Weissner and I'll be your moderator.

Our focus today will center on the development of a major reinsurance system including extracts for loss reserving using the concept of a relational database. Now, some of you might want to yell out, "Wait a minute, I came here to learn more about the design of a loss reserve database or system - not the design of a major reinsurance system." I hear you! I believe however, at least for a reinsurer, that there is little difference between the two!

When I list some of the major reserves to be evaluated in any (reinsurance) reserve study and the data that I need to do the evaluation, it appears to me that my data needs for reserving pretty much cover the insurance side of an entire reinsurance system. If we're going to evaluate a reinsurer's IBNR, we need contract data to classify the contracts into homogeneous IBNR groups (variables like pro rata or excess, property or casualty, high layer or low layer spring to mind), we need claim data to (1) classify claims into subgroups (variables like cause of loss, date of loss, etc) and (2) study development patterns (variables like paids, reserves, posted date, etc), we need premium data and market factors to create an exposure base for loss experience, we need exchange rates if there are many currencies in our database, we need information on internal cost centers, brokers and ceding companies, etc. To me it sounds like there is hardly any area of a (reinsurance) system that is not related one way or another to reserving. (See exhibit A - all exhibits are at the end)

Perhaps some of you are not interested in developing an entirely new system. You would prefer to pull data from various systems in your own shop and create a loss reserving database. Let me assure you that the methodology that I am about to show you is perfect for your need; in fact, we did precisely this several years ago. (See exhibit B)

I think we're about to discuss a very interesting topic and I don't know how easy or hard it's going to be for you. Those of you who attended Session 4F-1, Trends in Data Collection and Management Information Systems, got a very nice introduction to the systems side of what we're about to talk about today. If you were not in 4F-1, it won't hurt you at all. I intend to begin at the beginning. However, Mark Savory did provide a very nice tie between our talk today and systems trends.

Our panelists today are myself and Linda Mitchell who is also from Pru Re. Our plan is to divide our presentation as follows:

Information Modeling	Ed
Getting Focused	Linda
The Process	Linda
Why Relational?	Linda
Actuarial Extracts	Ed
Questions	?

I was going to give a whole load of introductory stuff, but I decided that the essentials are that we both have degrees in mathematics, that we both have teaching experience, that we're both with Pru Re - except I'm in Actuarial and Linda is in Systems, and that we've both "been there". We've actually worked on the design and construction of a major system for over 3 years. What we're about to tell you is all practical stuff! Of course there will be some theory, but we intend to tell you how to implement that theory. Moreover we want to share with you everything that we've learned in the past 3 years.

Not only will that be impossible, but I am concerned that "much of what we say you won't be able to hear." You need to work on one of these projects to really hear the message!

So let's jump in and get going. I hope you all have a handout. I intend to be as detailed as possible given the time - but you may feel I'm being glossy. I'm also not going to tell you about some of the sophisticated things we did in our database because it's our secret. But I'm going to tell you enough so that you could uncover all the sophisticated things. I hope that you'll feel that what we're giving you is very detailed and that you'll feel free to ask questions on anything. But the bottom line is that this is an introductory talk and our focus is the process and process details. I don't want to get into any debates on how we should have done this or that. If you understand the process, you can model the details any way you like.

So let us begin our presentation on the development of a major reinsurance system which includes extracts for loss reserving.

INFORMATION MODELING

ED WEISSNER: In a relational system the main focus is on the "natural structure in the data" over "processing"! You create a database to hold the data in its "natural" form; you don't massage the data and store it for a particular processing need. Moreover you store it once and let all processing draw on it as needed! This is very important and represents a big shift from the 50's, 60's and 70's where processing was king.

To develop a database with this "natural structure" we use "Information Modeling". It is very difficult to describe, but it puts the:

FOCUS ON DATA STRUCTURE
FOCUS ON DATA RELATIONSHIPS
FOCUS ON NON-REDUNDANT DATA CAPTURE
FOCUS ON A STRUCTURE THAT SHOULD BE FIXED OVERTIME
FOCUS ON NORMAL FORMS (THEORY STUFF)

The best way to describe it, I believe, is by example. Let's assume were going to model the data for the insurance side of a reinsurance system. Further, let's focus on the data structure that is "natural" and the ideal storage system from a user viewpoint. This is key! Do not confuse input data structure or output data structure with the information model - they can be different. Further, the actual physical implementation of the database in the system may also be different (it will be "equivalent", however, to the user information model).

To begin the modeling process, you must split your database into some general "natural" data clumps. (See exhibit C) I use the word "clumps" because I want to signal that this is data that appears to be connected and related and because I don't want to use the technical term that always sounds like more than it is. Finally, don't worry if you don't do it right - any "errors" will be corrected later. In all of these matters "its too early to tell" if you're right or wrong.

Before we "define" these clumps just a little bit so we all know what's in which, I hope that its clear to you that these clumps are clearly related to each other. Lets look at Exhibit D.

If there is to be no redundancy of data, then clearly the premium and claims on a contract must be "tied" to it. Further, premiums, claim amounts and limits will have to carry currency codes and be related to the foreign currency exchange clump if we want to do currency conversions. Also the individual staff members in a company will be related to contracts and claims as underwriters and claim techs.

So, as you can see, these big data clumps are really part of one big data clump - your database.

Our goal will be to break these clumps down into "molecules" and "relationships or ties". Before we begin the process, let's make sure that we all have a common vision of the major data clumps.

The Business Unit Data Clump (see exhibit E) contains information on internal and external business units that we deal with. It includes brokers, ceding companies, claim adjustment services, law firms, reinsurers, as well as all of our internal subdivisions. The information captured on each includes addresses, functions, hierarchies, relationships, etc.

The Person Clump (see exhibit F) contains information on each employee of Pru Re. Included is his "read/write" capabilities with respect to various components of the system.

The Foreign Currency Exchange Data Block (see exhibit G) contains the complete history of exchange rates over time between all pairs of currencies of interest. We'll need to talk more about this "history" requirement later.

The Contract Data Clump, a very key clump, (see exhibit H) includes for each contract, cession, policy, etc classification information "about" the contract that can be used to bring premium and loss together for management reports, specific contract terms and details, ties to other contracts, details on internal subsplits (we call them sections), etc. It is very important here to separate the information that is "about" the contract from information related to specific details. More on this later.

The Premium Plus Data Clump (see exhibit I) includes information based on "accounts" and premium statements. Unfortunately, for a reinsurer, these accounts come in all "shapes and sizes." Some companies report on a statutory basis, some on a policy period basis,... Some companies provide a detailed split by annual statement major line, some don't. Some send the on-going data in a statutory format but do retrospective premium calculations on a calendar/accident basis using 3 year periods as a base. Since this clump includes commissions and brokerages as well as premiums and, on occasion, losses that are reported in a summary manner, I've called the clump Premium Plus to remind us what's there. A better label might be PANIC, Premium and Non-Individual Claim.

Finally, we come to the Individual Claim Data Clump (See exhibit J). It contains all the information (description and money amounts) on each and every claim. It includes assumed claims, their cessions, specific cessions related to Cat covers that protect the company as well as summaries of claims to reflect aggregate limits or deductibles. Note that since we are designing a database, any claim can be stored in it.

Thus we can store individual claims that will not be sent to the financials as well as a financial impact claim that will summarize the individuals and then be adjusted for an aggregate deductible. Of course, we must be careful in "processing" to send only the applicable claims to the financials.

Let's now model the Individual Claim Data Clump. That is, let's see if we can break it down into a bunch of "molecules" and "relationships". Keep in mind as we proceed that my focus is reinsurance and that the process is more important than any controversial statement I make on the natural structure of claims.

For me, a "natural claim structure" is given in exhibit K. For each claim, there can be 1 or more sub-claims (individual claimants, individual layers, individual coverages,...). For each sub-claim, there will probably be many transactions (paids, reserve changes,...). For each transaction, there may be several money amounts involved. Further, at each level in the structure, there is unique information that applies to all lower levels. Let's assume we all like this model.

Next let us look at an event structure that will store information on key events (major catastrophes, big losses, major casualty losses,...). Exhibit L shows a simple structure. An event is defined and may have many names, many potential jurisdictions of loss, many alleged causes of loss, etc. Note that whenever there is the "possibility of many", I show this in my structure. Our actual event structure took 4 pages, but I think this is good enough for now.

To model the above situations, we need to digress for a minute or two to learn the notation used in information modeling.

In modeling, we use a box to denote a clump of data or entity of data. (See exhibit M) I find it helpful to think of the box as a pad of paper where each sheet has the "same record layout."

Further if for each occurrence (sheet of paper in my pad) in the clump A there can be 0,1,2,.. occurrences in the clump B, then B is related to A and an arrow is drawn between A and B with the double head at B. If you're confused, hang on, we'll get back to our example in a minute.

Now for each clump, we need to identify as many individual data attributes as we can possibly think of. They are listed along the right edge. Some data items are not only of interest because they are data but also because they uniquely identify the specific occurrences in this clump. Claim ID and Contract ID are good examples. These data items called "keys", are listed above the other data attributes and are preceded by an asterisk. If a data item ties us to another clump, it is called a 'foreign key". A good example is the currency code on a money amount which would tie it to the Foreign Currency Exchange Clump. (See exhibit N).

Lets now return to our claim structure (See exhibit K). Using our notation, we obtain Exhibit O. If we merge the transaction and money boxes into one money box (I think that transaction is too input oriented and contains no real data) and try to add attributes, our model might look like Exhibit P.

I hope you will agree that the non-key items are reasonable for each level in the model. I suppose that some of you may want to move location or cause up to the claim level. If you believe that in every case the location or cause of loss of all subclaims will be the same, then you should move it up to the next level. For reinsurers, we decided you couldn't do that!

This raises a very important point. In modeling, always begin by placing data low in the model and then try to move it up to higher levels! When in doubt, leave it lower!

Note that on the money clump there are 2 attributes: amount and amount type. This is a fairly typical situation. If a transaction had a paid loss for $200 and a paid expense for $300, then there would be 2 occurrences - one would have 200/Paid loss; the other 300/Paid expense. (Clearly we need a currency code here too.)

Observe the keys! For the claim level it is claim ID. For each occurrence in the subclaim info level, it's claim ID and subclaim number within the claim ID. For each money occurrence it's claim ID, subclaim number (within the claim ID) and sequence number (within the subclaim number). If for some reason all the "records" got shuffled and the "arrows were lost", you could reconstruct the data using only these keys!!!

Some of you might be thinking, he's just violated the no-redundancy rule. So it appears! But the keys are the only legal redundancy! (Further, the actual physical implementation does not keep the redundancy).

So, except for filling in attributes, are we done? Well, I wanted the model to carry many loss dates. For example, if a loss occurred on a claims made policy, I'd like to capture the actual claims made date as well as the actual accident date if it is available. If a loss occurs on a contract that is "risk attaching", I'd like to capture the policy effective date as well as the occurrence date. In some mass action cases I might have 3 or 4 loss dates.

I could, of course, just add all these data attributes to the Claim Level Clump. (See exhibit Q) However, if I did, then for some occurrences (claims), I'd fill in one date; for some others I'd fill in two; for some others I'd fill in three; etc.

As a rule of thumb (and according to the rules on 'normal forms" and redundancy), anytime there can be 0, 1, 2, or ... responses, we should open a new clump.

Let's repeat that! Anytime you can have 0, 1, 2, or ... responses, you should open a new clump.

Thus, as shown in exhibit Q, we open a clump for Loss Dates. Each claim will have (zero?) 1, 2 or .... occurrences of this clump; hence the arrow from the Claim Level Clump to the Loss Dates Clump. Note the keys are claim ID (the key from the Claim Level Clump) and Date Type (Accident, Claims Made, ...) within the claim ID. Date is the only attribute so far.

In the earlier examples, I would have 2 loss date occurrences claims made date and accident date or policy effective date and occurrence date.

So, are we done now? Well, I would like the model to carry the claim tech ID. Further, management would like it to carry a claim supervisor ID and a cession tech ID if there are cessions. Are you hearing what I'm hearing? Zero, one, two, or more! Of course we could list all these people as attributes on the Claim Level. (See exhibit R) But there's a more efficient way!

Following our prior example on Loss Dates you might decide to set up a "claim people" clump. You could have keys of claim ID and claim person type. An attribute of name or, better yet, person ID would be included. Close, but not quite.

Recall that we already have a person clump that carries information on each staff member. The key is Person ID and the information includes his name. Somehow we want to tie the information in the Person Clump to the Claim Level Clump and to the claim person role.

Now if we do tie these clumps, there will be an arrow from Claim Level to People (a claim can involve many people in the various roles) and an arrow from People to Claim Level (a person can be involved in many claims). According to the rules of modeling, this is illegal! (See #2 in exhibit R)

The modeling solution is to create a new clump called a "junction box" (which is somewhat artificial) to bring these two clumps of information together. (See exhibit S) Here we create the Claim/People Junction Box. It carries the keys of the combined clumps and has arrows going into it from both. Note the attributes are role and diary date. Thus for each claim and each person associated with it, you can name his role. (Note under this model, a person can only have one role on a claim.)

Junction Boxes are very important! They are very useful when you want to tap into all the information in another clump; all you need to do is set up a junction box, copy the keys of the two clumps and add attributes, if necessary.

So, are we done now? Well, I did want to create an Event Structure so that I could tie all claims on one event to the information about the event or to get the event incurred. Recall my Event Structure (See exhibit L). Using the modeling concepts discussed already, I hope you can see that it can be modeled as Exhibit T.

Now, how do we tie the Event Structure to the Claim Structure. Clearly for each event there can be many claims and for each claim there can be many events (at least in reinsurance where some aggregates combine losses from several occurrences). (See exhibit U) I hope you're already thinking junction box.

Exhibit V shows the tie between the Event Clump and, for us, the subclaim clump. We decided that subclaims should be tied to events and that in some reinsurance cases only part of those subclaims dollars should be allocated to the event. Note the 3 keys on the junction box are just the keys from the clumps being tied and there is only one attribute. (By the way we have one junction box that has 8 keys!)

Our modeling also allows us to tie 2 claims together - maybe they are various layers of the same loss but on different contracts. Or maybe one claim is an individual claim that is part of an aggregate deductible claim. Exhibit W shows the modeling. Here you are connecting the claim box to itself through a junction box.

Are we done now? Well, let's see where we stand! Exhibit X shows the model we have built so far; I added the tie to contract section (a natural subdivision of the contract or sub-contract if you like) just to show you the tie to contract. As you can see, its getting bigger and more complex. Moreover we left off the keys and attributes.

So are we done now? Well, its up to you. Are we? What about notes for the claim tech? What if we pay some expenses (say, legal) that can not be easily charged to the individual subclaims? Will cessions be handled here? What if the cession is excess on all of the subclaims (some of the subclaims)? Suppose the claim is not a valid claim based on your coverage? (See exhibit Y) And there are more!

Our claim model has over 50 boxes or entities. In all, including contract and premium our model has well over 200 boxes.

DATES - HISTORY

I'd love to say more on information modeling, but time is short. Before I turn it over to Linda, I'd like to add a few words on dates, data access and history.

There are many dates throughout our information model. (See exhibit Z). There are 2 dates that are super important however because they allow you to access the correct view of your data. They are Posted Date and Effective Period.

The Posted Date goes on every occurrence of a clump (we should have listed it on each attribute list) and is the date and time the information is stored in the database. With respect to money, it provides history; with respect to descriptive information (cause of loss, major line) it provides a "what did you know when" date. (See exhibit AA)

The Effective Period goes on data clump occurrences that are "inforce" over time. In general you will need effective periods on contract terms, foreign currency exchange rates, business unit information, etc. You do not need an effective date for a claim or a premium; you may need other dates like date of loss or period of loss or premium period - but these are not effective or inforce periods. (See exhibit BB).

Now, if you use the Posted Date in conjunction with the Effective Period, you can develop a history structure in your database. To see the power of this idea, let's look at a Currency Exchange Rates example. (See exhibit CC).

As you can see, on date 1 I entered an exchange rate of 3 for date 1 on. (It is very convenient to assume this rate will be in effect until I change it "or overlay it".) Note that in the picture below, I use a line to represent the inforce period and I put the rate on the line. The next 2 inputs are similar except they move down in the picture to reflect a more current posted date and to the right to reflect a later inforce begin date. The fourth input on day 4 is a correction to the original rate and applies only to the piece that is not already overlayed.

After day 4, these 4 "records" are in the database.

If we now want to inquire into the database to get a rate, we need to provide 2 dates. First we need to provide an "in effect on" (IEO) date - "the date" the exchange rate is inforce or effective. (Note, we input rates with effective periods - now we want the rate for a specific day). Second we need to provide a "knowledge as of" (KAO) date - what is the most current posted date for which I can view information? Lets see how this works.

Exhibit DD has several examples. Let's use exhibit CC to find the answers. For each pair of dates,

1) cover the lower part of the picture from just below the Posted Date that equals the knowledge as of date
2) draw a vertical line through the effective date axis at the In Effect On date
3) Select the rate whose inforce line passes through the vertical line and which is closest to the knowledge as of cover.

Note that the final 3 examples exclude the fourth record!

This is a very powerful concept for keeping history and answering the question of "what did you know when" about the term in effect "then". I wish I could say more.

GETTING FOCUSED

LINDA MITCHELL: Now that Ed has described to you "what" an Information Model is, I would like to continue by explaining "how" that Information Model was used to develop our System (called "ReSource"), "who" was involved in the process and "when" these discussions took place.

Our next steps after completing the model, were the tasks of describing the functional requirements of a system which would mirror this model and then designing, programming and implementing those requirements.

We began with one of the simpler "data clumps" that Ed described, the one which contained information about our "business units" (brokers, ceding companies, our internal department structure, etc.). Despite the fact that this was one of the smaller pieces to implement, it quickly became obvious that the project was too big! If we continued to implement the entire model, as it stood, this would take far longer than anyone had originally anticipated. A critical/objective look at the model indicated that it reflected a "dream system" - one that could be our ultimate goal, but NOT one that should be implemented as an immediate objective.

The question that then faced us was: "Now what? How do we take this valuable model and implement its key parts in a reasonable timeframe?". To answer this question, the executives at Pru Re selected a group of individuals to work together on a broad implementation plan. The group was charged with the task of developing a realistic plan that in the:

Short Term	-----	Guaranteed Meaningful Strategic Information
	-----	Minimized the need for Existing Systems
Long Term	-----	Maintained our Ability to Implement the Entire Information Model

This group (affectionately known as the "gang of eight") was comprised of key individuals from the various disciplines throughout the company. It included members from Underwriting, Claims, Accounting, Actuarial and Systems - people who, in the eyes of the executives, had the knowledge and the vision to provide a broad focus on the problem at hand. The actuary, in particular, was in a unique position to contribute to this process since the actuary, in doing reserve studies, had become very familiar with the interplay between contract descriptive information, currency conversion, premium and claim data, grouping for homogeneity, etc. Thus, the actuary was concerned about all aspects of

the system. Team members were selected from our managements ranks and included managers, directors and vice-presidents.

The group was given one month - full time - to develop the plan.

One of the first items that the group addressed was why the Business Unit project was taking longer than originally projected - we felt that if we could see where we "went wrong" on this project, we would be able to avoid those same pitfalls on subsequent ones. The Systems Department was put on the spot to explain.

The answer was actually not very difficult and depended upon these premises:

1 - More data = More time/resources
This is actually a pretty reasonable statement when you think about it. A builder will need more men, money, supplies, etc. to add a 5-room addition onto your house than he will to add a 1-room addition. Similarly, in developing a system, it will take longer to develop 5 screens of data than it will to develop just 1.

2 - Extra processing = More time/resources
This idea, too, is pretty straightforward if you think about it for a bit. The addition of one "no frills" room will take less time and effort than will the addition of a room which contains a cathedral ceiling, fireplace and spiral staircase. In the same way, a screen with few processing requirements will take less time and resources to develop than a screen with many calculations which need to be performed and with complicated edits (within the screen items and/or between other screen items).

3 - More people does <u>not</u> = less time

This idea is one that is not immediately obvious. At first glance, it would seem that if you add more people to a job it will get done faster. In actuality, the number of resources that can be accommodated on any project depends on the number of independent tasks associated with it. Hence, it might be reasonable to hire five people to paint five rooms, but five people to paint one room would turn out to be more trouble than it's worth.
Further, the number of months that a project will take is dependent upon the number of sequential tasks within that project. In other words, if two coats of paint are required for a room, there is little one can do to get around the necessity of waiting for the first

coat to dry before the second can be applied. Ed's favorite phrase for describing this principle is: "while it takes 1 pregnant woman 9 months to have a baby, 9 pregnant women can't have the baby in 1 month".

In our retrospective look at the Business Unit project we realized that we had allowed too much data and too much extra processing to be added to the project - one little piece at a time. My boss calls this "creeping elegance". To avoid this pitfall, the group agreed that one needs a common vision (what are we trying to achieve) and a tight scope (that specifically defines what is "in" as well as what is "out").

With this in mind, the group developed "target goals" (where we want to be when the system is "completed") for our system. These were:

1 - More, Meaningful Management Information (strategic information for our executives)

2 - Support for human processing (automated support for what people are currently doing manually - including access to contract terms for Claims people and Underwriters, "simple" inquiries into the data, "simple" reports on overdue premium, etc.)

3 - Automatic processing (covering a broad range of calcuations - including retro-premium calculations, cession calculations, etc.)

4 - Focus on Reinsurance

5 - Time Boundary

The group came to realize that it was unrealistic to try to achieve all these goals at once. So, of these "target" goals, the group selected the most essential (the "core" goals) - the primary ones needed to achieve the directive we had received from our executives. The "core" goals became:

1 - Strategic Information

4 - Focus on Reinsurance

5 - Time Boundary - a shorter one

In addition, the word "core" took on the meaning of simple and generic -- "lean and mean" became our slogan.

The group proceeded one step further, however, in order to produce the tight scope that I mentioned above, so that we would have a common vision of what the final product should be. To do this, we listed some very specific "ins" and

"outs" for each of the goals so that the executives would get a good idea of what they were (and were not) going to have when the "core" system was in place.

While I am not going to review all the goals and their associated "ins" and "outs", I wanted to share some of them with you so you could understand the process we went through.

For example, for the goal of producing meaningful, management information reports, the "ins" centered around information about the contract - information that could be used to classify contracts on summary reports; while "outs" centered around detailed information in the contract:

IN	OUT
- Contract ID	
- Sufficient Limit Info for Profile Reports	- Detailed definitive limits
- Sufficient Coverage Info to broadly classify contracts	- Detailed definitive coverages

For the goal of support for human processing - which was not a "core" goal - we had more "outs" than "ins". For example:

IN	OUT
- Limited on-line inquiry (needed to verify that data was correctly input)	- Accounting Terms - Cancellation Terms - Detailed Coverage Info - Specific Limits - Remarks/Text - Premium Formulas

Finally, under the goal of "automated processing", we again had only a very few "ins" - since this was not a "core" goal:

IN	OUT
- Systems-generated IDs (Contract ID, Claim ID, etc.)	- Automatic Diaries
- Earned Premium (needed for key ratios in Experience Reports)	- Retrospective Rating Formulas - Contingent & Sliding Scale Commission Formulas - Form Letters - Overdue Reports

While all of the "outs" listed above have merit as types of data/processing that should be included in a reinsurance system, they were the "extras" that we were asking the executives to give up in the short term so that they could receive the strategic information they needed in a reasonable timeframe. The model and the subsequent project development would support the addition of these "outs" in the long term.

To bring our point home to the executives, we provided time-estimates for implementing Expanded "core" Packages; such as, a Reinsurance Accounting Package which contained such items as cancellation terms; a Claims Support Package which contained detailed limits and coverage information; and an Underwriting Package containing information in the contract. When the executives saw the "price" they would have to pay to have this information up-front, they agreed with our recommedation to leave these items out for the short-term.

So far, I have been focusing on the decisions that Pru Re made regarding the new system that was being developed. However, there were also some key decisions that were needed in two other areas, due to the fact that we have systems which currently exist. The first area that we needed to address was that of Conversion.

CONVERSION

By "conversion" I am talking about a one-time process whose function it is to take "all" the data from existing systems and map it into the new system's structure. Once again, we decided to look at the conversion of Contract, Premium and Claim data from a "core" viewpoint. For Contract this came down to a simplified automated process which converted one view (the most recent) of most of our contract classification variables and associated that view with the full life of the contract. For most types of business, this was determined to be "good enough". For selected kinds of business (such as Casualty) or very specific treaty arrangements, where this kind of information was NOT good enough, we asked the executives to agree to a manual conversion effort (to be done by the Underwriters) which would reflect the correct historical changes over the life of the contract.

Where dollars were concerned - for our Premiums and Claims - the historical development of the dollars was, of course, a necessity. For these areas, we proposed an almost-fully automatic process which converted all the historical money, with appropriate historical dates, on a contract. Where we did use the "good enough" approach was on the descriptive information associated with the money, for which only the current view was converted (as with the contract)

BRIDGERUNS

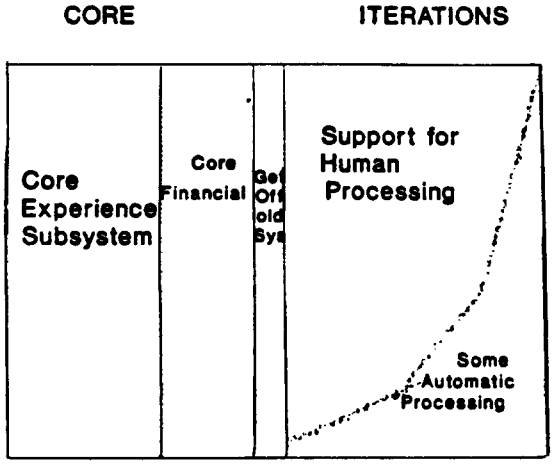
The final aspect of the project which required our attention was the phase called "bridgeruns", where we are taking data from the new ReSource system and feeding it back into existing systems automatically. This process is necessitated by our staged approach to the project, wherein our Contract,

Premium and Claim data is entered in ReSource, yet must be also input into our existing systems in order for the Accounts Receivable/Payable, Cash, and Accounting pieces of those systems to continue to run (until they, too, become a part of ReSource).

In contrast to the conversion process described above, this is a "many time" process that avoids the necessity for (and pitfalls of) data entry into two systems. The cardinal rule of data entry for our systems becomes entry into ReSource only, with ReSource feeding the data back into other systems where necessary. There are, of course, a few exceptions, which in keeping with the "core" spirit are manually entered into both systems, but these are kept to a minimum. All bridgerun processing is carefully reconciled to make sure that the two systems remain in synch.

I mention these last two items (conversions and bridgeruns) because they turned out to be lots more work than we would have hoped - even though we kept them "core". I caution others who are faced with these processes not to underestimate the effort involved in them.

Having followed the approach described above, the "Gang of Eight" was able to present the following plan to Pru Re's executives - which they subsequently accepted.



Roughly, the plan called for the first half of the overall project to be devoted to implementing the "core" system. The "Core Experience Subsystem" block provides the company with the strategic information they requested. The "Core Financial" block was a necessary middle-step to get to the final block of "Getting Off the Existing Systems", and, of course, producing financials (which, by the way, were not defined to be strategic underwriting information).

The second half of the plan proposed processing iterations where support for human processing and some automatic processing would be provided. As you can see, the plan allows for lots of interim "deliverables" over its timespan, instead of one output at the end of a number of years.

As part of the plan, we listed the "Requirements" that would be needed to accomplish it. These were:

- The "RIGHT" people -- people with vision, knowledge, interest, and good people skills
- Do "ESSENTIALS" only
- Good Project Methodology
- Issue Resolution Process

The next part of my talk focuses on these last two items, so that I can share with you our experiences in these important areas.

THE PROCESS

The "project methodology" that we, at Pru Re, used to develop ReSource is actually a mixture of different methodologies, from which we picked the features that worked best for us. Also mixed into our methodology are a number of techniques we learned "along the way". Many of them seem deceptively simple - yet, amazingly enough, we found that they worked! We are sharing them with you here today in the hopes that you might find them applicable in your environment and that we might save you the trouble of "re-inventing the wheel".

I am going to describe the methodology in the setting of our work to define the specific system (Contract, Claim, etc.) we were working on. Many of the techniques, however were used in other phases of the project's life-cycle.

The work to define the system is called by many names in the industry - you may have heard it referred to as:

- Functional Analysis
- JAD - Joint Application Design
- BARD - Business Analysis Requirements and Definitions

I may use any of these names as I am talking, but remember

that our methodology was really a mix of these, tailored to our needs.

Our analysis and discussions focused on documenting what could be called a functional specification for the system. To clarify what I mean by that, I can list the following "outputs" that were produced during the process:

- Finalized Logical Information Model
- List of Transactions
- Transaction Processing Descriptions
- Screen Layouts
- Report Layouts
- Data Definitions
- Code Tables and Definitions
- Workflows
- Conversion Processing Description
- Bridgerun Processing Description

Involved in the process were, once again, people from all areas of the company that were concerned with/impacted by the data under discussion. These included representatives from:

- Underwriting - generally 1-2 people - as many as 3 people in our Contract discussions
- Claims - generally 1 person - as many as 3 people in our Claim discussions
- Accounting - 1-2 people
- Actuarial - 1 person
- Systems - 4-6 people (described in detail in a minute)

Depending upon the project under discussion, some players were "major", while others played a "minor" role. For example, on the Claim project, Underwriting played a minor role, while Claims people played the major role. For the Contract project, the importance of the Claims versus Underwriting people was reversed. In all projects, the Actuary was, however, a key player, since (as noted before) the actuary has an overall, high-level view of all the data (and its interplay) and thus provided continuity amongst the projects.

Players needed to be a mix of "visionaries" (with a broad, futuristic view) and "doers" (with a more detailed view). All players needed decision making authority, however, since the process falls apart if the team needs to check every move with superiors.

The Systems representation on the team was comprised of the following types of people:

- Business Systems Analyst

  -- generally 2 - 4 per project team
  -- acted as the "middle-man" between the technical Systems people and the user-community
  -- served as "translators"
  -- are "jack of all trades"

- Architect
  -- 1 per project team
  -- the "techie"
  -- provided overall System continuity in terms of design
  -- told the rest of the team when what they were requesting was "out of line" (not "core")
  -- attended all meetings so that they could personally hear the users requirements
  -- becomes the project leader for the design/programming phases of the project

- Data Base Administrator
  -- 1 per project team
  -- needed since our system is implemented in a data base environment
  -- attended all meetings so that they could personally hear the user views and understand the "pulls" in their requirements

Now that I have talked about "who" made up the project team, I would like to move to discuss when the team met and how they operated. When the project team was put together, all executives made the commitment that the resources they were contributing would be available to the project on a full-time basis. You can understand, I would imagine, that this was not an easy commitment for them to make; but, they learned to realize that this was the only practical way to get the job done.

We structured each day into 4 sessions - roughly 2 hours each. Session-work might involve a group meeting/discussion or it might entail some independent research, discussion with other department members, documentation, etc. Some groups met as many as eighteen times per week.

Group discussions were documented using a "photoboard". (For those of you not familiar a photoboard, it is a piece of equipment - with four writing surfaces - which can print copies of what is written on each of the boards.) The photoboard was an easy mechanism for taking notes during the meeting and distributing the notes immediately. It also served as a means of putting each person's ideas in front of the group so he felt "recognized".

Group meetings were carefully structured - making sure that no meeting ran longer than 2 hours. Each meeting was "led" by a facilitator - for the most part, one of the Business

Systems Analysts took this role. Occasionally, however, a user "expert" in a particular topic would facilitate the discussion.

The facilitator attempted to keep the discussion on track. Sometimes, before discussing any one issue or idea, we used the technique of "going around the table" - asking people one by one for a comment/idea - continuing around the table until ideas ran out. This is a particularly good technique to use when some people in the group are either too vocal, too reticent or too dedicated to a specific cause.

A rule during discussions was that "job level" made no difference - there were no "vice-presidents" in the room, speaking down to "managers" - we were a team of equals.

Eventually, what we discovered is that the group developed a real synergy after working together full-time for a week or two. Frankly, we had to or we might have killed one another!!

One of the cardinal rules for our daily sessions was that we always alternated topics from one session to the next. We did this for several reasons: it allowed people time to think over the topic independently; it prevented us from getting hung up repeating the same arguments for hours; it gave people time to talk with others in their departments and see another side, etc. Many times what happened when the topic was raised again was that players had changed sides on the topic and now were arguing reverse positions!!

Another basic rule was Keep Moving!! To keep the discussions going we instituted a decision-making process (that I will describe in a minute) and maintained an Issues List of those items that were too big to handle at the time, were off the topic at the time, and/or whose lack of resolution would not seriously impede the project's progress.

Our decision-making process took into consideration the idea I mentioned above that the team was composed of decision-makers. Thus, the first rule of the process is that the team decides!

If, after several discussions of an issue, there are conflicting views within the team that cannot be resolved, the User Project Leader (the main user on the project) chose a solution so that the project could continue. In many situations, this was as far as a conflict went.

If, however, some member of the BARD team felt strongly that the solution chosen was unacceptable, that member could speak with the head of his department about the issue. If the department head agreed that the chosen solution was unacceptable, he could then "appeal" the decision to our Data

Administrator.
The Data Administrator is one of Pru Re's top executives, whose responsibility it is to ensure data consistency and integrity and who specifically "rules" in an appeal situation. The Data Administrator hears both sides of an appeal and gives a decision.

Certain decisions have a negative impact on the overall "target plan" that I described to you earlier. If the Data Administrator's ruling on an appeal would have this kind of impact, the decision is brought to a larger group. This group, our Long Range Computer Planning Committee (LRCPC), is the group that must approve decisions that impact the ReSource plan. The LRCPC is composed of all Pru Re's top executives and the head of the Systems Division (roughly 7 people).

In the analysis of all the projects we have done so far (Business Unit, Foreign Currency, Contract, Claim and Premium), there have been only a handful of appeals to the Data Administrator and none (that I can recall) that needed to be brought to the LRCPC.

We found that by discussing most issues until the group found itself at a logjam and detailing a decision-making process like the one above, we were able to resolve conflicts quickly and efficiently - with little impact on the actual BARD team.

Another key group (we're big on lots of groups!) in our company that has a role in this process is known as our Data Review Committee (DRC). The DRC reports to the Data Administrator that I just mentioned - and really performs the detailed work that goes with Data Administration. The DRC is made up of seven people, representing all areas of the company (many of them were key players in the various efforts). They are the "Keepers of the Information Model" - making sure that all development efforts are consistent with the larger model originally defined. They also insure data integrity, quality and consistency by approving all definitions for data items, including tables of valid codes for the items. The group meets on an as-needed basis.

Now that I've spent quite a bit of time on the details of the process, let me jump to a broader view. After making mistakes on our first two projects, we realized that the best approach to analysis was an iterative one - where we would discuss an output several times, getting more detailed during each pass. Thus, we divided our BARD process, for instance, into four phases (with the total BARD process accounting for about 20% of the total system development time).

Prep Phase -- developed a project scope - individualized for the project - keeping within the "core" goals we talked about before

-- developed a schedule for the total functional phase
-- approximately 15% of the BARD time

Phase I
-- produced Preliminary Outputs - these were high-level drafts of all the items I mentioned above as outputs of the process
-- For example - prototype of screen layouts with preliminary groupings of data
-- approximately 35% of the BARD time

Phase II
-- produced Finalized Outputs
-- For example - finalized screen layouts with correct field sizes and labels
-- approximately 30% of the BARD time

Review Phase
-- comprehensive walkthrough of all outputs where we took "real life" examples and saw how they would appear on the screens, be processed, etc.
-- approximately 20% of the BARD time
** Don't skimp on this step - it is particularly important for the project Data Base Administrator and designers

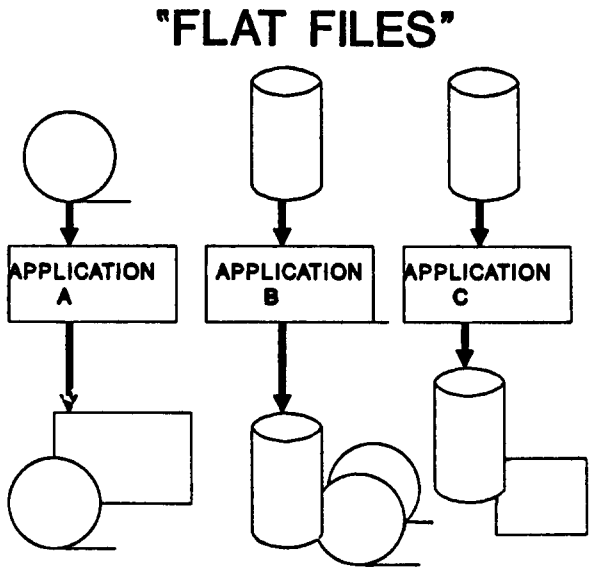
I hope what I have described to you gives you a good idea of the process we underwent. I can tell you that we used this specific methodology with the largest "data clumps" that Ed described to you - Contract, Claim and Premium - with great success! After three years, we continue to be on schedule vis-a-vis the project plan I showed you earlier - which, for a project the size of the one we are undertaking, is fairly unique in the industry. The bottom line is - we feel we have developed an approach that really works!!

WHY RELATIONAL

I am going to shift gears now to briefly explain why we chose to implement our system in a data base environment, supported by a relational data model. A relational data model was the ideal form in which to represent the variety and complexity of relationships that exist among (re)insurance data items, as pictured earlier, at a pretty high level, by Ed.

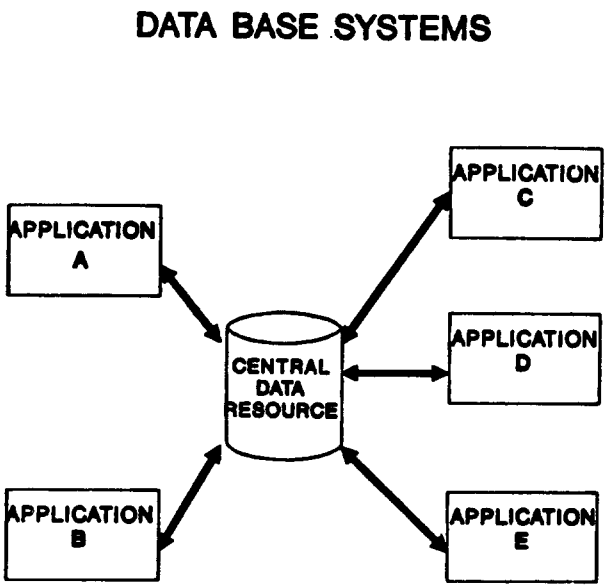
We chose to use data bases in our physical implementation of the model for several reasons. First of all, we were trying to avoid some standards problems that one faces with a non-database or "flat file" environment. As pictured, in a flat

file environment, each application defines and processes its own universe of data.



This leads to a good deal of duplication of data. The main concern surrounding redundant data is its integrity - have I updated the data item on one file and not on another and thus gotten the two files out of snych? Another concern in the flat file environment is the dependency between the program and the file structure - making reprogramming necessary if the record/file format changes.

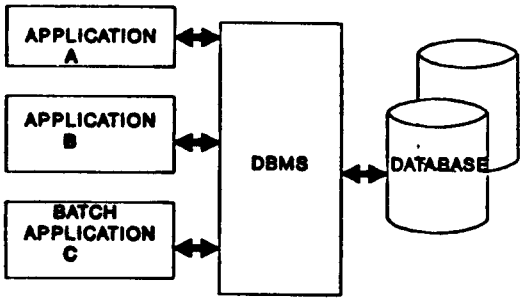
These problems are avoided when one uses a data base system which employs a single, central copy of data.



When data is stored in a centralized location and shared with the applications, there is no unplanned data redundancy. The view of the data is consistent to all applications, thus providing better data integrity. The data definition and progams are independent -thus, the likelihood of reprogramming, when record formats change, is lessened.

Database systems provide a "Database Management System" or DBMS to do a lot of jobs that programmers would do in a flat file environment.

USING A DATABASE MANAGEMENT SYSTEM TO MAINTAIN A CENTRALIZED DATA RESOURCE



The DBMS:
- Accepts functional request for data retrieval or update
- Locates data
- Performs necessary I/O
- Automatically enforces security
- Passes appropriate data and control information back to the application program
- Maintains its position in the database and therefore its ability to progress logically
- Automatically provides statistics, audit trail, and recovery capability

Because of these features, which allow for improved programmer efficiency, the avoidance of the concerns that I mentioned about data redundancy and integrity, and the ability to capture the flexible data relationships that you saw earlier in the model, we chose to implement our system using a data base structure.

We are currently using an IDMS network data base structure for ReSource, because when we selected a DBMS, we felt that this was a better choice than any relational DBMS available at the time. Since then, DB2 - IBM's relational DBMS has made great strides and we are considering a move to DB2 at some point in the future. Essentially, the physical layout of the database looks similar to the logical model - with lots more technical notation. Another difference is that our physical picture generally has two boxes for every one box on the logical model. This is due to the manner in which we

handled the need to capture historical information in a physical form. Otherwise, the record groupings and data relationships can be found somewhere in the physical picture.

While I am sure that I have not told you "all you ever wanted to hear about data bases" (or maybe I have!), that is about all I can cover in the time we have. So, I'd like to turn things back to Ed to tell you a little bit about our Actuarial Extracts.

EXTRACTS OR SUMMARIZED DATABASES

ED WEISSNER: Thanks Linda. Well now we know a little about information modeling, something about, the process and getting focused and a little about the systems considerations. Let's move on to the subject you came for! Lets assume the database is built!

At the beginning of the hour I tried to convince you that the database is just what you need to do a reserve study. So, aren't we done? The answer quite simply is no. While we could use the database to do reserve studies, it is just two big, too complex and too detailed to use. Moreover your processing time would be very slow. (See exhibit EE)

To do the job of loss reserving in an efficient manner we need to summarize the data in the database to a much higher level. We need to delete data we do not need (claim tech, diary date, claim notes, etc) and summarize the rest. In short, we need to find the smallest summarized database that will support all of our needs (See exhibit FF).

To do this, we need to define our needs with respect to a loss reserve study. Exhibit GG lists some of those needs along with 2 key requirements for us. Because grouping of claims, premiums and contracts is still an inexact Science in reinsurance, we need to be able to regroup at anytime. Further we need to be able to see our data both net of reinsurance and gross. Again, these concerns may not be yours, but let's proceed anyway.

To meet all of our needs in an efficient way for our independent networked PC environment of 10 PC's and a super disk, we decided to create 3 extracts. One contains all of our claim detail for individual claims. Another contains, for each contract, current premiums, commissions, brokerages, account losses, etc. by main experience period. The third contains, for each contract, an earned premium development triangle and an account loss development triangle, if any. Keep in mind my requirement that I must be able to regroup my data - hence the "by claim", "by contract" nature of my extracts. Also while these extracts are large, they are relatively small given that my employer is a reinsurer.

Let's now spend a little more time defining the exact nature of each of these extracts.

The first extract is called the Cumulative, Historical Claim Extract. (See exhibit HH) For each individual claim in the database (losses reported on accounts are not included), the extract includes claim information, the claim's contract

information (a claim in our system is a loss against a specific contract), all associated information on internal and external business units along with a complete history of transaction posted dates and the associated cumulative amounts for all amount types. The "information" obtained from the database is generally based on a KAO (knowledge as of) date equal to "today" and where necessary (Contract Terms and Business Unit terms) an IEO (In Effect On) date equal to the "trigger" date of loss (or today).

Based on our experience, the transaction history of dates and cumulative amounts is very flexible and allows us to generate any kind of development triangle - accident year, report year, policy year, etc. (Of course, if you know that you are only interested in year end evaluation points, you might want to restrict your interest to those dates.) Further a review of our claims shows that most have fewer than 5 transaction dates although some do have over 200. The extract today includes all claims, closed or open.

Moving on, the second extract is called the Current Premium Plus Extract. (See exhibit II) For each contract in the database, the extract includes contract information, all associated information on internal and external business units and the Cumulative Written Premium, Earned Premium, Commission, Brokerage, ..., Account Paid Loss, Account Paid Expense, Account Loss Reserve,... by Main Experience Period. The Main Experience Periods are defined by the underwriter when he writes the contract and usually are the ceding company's reporting periods The information obtained from the database is generally based on a KAO date equal the IEO date equal "today." This extract is very useful for producing experience reports and for creating an exposure base (usually EP for a reinsurer).

Finally, the third extract is called the Premium Plus Triangle Extract. (See exhibit JJ). For each contract in the database, the extract includes the same contract and business unit information as in extract 2 along with a development triangle for the account losses and for the earned premium. Again the "information" is based on a KAO date and IEO date of "today". More importantly, the triangles are incremental (not cumulative) and only the non zero values along with their row and column number are stored. Without this efficiency step, the extract would be the size of the World Trade Center! This extract is very useful for developing EBNR, an exposure base to do IBNR evaluations and IBNR.

I hope you now understand the fundamental form of each of our 3 extracts. You can of course model these as we did at the beginning of the hour. If you do, then there are several languages available today that you can use to access the data. Currently ours are on flat files and we use APL to process the data. Hopefully, we will convert to a relational extract soon.

By the way, did I say I had 3 extracts? Well I really meant to say that I had 3 basic types and that each type had several varieties. (See exhibit KK) Before you can create an extract, you must specify some key characteristics. Will it be gross, net, ceded only, net before certain cessions,...? Which currency conversion rule will be used throughout (convert everything at today's rates, convert individual paids at the paid date rate and reserves at today's rate, ...)? What is your KAO date? Do you want all the data or just some of the data - for which business units? The list goes on. It is important I believe to think of main types and varieties of extracts instead of many, many types with no varieties.

The fewer extracts you have, the better. You don't want to have to create several programs for each. Also using this approach, you can add varieties at will if your fundamental characteristics are in place. It should be easy to add another currency routine in the currency conversion module.

I should also point out to you that because we can update information, it is important to regenerate your extract "from scratch" when you need the next one; we do not add on the latest quarter. It is possible, for example, that you corrected a date of loss on a claim, a currency exchange rate or the dates on a Main Experience Period. Any of these would cause the "old data" to change. More specifically, if your currency conversion rule was to convert all amounts at today's rates then clearly the "old data" would change from run to run. (See exhibit LL)

So there you have it! Except you don't! In the old days we never had enough information and were constantly moaning about our handicap and what we would do if we ever got a detailed, historical database. Well, now I have it. But I also have problems like I've never seen before.

It all relates to KAO dates and IEO dates and the correct views of my data. The information associated with each contract, each business unit and each currency exchange rate can vary over time (effective period). Thus depending on my IEO date, I will obtain (possibly) different views of the desired information. (The limits in effect on 1/1/78 might be 3.2 million, on 3/1/80 3.7 million, on 3/1/87 5 million, etc).

Now, in extract 2 and 3, I suggested that all the information be valued based on an IEO date of "today." Based on the above, maybe we should generate our information for each Main Experience Period so there is a better match between the money and the information. If so, then instead of creating extract 2 and 3 by contract maybe we should create them "by contract and Main

Experience Period" where the information is based on an IEO date of Main Experience Period end date say. That's certainly better, but of course the information could be changing mid period also (See exhibit MM and NN).

Further, our super deluxe database had detailed information and money at the subclaim and contract section (subcontract) level. If I don't want to lose that detail in the extract which summarizes data to the claim or contract level, then instead of doing my extracts by claim or by contract, I'll have to do them "by sub-claim" and "by contract section." (See exhibit OO)

Finally there are all kinds of issues surrounding allocations, retro-rated premiums done over 3 year periods when the Main Experience Periods are 1 year long, contracts with mixed account formats (split to major line one year, to contract section the next; etc), contracts with several accounting bases (policy one year, statutory the next, etc), different accounting bases for different contracts, ... (See exhibit PP)

Well, fortunately we've run out of time! If you need some references you might try the CAS Bibliography notebook. Look under Databases Bibliography which was developed by the CAS Committee on Databases.

I think we have time for a few questions.

QUESTIONS AND ANSWERS

QUESTION: Al Commador, Nobel Insurance Group. You certainly didn't reinvent the wheel. I'd like to know what the motivation was for going through this process, say from an actuarial view point.

WEISSNER: Well, our systems were old and breaking down. We had to develop an entirely new system or build a modernized copy of our old flat file systems. The Systems area studied the question and announced we would go with state of the art with respect to systems design. Hence we got into relational databases and the process to achieve it.

From an actuarial view point, I'm glad actuarial was allowed to participate. I think that our analytical skills and broad knowledge of the company paid off highly!

QUESTION: Were there any time constraints as far as getting the loss reserve extracts up?

WEISSNER: To date, all the time constraints have been on building the database. Actuarial still gets its data from the old systems which are running in dual mode.

We hope to get new extracts off the database itself soon. However the financial system must be developed first.

I am very concerned about the first reserve studies done from extract data from the ReSource database. ReSource captures so much more detailed data than our old systems and corrects so many flaws found in our old systems, that I expect the reserves to change significantly when the first study is done. Whether they will go up or down is anyone's guess.

QUESTION: You said at the end that there were some relationships to algebraic structures. Could you be more specific?

WEISSNER: When I mentioned algebra, I was trying to talk about the importance of our role in this kind of project. I did not see any tie to algebraic structures.

For me, this project has used my math skills more fully than any other. Note the emphasis on skills and not techniques. You have to love structure and modeling it. You have to be able to enumerate all the cases and identify the exceptions. You must be able to sharply define concepts. You must believe you can do it - you must be willing to wrestle with ideas until they come clear. People with math backgrounds do this automatically. Others can't do it, hate it, get frustrated, etc.

You have a big contribution you can make!

Any other questions?

I'd like to thank you for your patience and to give Linda a round of applause because she was so great!

INFORMATION NEEDS VS RESERVE TYPE

Information	IBNR	EBNR	CASE SUP
Contract/Grouping	✓	✓	✓
Claim/Grouping, $	✓		✓
Premium/$		✓	
Premium/Exposure Base	✓		?
Currency Exch.	✓	✓	✓
Cost Centers, Brokers	✓	✓	✓

EXHIBIT A

DEVELOPING A RELATIONAL DATABASE INTERNALLY

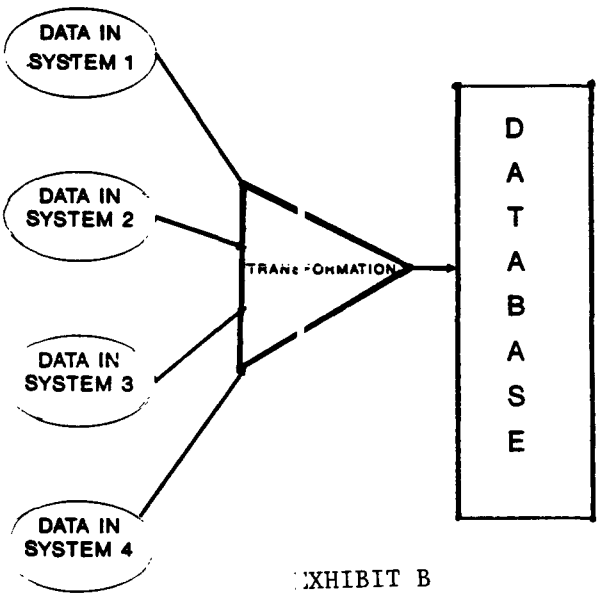


EXHIBIT B

MAJOR DATA CLUMPS

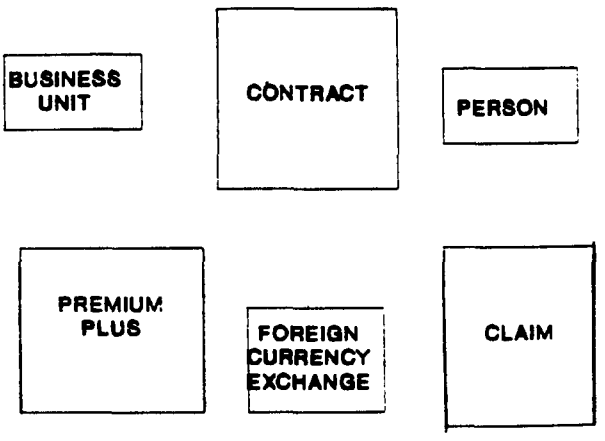


EXHIBIT C

MAJOR DATA CLUMPS

SOME TIES

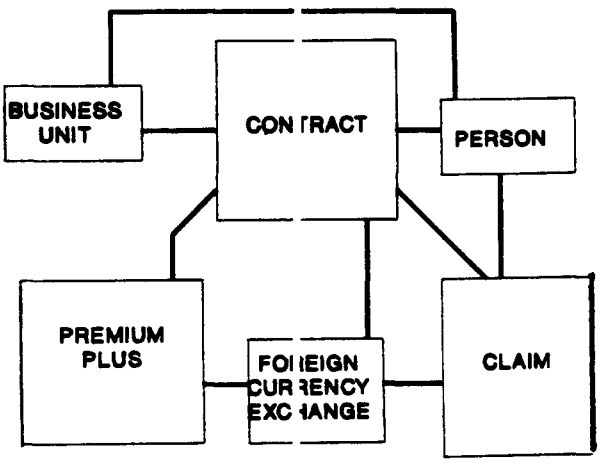


EXHIBIT D

BUSINESS UNIT DATA CLUMP

Internal Cost Centers, Brokers, Insurance Companies, Law Firms

Heirarchies, Addresses, Licenses, Lines Functions, Contact People

History

EXHIBIT E

PERSON DATA CLUMP

Internal People

Department, System Access Capabilities

EXHIBIT F

FOREIGN CURRENCY EXCHANGE DATA BLOCK

For Pairs of Currencies of Interest
Exchange Rates Over Time
Complete History

For Individual Currencies
Info on Acceptability

EXHIBIT G

CONTRACT DATA CLUMP

Info "ABOUT" The Contract That Can be Used to Tie Prem and Loss - Loss Coverage Method, Basic Limit, Basic Coverage

Specific Contract Details - Limits, Coverages, Accounting Terms, Premium Formulas, Cancellation terms, Reporting Frequency,...

Complete History

Contract Relationships to Others, to Cessions

Sections (Sub Contracts)

EXHIBIT H

PREMIUM PLUS DATA BLOCK

(PANIC: PREMIUM AND NON INDIVIDUAL CLAIM)

Accounts
- Accounting Bases (Policy, Statutory, CAL/Accident,..)
- Sub Splits (None, ML, ML and Accid YR,..)
- Shifting Formats
- Retro-Premium: 3 Year CAL/Accid
  (Regular is Statutory)

Main Experience Periods

Tie to contract section (Allocation?)

Original Currency

History

EXHIBIT I

INDIVIDUAL CLAIM DATA BLOCK

Sub Claims
Reflect "Specific" Cessio is
Multiple Dates of Loss
Original Currency
Tie to Major Events
Handle Cash Calls, Aggr gate Limits, Aggregate Deductibles, Collectio is of Little Claims
Focus on Data Not Finar cials
History

EXHIBIT J

A CLAIM STRUCTURE

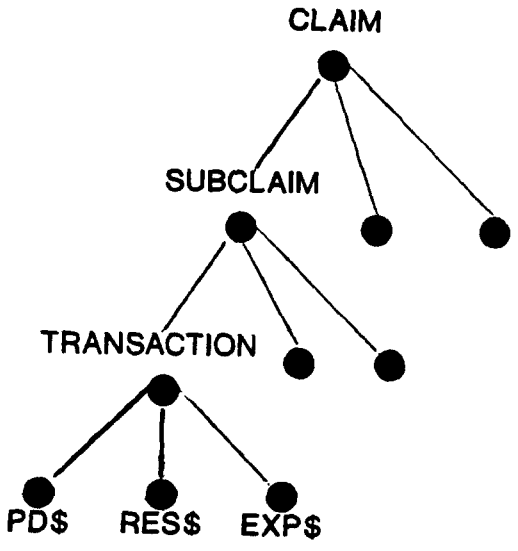


EXHIBIT K

EVENT STRUCTURE

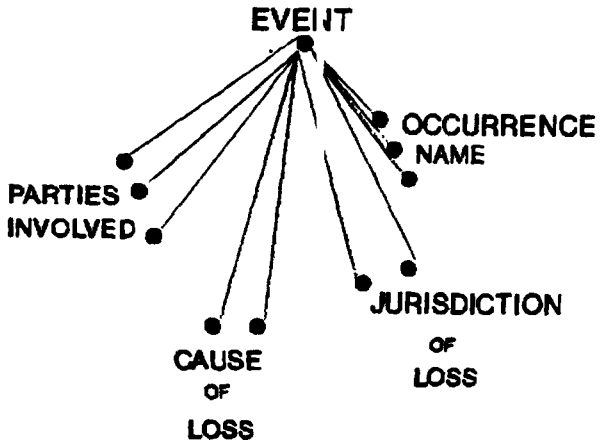
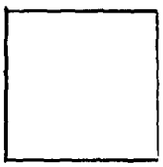


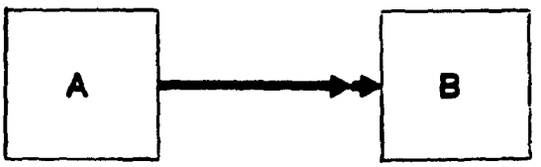
EXHIBIT L

MODELING CONCEPTS



A DATA CLUMP

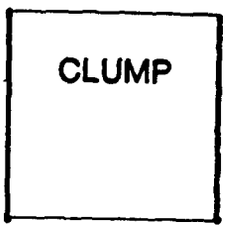
A MOLECULE OF DATA



For each clump A, there is 0, 1,.., many clumps B

EXHIBIT M

MODELING CONCEPTS



- Key ID 1
- Key ID 2

. . .

Data Item 1

Data Item 2

Data Item 3

. . .

FK = Foreign Key = Data Item that Ties the Clump to Another

EXHIBIT N

A CLAIM MODEL

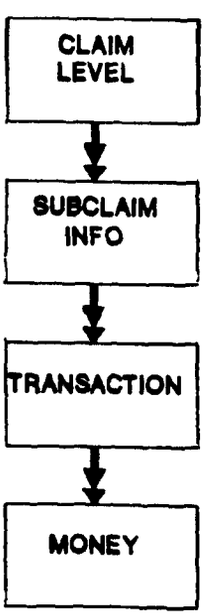


EXHIBIT O

A CLAIM MODEL

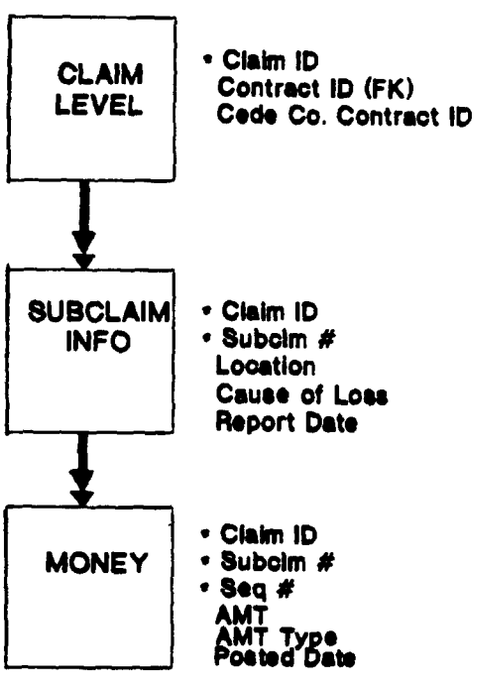


EXHIBIT P

LOSS DATES: Accident Date
Claims Made Date
Policy Effective Date
Discovery Date
Exposure Date
. . .

1) CLAIM LEVEL
Accident
Claims Made
Policy Eff
. . .

2) CLAIM LEVEL → LOSS DATES
•Claim ID
•Date Type
Date

EXHIBIT Q

CLAIM PEOPLE: Technician
Supervisor
Manager
Cession Tech
Company Protection
Manager
. . .

1) CLAIM LEVEL
Tech ID
Supervisor ID
. . .

or

2) CLAIM LEVEL —(•Claim ID)→ PEOPLE (•Person ID)
(Illegal) PEOPLE → CLAIM LEVEL

EXHIBIT R

CLAIM PEOPLE

CLAIM LEVEL • Claim ID

CLAIM/PEOPLE JUNCTION BOX
• Claim ID
• Person ID
Role
Diary Date

PEOPLE • Person ID

EXHIBIT S

EVENT • Event ID

PARTIES INVOLVED
CAUSE OF LOSS
JURIS-DICTION OF LOSS
OCCUR NAME

• Event ID
• Party #
Name
BU ID (FK)

(So Far)

EXHIBIT T

RELATE CLAIM TO EVENT

FOR EACH EVENT MANY CLAIMS

FOR EACH CLAIM MANY EVENTS
(AT LEAST IN REINSURANCE)

EXHIBIT U

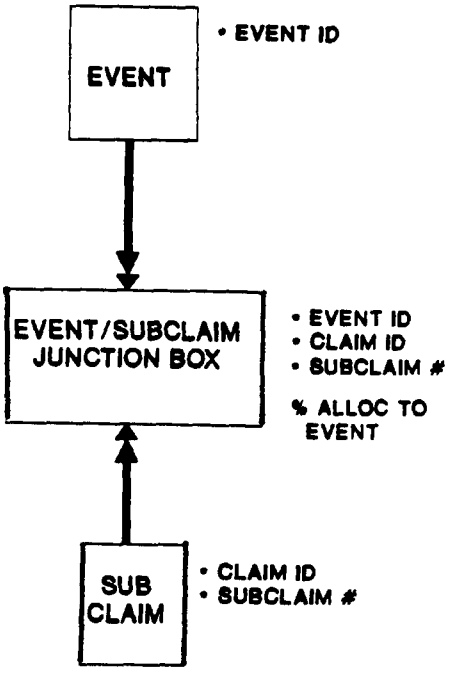


EXHIBIT V

CAN YOU TIE CLAIMS TOGETHER?

VARIOUS LAYERS OF SAME LOSS
CLAIM IS PART OF AGG DEDUCT CLAIM

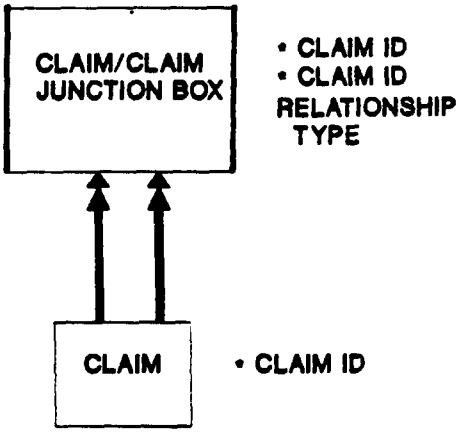


EXHIBIT W

OUR MODEL, SO FAR

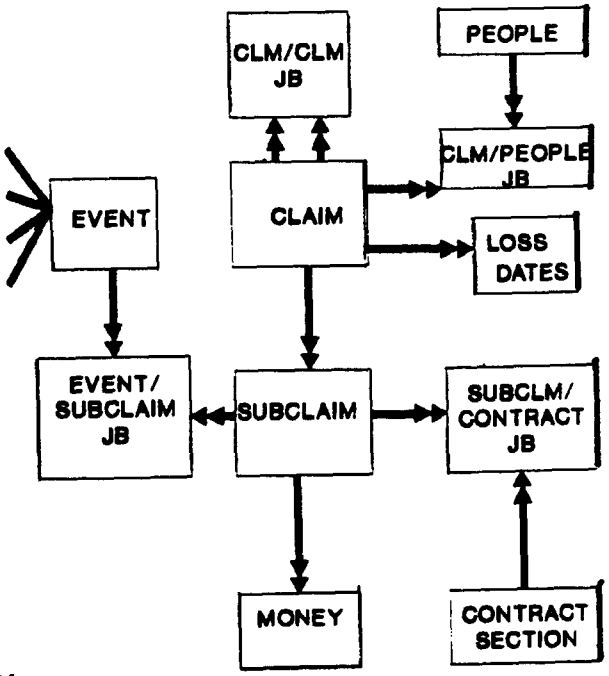


EXHIBIT X

WHAT ABOUT

EXPENSES AT THE CLAIM LEVEL

PRO RATA CESSIONS

EXCESS CESSIONS

PAY TO/MAIL TO (BU?)

CLAIM TECH NOTES

SALVAGE TO THE CLAIM

NO CLAIM CLAIMS

EXHIBIT Y

DATES

REPORT DATE

DATE OF LOSS

CANCELLATION DATE

INCEPTION DATE

RENEWAL DATE

PREMIUM PERIOD

EXPERIENCE PERIOD

. . .

- POSTED DATE
- EFFECTIVE PERIOD

EXHIBIT Z

POSTED DATE

DATE THE DATA IS STORED IN THE SYSTEM AND HENCE KNOWN TO THE COMPANY

HISTORY FOR
- CLAIM
- PREMIUM
- PEOPLE
- CONTRACT
- BU
- FOREIGN CURRENCY

EXHIBIT AA

EFFECTIVE PERIOD

PERIOD THE INFORMATION IS INFORCE

APPLIES TO
- CONTRACT
- FOREIGN CURRENCY EXCHANGE
- BU

EXHIBIT BB

EXCHANGE RATE INFO: US$ TO AA$

ON	FOR	RATE
DATE 1	DATE 1 ON	3
2	2 ON	3.2
3	3 ON	3.22
4	DATE 1 TO 2	3.1 CORRECTION

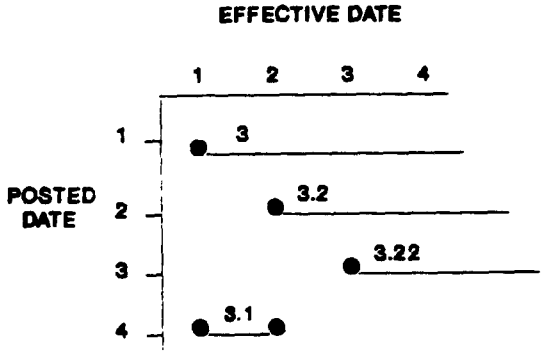


EXHIBIT CC

KAO IEO RATE

KNOWLEDGE IN EFFECT AS OF	ON	
6	2.5	3.2
5	4.3	3.22
5	1.5	3.1
3	2.5	3.2
3	3.5	3.22
3	1.5	3

SAME IDEA FOR CONTRACT TERMS

EXHIBIT DD

EXTRACTS - WHY?

DATABASE

TOO MUCH DETAIL
TOO MANY CLUMPS
UNNECESSARY DATA
COMPLEX RELATIONSHIPS

PROCESSING

VERY SLOW

EXHIBIT EE

EXTRACT

MAXIMUM SUMMARIZATION OF DATABASE

THAT YIELDS

THE MINIMUM

MAXIMUM DETAIL FOR ACTUAL USE

EXHIBIT FF

WHAT DO WE NEED?

CLAIM DEVELOPMENT TRIANGLES

- REPORT YEAR
- ACCIDENT YEAR
- FIRST NON-ZERO INCURRED YEAR

REPORT LAGS

EXPOSURE BY CALENDAR/ACCIDENT YR

EP DEVELOPMENT TRIANGLE

. . . .

FLEXIBLE GROUPING

NET OR GROSS

EXHIBIT GG

EXTRACT 1

CUMULATIVE, HISTORICAL CLAIM EXTRACT

FOR EACH INDIVIDUAL CLAIM

CLAIM INFO	KAO • TODAY
CONTRACT INFO	KAO • TODAY
BU INFO	KAO • TODAY

AND

COMPLETE HISTORY OF TRANSACTION POSTED

DATE AND CUMULATIVE AMOUNTS FOR ALL AMOUNTS TYPES

EXHIBIT HH

EXTRACT 2

CURRENT PREMIUM PLUS EXTRACT

FOR EACH CONTRACT

CONTRACT INFO	KAO • IEO • TODAY
BU INFO	KAO • IEO • TODAY

AND

CUM PREMIUM, EP, COMM, PAID LOSS, PAID EXP, LOSS RESERVES, ETC. BY MAIN EXPERIENCE PERIOD

EXHIBIT II

EXTRACT 3

PREMIUM PLUS TRIANGLE EXTRACT

FOR EACH CONTRACT

CONTRACT INFO	KAO • IEO • TODAY
BU INFO	KAO • IEO • TODAY

AND

DEVELOPMENT TRIANGLE (EP, LOSS) (EFFICIENTLY STORED)

EXHIBIT JJ

EXTRACT VARIETIES

GROSS, NET, CEDED, NET BEFORE (LIST)

CURRENCY CONVERSION RULE

KA_ (KNOWLEDGE AS OF DATE)

BU SELECTION

. . .

EXHIBIT KK

REGENERATE EACH TIME

REFLECT LATEST DATA VIEW

CURRENCY EXCHANGE RULE

DO QUARTERLY

EXHIBIT LL

BUT

CONTRACT INFO VARIES OVER TIME

BU INFO ON A CONTRACT VARIES OVER TIME

MAIN EXPERIENCE PERIOD BASES VARY OVER TIME

EXHIBIT MM

EXTRACT 2 CURRENT PREMIUM PLUS EXTRACT

FOR EACH CONTRACT AND MEP
CONTRACT INFO KAO TODAY, IEO MEP END
BU INFO KAO TODAY, IEO MEP END
AND
CUM PREM, COMM, EP, PAID LOSS, ETC.

EXTRACT 3 PREMIUM PLUS TRIANGLE EXTRACT

FOR EACH CONTRACT AND MEP
. . .

EXHIBIT NN

BUT

CLAIMS HAVE SUB - CLAIMS

CONTRACTS HAVE SECTIONS

EXTRACT 1 FOR EACH SUBCLAIM

2 FOR EACH CONTRACT SECTION AND MEP

3 FOR EACH CONTRACT SECTION AND MEP

EXHIBIT OO

PROCESSING CAN BE

CHALLENGING

IF

YOU STORE INCOMING DATA

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1989 CASUALTY LOSS RESERVE SEMINAR

6G: ADVANCED CASE STUDY

Moderator

David C. Westerholm
Mercer Meidinger Hansen

Panel

Dean R. Anderson
Tillinghast/Towers Perrin

Richard S. Biondi
Milliman & Robertson, Inc.

Ben Zehnwirth
School of Economics and Finance
Macquarie University

MR. WESTERHOLM: Good morning and welcome to Session 6G - Advanced Case Study. I'm Dave Westerholm, a Principal with Mercer Meidinger Hansen and I will serve as Moderator for this panel. As you can see, the panel size has experienced a 50% growth since the preliminary printing of the CLRS program schedule.

Professor Ben Zehnwirth has graciously agreed to enhance our already distinguished panel. Those of you who were fortunate enough to hear Mr. Zehnwirth speak at Session 4G, Regession Method Applications, already appreciate the approach he brings to this case study.

The printed abstract, with a slight modification, accurately describes this panel's task.

> Two actuaries and a professor of economics, finance, and actuarial science have been requested to perform an independent reserve analysis of actual medical malpractice loss developments. They have been asked to predict the ultimate incurred losses on a discounted and undiscounted basis.

I emphasize that the purpose of this session is to discuss the **panelists approaches and conclusions.** As I stated in the advance handout, this is a working session -- **all of you are participants.** Our goal is to provide a forum for a free-form discussion of reserving methodologies, pitfalls, data, etc. among experienced reservists, with the panelists presentations serving as a focal point for such discussions.

Dick Biondi is our first speaker. Dick is currently a consulting actuary with Milliman & Robertson's New York office, where he provides rate-making and loss reserving consulting services, primarily for hospitals and medical professional liability, commercial property and liability insurance and workers compensation.

Prior to joining M & R in 1986, Dick spent 16 years at ISO as Assistant Vice President & Actuary in their commercial actuarial casualty division. He's a FCAS and is a member of the Rate-Making Subcommittee of the American Academy's Interim Actuarial Standards Board.

CASUALTY LOSS RESERVE SEMINAR PRESENTATION
BY RICHARD S. BIONDI
SEPTEMBER 19, 1989

Prior to joining M&R in 1986, Dick spent 16 years at ISO as an AVP and Actuary in the Commercial Casualty Actuarial Department.

He's also the Chairman of the CAS Exam Committee and a member of the Rate-Making Subcommittee of the American Academy's Actuarial Standards Board.

Dick?

MR. BIONDI: Thank you, Dave. You may wonder where I have time to do all these things, in addition to my responsibilities as a Chicago DJ, but I try to fit it all in. I've seen a lot of data for New York medical malpractice, and I've spent, not all of my time during the last three years, but quite a bit of it working as the actuary for the largest company that sells medical malpractice in New York, MLMIC, the Medical Liability Mutual Insurance Company. Most of the data in the material that you got actually does correspond to MLMIC. There is also data corresponding to another carrier, Medical Malpractice Insurance Association (MMIA), which is really a JUA (Joint Underwriting Association).

To start this off, I guess I would start by doing something basic. This is Exhibit 1, which is a simple incurred loss triangle. I just figured out the link ratios. The data on the top of the exhibit is identical to the data that you got in the large package of handouts. It's just incurred losses, and I did what I would think is the most straightforward thing to do with incurred loss data. I figured out the link ratios and the ultimate losses, and you see those on the right side of the exhibit.

If things were simple, then this would be almost the end of the calculation. I would just subtract my paid losses from these ultimate incurred losses, and that would be my answer. It would come out to a whooping $4.2 billion in New York, which gives you an idea of the magnitude of these loss reserves.

It's not so simple, however. The one thing that is helpful is there is a lot of data. We get this data from MLMIC, generally within two weeks after the end of the experience period. We currently have data now through the middle of 1989. We got that data in the middle of July, so that we have current data; but still, loss reserving involves predicting the future so there are still a lot of questions.

One question has to do with the fact that if you look at these link ratios, there is a downward trend to them over time, and it is a very significant downward trend. If I showed you more recent data, you'd see that the downward trend continues. So, one question that one should ask, and we've been asking for a long time, is: Why is there a downward trend? Do we expect it to continue, and what do we expect that to do to the results? Now, in these numbers that I computed, I used a five-year average and, of course if I had used a three-year average, I would have gotten lower results. But, the question is, why is there a downward trend?

I think there are two principal reasons. One reason is the effect of policy limits. The policy limit is $1 million. It's been $1 million for the most part since the '70's. In 1975, when MLMIC and MMIA were first set up, there were some policies that had lower limits, but for the most part it's been $1 million.

Now, given the effect of inflation, more and more claims approach the million dollars, so the effect of that policy limit will truncate the loss development. I guess it will truncate the trend also, but the effect on loss development will have the effect of reducing the link ratios as you go on in time. So, one of our goals, really, was to evaluate what that policy limit would do to the link ratios on a prospective basis when we fill out the bottom of the rectangle.

I think another reason for the effect that we saw is tort reform. New York has had tort reform since 1986. For example, there have been mandatory structured settlements on large claims. We think that has a significant effect. And there have been other tort reforms also. There has been an elimination of collateral source duplication. Also, courts perhaps are not quite as liberal today as they were in, say, the late '70's. These are some possible explanations of why the development ratios and the trend rate dropped.

Another question relates to the tail. MLMIC has been in existence since 1975, so, as a result, we only have in this data 13 years of experience. We really don't know what's going to happen after that. By now, of course, we have data through 14 1/2 years, but we still have the question of what's going to happen after the end of the tail.

The prior carrier was the Employers of Wausau, and they wrote this business for many years, and they do have a longer tail than 14 years. However, since the time that they wrote in New York State, the statute of limitations has changed, and now its 2.5 years for most claims and as long as 10 years for claims involving injuries to infants, with certain exceptions.

But, still, there still could be claims because of continuing treatment types of situations and sometimes there could be claims when additional defendants are brought in to old cases. So, it's kind of fuzzy what the effect of the statute of limitations is, but it is clear that we don't really have a good reason to expect that the tail will be as long as it was when the Employers wrote the business.

So, we have these questions. We have the simple result, but what the real answer is not quite that clear. But let me tell you some of the things that we did. We observe that the tail is longer in New York than in just about any other place. Perhaps its because the courts are more congested.

Now, this exhibit is simply total claims, and there's a long tail on those too, although certainly not nearly as long as the dollar development pattern. Our calculations were similar to what was done with the losses; I just used the ratio method to figure out the ultimate value of the claim counts.

Now, an important thing about this data is that these are total claims, including the claims closed with payment and without payment. And that's important because in this business roughly two thirds of the claims are closed without payment. When I started to work on this, it was difficult to understand really how there could be a long tail, with loss dollars going up while the number of claim counts drops as two thirds are closed without payment.

So, I though to myself, how could that possibly happen? How could the losses go up and the claim counts go down? The losses per claim, or the average claim cost, must go through the roof, and that just didn't seem realistic. But then I thought about it some more and I realized that what probably happens is, when the company reserves for a claim, initially, they tend to reserve low, because when little information is known about

a claim, the tendency is to think that it's a routine, minor claim and not put a big reserve on it.

But, also, let's consider that the Claims Department knows that many of the claims will be closed without payment, although they don't know which ones. Suppose they think that the odds are, for example, fifty percent that a claim will be closed without payment if the insured wins his case. If the insured loses, it will be, say, a half-million dollar claim. So, one would think that the Claims Department would reserve for a quarter of a million dollars, they'd multiply the half-million by the fifty percent probability of losing.

If they do that, then that would explain the data, because initially they would reserve a low amount, but as the claims get closed without payment, the amount per claim for the ones that do get paid will increase greatly.

One thing to be concerned about is the policy limits effect. Because they're reserving a low amount, they're kind of discounting for the probability that the claim will get closed without payment. So, perhaps they're reserving $100,000 to $200,000, which in New York is a relatively small claim.

But if they are reserving those amounts, are they recognizing the fact that, if the claim is expected to be closed with payment of either 0 or over the policy limit, the reserve should first be truncated to the policy limit and then be discounted by the probability of closing with no payment. The impact of the policy limit upon the reserves is difficult to quantify, but it does have a significant impact on the results.

This next slide shows the claim count development data. As you can see, the tail is long on counts as well as on dollars. It looks like there isn't that much of a tail after the 13 years on the claims, although there might be a longer tail on the losses .

When we see the data, in may respects it raises more questions than it answers, thorough as it is. So, we asked people from the claims department a questions about the way they reserve claims. One is the question about whether they factor in the probability of winning, and they say they do, to a degree, although they try not to be overly optimistic.

No one really knows how much the claims are worth. No one really knows the probabilities of them being closed with payment or without payment. But I think they do factor in some probability of winning.

But the policy limit, is more complicated. Do they factor in the fact that if they lose, the claim will be over the million dollar policy limit, and do they truncate the reserve at a million dollars, and then factor down for the probability of winning? A lot of times I think they don't because there are all kinds of things that can happen to effectively cause the claim to exceed the policy limit.

One way for a claim to exceed the policy limit is where there is more than one doctor involved in a case. A lot of times that's true. Most of the claims involve hospitals, usually there's an anesthesiologist involved in addition to the surgeon performing the operation, and there could be other people involved also. Of course, they might not all be insured by the same company, but since MLMIC is such a big company, often they are.

There is also partnership liability coverage that is sold, with an extra policy limit for the partnership. Therefore, if the doctor belongs to a partnership, it's sometimes possible for a claimant to penetrate another limit by suing the partnership. Also, many claims

involve continuing treatment, so another limit applying to another policy year might become at risk.

However, it's not always that easy for claimants to tap these addit onal policy limits. They have to make a case that that other doctor or partnership actually did have liability. That's not always true and it's not always easy to prove.

So, although these things happen, I think that in the majority of sit uations, the policy limit is effective in limiting the cost to the insurer. Suppose it were true that as time passed and inflation caused more and more claims to approach the pol cy limit, more and more doctors would get named on each case, more and more years of coverage would be found to apply. If that happened, the claim frequency would increase over time and we would observe a positive claim frequency trend. Even though the claim severity would flatten out as individual loss amounts approach the policy limit, the claim frequency would increase.

But, in fact, the claim frequency has not increased. For New York, the frequency has been flat or declining, depending upon how you interpret the data, for the last five, six or seven years. So, I don't think that hypothesis really applies, at least or an overall basis.

But there are some other interesting questions. In New York, have the insurers become more successful at winning claims? We look at closed with payment ratios, called CWIP ratios, and it seems like in the last few years, perhaps they have declined. The CWIP ratios have been declining, and perhaps that's a reason for the declining loss development ratios in the first exhibit I presented, the loss development factors. But it's a very uncertain thing.

It seems that tort reform had a substantial favorable effect. A whole issue in itself is to quantify the effect of tort reform. I guess I really don't have time to get into that, but we think that tort reform has had a major effect in New York.

Is there a significant claim frequency trend? We think that there is not at this time. It is very flat.

With regard to claim severity trends, they seem to have flattened out quite a bit. For many years, they were very high, maybe 15 percent, 20 percent, maybe even higher than 20 percent. Of late, they've flattened out. Now, I guess one might question how they should be measured. When you compute claim severity trends on an accident year incurred basis, given the long tail, maybe there's a distortion introduced, particularly as the loss development ratios keep changing over time.

I guess that's an issue in itself, which, again, I don't think we really have time to spend a lot of time on. But the claim severity trend is very important, because in a loss reserve analysis, there is usually not much known claim data available to evaluate the latest accident year.

Most of the losses are IBNR, so usually what we do is to trend the data from the past years, which are more mature, by a trend factor. Currently, we've been using a trend factor which is lower than what we used before, maybe 10 percent, a though the data is kind of ambiguous; it could be even lower.

Since 1984, a second million dollars of coverage was offered in New York. Not by MLMIC, but by other carriers. Now some people have hypothesized that that has an effect on the first million dollars of coverage, because if a plaintiff or plaintiff's

attorney knows that an extra $1,000,000 of coverage exists, a bigger incentive is provided to actually pursue a claim, given the cost of actually going through the court process.

So some people think that the presence of the second $1,000,000 of coverage will increase the claim frequency for the first $1,000,000 of coverage. We don't have enough data yet since 1984 to test the validity of that theory yet. But the data that we do have says that the claim frequency did not increase.

Another issue, which I haven't mentioned yet is that there is a shift from occurrence coverage towards claims-made coverage in New York. And for claims-made, the reserves should include development on known claims but not IBNR claims. Reserves for IBNR claims only apply to tail coverage. In New York there are two kinds of tail coverage. There is tail coverage which can be purchased by a doctor if he ceases his practice or leaves the state and there is automatic tail coverage which is provided at retirement, death or disability at no extra charge. The cost of automatic tail coverage is factored into the claims-made premiums paid while the doctor is actively practicing.

Although the shift toward claims-made coverage is an important consideration in practice, the data that you were provided did not subdivide out the occurrence and claims-made data. All of the losses were categorized by accident date as if occurrence cove rage applied.

I prepared one more exhibit, which is a rough estimate of the limiting effect of policy limits on the reserves that I computed on Exhibit 1. This is just one way to measure this limitation.

In this exhibit, we see the ultimate incurred indemnities for each accident year. Those are the numbers that I estimated on Exhibit 1, using the link ratios. From that I subtract the paid losses as of the last evaluation, which is 12/31/87, to get the outstanding losses. Then I get the outstanding claim counts at 12/31/87. That's from the last diagonal of the second exhibit that I put on the screen.

I then add to that the number of IBNR claims. Now, that was gotten by doing a link ratio analysis on the claim exhibit and subtracting the ultimate value of the claims from the values as of 12/31/87. That is what is in column 6.

I then, in column 7, need to know what the closed with payment ratio is, and you didn't get any information that would really help you evaluate that, but we have other data which indicates that it's 1/3. It probably is an oversimplification to say that it's 1/3 for all of the years. It's probably more than 1/3 on the really old years, because for those old claims, the odds are a bit higher that they'll be closed with payment, but not that much higher. Perhaps the probability is as high as 1/2 for the older years; in any case, I used one third for all of the years in this example.

The objective is to figure out, on the outstanding claims, what the average claim cost is. I did that in column 8 by dividing the outstanding losses by the number of outstanding claims, and the result that I got was in column 9. In column 10, I assumed that the losses were lognormally distributed to figure out the adjusted value of the average claim cost, given the million dollar policy limit. That assumes that the numbers in column 9 are unlimited, i.e. unaffected by the policy limit, which I think they essentially are.

By subtracting the limited average outstanding claim severity in column 10 from the unlimited average outstanding claim severity in column 9, and by multiplying the difference by the number of outstanding claims, I get an estimate of the effect of the policy limits reduction on the losses.

That reduction equals almost a billion dollars, which is a lot, even in New York. Of course, this is a very approximate calculation, but it gives you an idea of how important the impact of the policy limit can be.

I guess we're running short of time so maybe I should hand this over to Mr. Anderson.

1989 CASUALTY LOSS RESERVE SEMINAR
MEDICAL MALPRACTICE RESERVE ANALYSIS

Exhibit 1
CAS9912

INCURRED INDEMNITY LOSSES (000'S)
(INCLUDING CATASTROPHE CLAIMS)

EVALUATION POINT (IN YEARS)

ACCIDENT YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	
1975				31,043	40,271	47,267	55,105	61,944	65,847	69,264	71,984	81,395	79,792	
1976			56,360	86,949	104,055	119,942	134,577	147,897	164,985	175,624	188,681	190,066	186,323	est.
1977		27,242	74,564	106,033	127,165	143,936	157,479	170,676	179,734	197,799	210,889		221,009	est.
1978	7,449	52,637	114,847	157,477	177,118	191,537	207,243	223,565	239,410	237,556			263,875	est.
1979	14,646	63,991	139,497	189,407	219,540	246,256	273,761	293,370	293,186				342,697	est.
1980	18,424	84,144	177,173	232,110	273,150	294,050	309,318	304,746					377,714	est.
1981	22,005	87,661	187,056	267,315	318,174	347,730	357,623						471,477	est.
1982	25,171	98,393	221,727	306,056	340,236	355,327							502,943	est.
1983	25,506	103,079	230,160	295,533	326,055								499,987	est.
1984	21,356	98,313	177,962	221,817									390,561	est.
1985	23,124	68,355	151,288										354,280	est.
1986	15,744	54,425											271,306	est.
1987	12,190												230,509	est.
													4,192,473	

LINK RATIOS

ACCIDENT YEAR	1:2	2:3	3:4	4:5	5:6	6:7	7:8	8:9	9:10	10:11	11:12	12:13
1975				1.297	1.174	1.166	1.124	1.063	1.052	1.039	1.131	0.980
1976			1.543	1.197	1.153	1.122	1.099	1.116	1.064	1.074	1.007	
1977		2.737	1.422	1.199	1.132	1.094	1.084	1.053	1.101	1.066		
1978	7.066	2.182	1.371	1.125	1.081	1.082	1.079	1.071	0.992			
1979	4.369	2.180	1.358	1.159	1.122	1.112	1.072	0.999				
1980	4.567	2.106	1.310	1.177	1.077	1.052	0.985					
1981	3.984	2.134	1.429	1.190	1.093	1.028						
1982	3.909	2.253	1.380	1.112	1.044							
1983	4.041	2.233	1.284	1.103								
1984	4.604	1.810	1.246									
1985	2.956	2.213										
1986	3.457											
1987												
5 Yr. Avg.	3.793	2.129	1.330	1.148	1.083	1.074	1.064	1.060	1.052	1.060	1.069	0.980
Cum. Avg.	18.910	4.985	2.342	1.761	1.533	1.415	1.318	1.239	1.169	1.111	1.048	0.980

Exhibit 2

REPORTED CLAIM COUNTS
(EXCLUDING CATASTROPHE CLAIMS)

EVALUATION POINT (IN YEARS)

ACCIDENT YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	
1975				1,511	1,645	1,725	1,775	1,818	1,856	1,885	1,920	1,956	1,973	
1976			2,455	2,855	2,986	3,087	3,149	3,249	3,324	3,389	3,434	3,451	3,481	est.
1977		1,533	2,428	2,859	3,028	3,141	3,232	3,308	3,386	3,444	3,502		3,574	est.
1978	739	1,885	2,741	3,266	3,415	3,527	3,634	3,716	3,777	3,827			3,969	est.
1979	781	1,850	2,925	3,438	3,647	3,791	3,913	4,005	4,076				4,297	est.
1980	839	2,046	3,180	3,817	4,014	4,126	4,241	4,303					4,629	est.
1981	813	2,025	3,268	3,894	4,137	4,278	4,397						4,839	est.
1982	838	2,106	3,419	4,083	4,295	4,451							5,043	est.
1983	905	2,063	3,262	3,785	4,001								4,688	est.
1984	682	1,836	2,621	3,076									3,809	est.
1985	752	1,636	2,457										3,602	est.
1986	735	1,444											3,280	est.
1987	730												3,856	est.
													51,039	

LINK RATIOS

ACCIDENT YEAR	1:2	2:3	3:4	4:5	5:6	6:7	7:8	8:9	9:10	10:11	11:12	12:13
1975				1.089	1.049	1.029	1.024	1.021	1.016	1.019	1.019	1.009
1976			1.163	1.046	1.034	1.020	1.032	1.023	1.020	1.013	1.005	
1977		1.584	1.178	1.059	1.037	1.029	1.024	1.024	1.017	1.017		
1978	2.551	1.454	1.102	1.044	1.033	1.030	1.023	1.014	1.013			
1979	2.369	1.581	1.175	1.061	1.039	1.032	1.024	1.018				
1980	2.439	1.554	1.200	1.052	1.028	1.028	1.015					
1981	2.491	1.614	1.192	1.062	1.034	1.028						
1982	2.513	1.623	1.194	1.052	1.036							
1983	2.280	1.581	1.160	1.057								
1984	2.692	1.428	1.174									
1985	2.176	1.502										
1986	1.965											
1987												
5 Yr. Avg.	2.325	1.550	1.184	1.057	1.034	1.029	1.023	1.020	1.016	1.016	1.012	1.009
Cum. Average	5.282	2.272	1.466	1.238	1.172	1.133	1.101	1.076	1.054	1.037	1.021	1.009

1989 CASUALTY LOSS RESERVE SEMINAR

Exhibit 3

MEDICAL MALPRACTICE RESERVE ANALYSIS

PROJECTED ULTIMATE INCURRED LOSSES MINUS PAID AS OF 12/31/87
AND PROJECTED AVERAGE CLAIM SEVERITY ON OUTSTANDING CLAIMS

(1) ACCIDENT YEAR	(2) ULTIMATE INCURRED INDEMNITY	(3) PAID @ 12/31/87	(4) ULTIMATE OUTS.IND. (2)-(3)	(5) OUTS.CLAIM COUNTS @ 12/31/87	(6) IBNR CLAIMS	(7) ULTIMATE CLOSE W/ PAY RATIO	(8) ULTIMATE OUTS.CLAIM COUNTS	(9) AVG.SEV. ON OPEN CLMS. (4)/(7)	(10) 1000 LIM. AVG.SEV. ON OPEN CLMS.	(11) POL.LIM.RED. IN LOSSES *((8)-(9))x(7)
1975	79,792	55,302	24,490	154	0	0.33	51	482	337	7,373
1976	186,323	110,433	75,890	353	30	0.33	126	600	400	25,386
1977	221,009	119,989	101,020	520	72	0.33	195	517	353	32,089
1978	263,875	129,748	134,127	661	142	0.33	265	506	358	39,250
1979	342,697	121,418	221,279	999	221	0.33	403	550	367	73,569
1980	377,714	104,960	272,754	1,346	326	0.33	552	494	353	78,258
1981	471,477	84,194	387,283	1,808	442	0.33	743	522	365	115,996
1982	502,943	56,193	446,750	2,155	592	0.33	906	493	352	127,803
1983	499,987	26,377	473,610	2,145	687	0.33	934	507	358	138,804
1984	390,561	14,633	375,928	1,760	733	0.33	823	457	325	108,567
1985	354,280	4,105	350,175	1,390	1,145	0.33	837	419	314	87,136
1986	271,306	708	270,598	705	1,836	0.33	839	323	260	52,564
1987	230,509	25	230,484	592	3,126	0.33	1,227	188	165	28,023
	4,192,473	828,085	3,364,388	14,588	9,351					914,819

Assumes log-normal distribution with coefficient of variation =2.0

(1)

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Discounted and Undiscounted Loss Reserves at 12/31/87

Accident Year	Earned Exposures	Reported Incurred	Adjusted Incurred	Frequency Severity	Selected Incurred	Pure Premium	Paid Losses	Loss Reserve	Discount Factor	Discount Reserve
1975	14,792	79,792	79,792	79,792	79,792	5,394	55,302	24,490	0.790	19,347
1976	30,411	190,066	190,066	191,018	190,500	6,264	110,433	80,067	0.767	61,411
1977	31,451	221,433	221,433	224,768	223,000	7,090	119,989	103,011	0.741	76,331
1978	31,551	264,813	264,813	268,878	267,000	8,462	129,748	137,252	0.722	99,096
1979	31,794	340,751	340,751	346,224	343,500	10,804	121,418	222,082	0.702	155,902
1980	31,634	366,493	366,493	370,687	368,500	11,649	104,960	263,540	0.692	182,370
1981	31,462	443,379	443,379	448,538	446,000	14,176	84,194	361,806	0.682	246,752
1982	30,398	460,357	460,357	463,655	462,000	15,198	56,193	405,807	0.665	269,862
1983	26,564	452,002	452,002	455,759	454,000	17,091	26,377	427,623	0.640	273,679
1984	22,404	341,325	425,444	428,111	427,000	19,059	14,633	412,367	0.611	251,956
1985	20,664	290,996	412,292	418,641	415,500	20,107	4,105	411,395	0.573	235,729
1986	20,210	214,603	359,152	369,238	364,000	18,011	708	363,292	0.534	193,998
1987	20,334	153,812	428,661	442,681	435,500	21,417	25	435,475	0.496	215,996
Total	343,669	3,819,822	4,444,636	4,507,988	4,476,292	13,025	828,085	3,648,207		2,282,428

(2)

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Ultimate Incurred Losses Using Adjusted Reported Losses

Accident Year	Earned Exposures	Incurred Losses	Loss Dev Factor	Pol Lmt Adj Factor	Ultimate Incurred	Pure Premium	Cat Losses	Total Incurred
1975	14,792	79,792	1.000	1.000	79,792	5,394	0	79,792
1976	30,411	190,066	1.000	1.000	190,066	6,250	0	190,066
1977	31,451	210,889	1.050	1.000	221,433	7,041	0	221,433
1978	31,551	230,503	1.118	1.000	257,760	8,170	7,053	264,813
1979	31,794	291,843	1.163	1.000	339,408	10,675	1,343	340,751
1980	31,634	304,476	1.204	1.000	366,493	11,585	0	366,493
1981	31,462	357,623	1.240	1.000	443,379	14,093	0	443,379
1982	30,398	355,327	1.296	1.000	460,357	15,144	0	460,357
1983	26,564	326,055	1.386	1.000	452,002	17,016	0	452,002
1984	22,404	276,484	1.539	1.000	425,444	18,990	0	425,444
1985	20,664	204,532	2.016	1.000	412,292	19,952	0	412,292
1986	20,210	89,085	4.032	1.000	359,152	17,771	0	359,152
1987	20,334	39,380	12.095	0.900	428,661	21,081	0	428,661
Total	343,669	2,956,055			4,436,240	12,908	8,396	4,444,636

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Adjusted Incurred Losses (Net of Catastrophes)

Accident Year	Evaluation Date In Months												
	12	24	36	48	60	72	84	96	108	120	132	144	156
1975				31,043	40,271	47,267	55,105	61,944	65,847	69,264	71,984	81,395	79,792
1976			56,630	86,949	104,055	119,942	134,577	147,897	164,985	175,624	188,681	190,066	
1977		27,242	74,564	106,033	127,165	143,936	157,479	170,676	179,734	197,799	210,889		
1978	7,449	52,637	108,491	150,115	169,959	184,384	200,158	216,480	232,335	230,503			
1979	14,646	63,461	138,967	187,577	217,780	244,878	272,434	292,044	291,843				
1980	18,424	84,144	177,173	232,110	273,150	294,050	309,318	304,476					
1981	22,005	87,661	187,056	267,315	318,174	347,730	357,623						
1982	25,171	98,393	221,727	306,056	340,236	355,327							
1983	25,506	103,079	230,160	295,533	326,055								
1984	25,702	111,014	207,292	276,484									
1985	29,513	97,851	204,532										
1986	33,538	89,085											
1987	39,380												

In Thousands

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Adjusted Incurred Losses (Net of Catastrophes)

Accident Year	Period-to-Period Factors												
	12 to 24	24 to 36	36 to 48	48 to 60	60 to 72	72 to 84	84 to 96	96 to 108	108 to 120	120 to 132	132 to 144	144 to 156	156 to Ult
1975				1.297	1.174	1.166	1.124	1.063	1.052	1.039	1.131	0.980	
1976			1.535	1.197	1.153	1.122	1.099	1.116	1.064	1.074	1.007		
1977		2.737	1.422	1.199	1.132	1.094	1.084	1.053	1.101	1.066			
1978	7.066	2.061	1.384	1.132	1.085	1.086	1.082	1.073	0.992				
1979	4.333	2.190	1.350	1.161	1.124	1.113	1.072	0.999					
1980	4.567	2.106	1.310	1.177	1.077	1.052	0.984						
1981	3.984	2.134	1.429	1.190	1.093	1.028							
1982	3.909	2.253	1.380	1.112	1.044								
1983	4.041	2.233	1.284	1.103									
1984	4.319	1.867	1.334										
1985	3.316	2.090											
1986	2.656												
1987													
3 Yr Avg	3.430	2.063	1.333	1.135	1.071	1.064	1.046	1.042	1.052	1.060	1.069	0.980	
2 Yr Avg	2.986	1.979	1.309	1.107	1.069	1.040	1.028	1.036	1.046	1.070	1.069	0.980	
3 of 5 Avg	3.755	2.152	1.341	1.150	1.085	1.077	1.079	1.063	1.058	1.060	1.069	0.980	
3 Yr $ Wgt	3.357	2.058	1.332	1.133	1.070	1.059	1.040	1.036	1.047	1.065	1.041	0.980	
2 Yr $ Wgt	2.965	1.972	1.308	1.108	1.068	1.039	1.025	1.031	1.039	1.070	1.041	0.980	
Selected	3.000	2.000	1.310	1.110	1.070	1.045	1.030	1.035	1.040	1.065	1.050	1.000	1.000
Cumulative	12.095	4.032	2.016	1.539	1.386	1.296	1.240	1.204	1.163	1.118	1.050	1.000	1.000

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Ultimate Incurred Losses Using Frequency and Severity

Accident Year	Earned Exposures	Ultimate Frequency	Ultimate Severity	Ultimate Incurred	Pure Premium	Cat Losses	Total Incurred
1975	14,792	0.133	40,442	79,792	5,394	0	79,792
1976	30,411	0.114	55,076	191,018	6,281	0	191,018
1977	31,451	0.113	63,231	224,768	7,147	0	224,768
1978	31,551	0.125	66,405	261,825	8,298	7,053	268,878
1979	31,794	0.134	80,912	344,881	10,847	1,343	346,224
1980	31,634	0.144	81,162	370,687	11,718	0	370,687
1981	31,462	0.151	94,223	448,538	14,256	0	448,538
1982	30,398	0.162	93,870	463,655	15,253	0	463,655
1983	26,564	0.173	99,178	455,759	17,157	0	455,759
1984	22,404	0.166	114,860	428,111	19,109	0	428,111
1985	20,664	0.169	119,673	418,641	20,259	0	418,641
1986	20,210	0.153	119,731	369,238	18,270	0	369,238
1987	20,334	0.161	135,213	442,681	21,770	0	442,681
Total	343,669			4,499,592	13,093	8,396	4,507,988

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Ultimate Frequency

Accident Year	Earned Exposures	Reported Claims	Loss Dev Factor	Ultimate Claims	Frequency
1975	14,792	1,973	1.000	1,973	0.133
1976	30,411	3,451	1.005	3,468	0.114
1977	31,451	3,502	1.015	3,555	0.113
1978	31,551	3,827	1.030	3,943	0.125
1979	31,794	4,076	1.046	4,262	0.134
1980	31,634	4,303	1.061	4,567	0.144
1981	31,462	4,397	1.083	4,760	0.151
1982	30,398	4,451	1.110	4,939	0.162
1983	26,564	4,001	1.149	4,595	0.173
1984	22,404	3,076	1.212	3,727	0.166
1985	20,664	2,457	1.424	3,498	0.169
1986	20,210	1,444	2.136	3,084	0.153
1987	20,334	730	4.485	3,274	0.161
Total	343,669	41,688		49,647	0.144

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Ultimate Severity Using Adj. Average Incurred Loss

Accident Year	Adjusted Severity	Loss Dev Factor	Pol Lmt Adj Factor	Ultimate Severity
1975	40,442	1.000	1.000	40,442
1976	55,076	1.000	1.000	55,076
1977	60,220	1.050	1.000	63,231
1978	60,231	1.103	1.000	66,405
1979	71,600	1.130	1.000	80,912
1980	70,759	1.147	1.000	81,162
1981	81,333	1.158	1.000	94,223
1982	79,831	1.176	1.000	93,870
1983	81,493	1.217	1.000	99,178
1984	89,884	1.278	1.000	114,860
1985	83,245	1.438	1.000	119,673
1986	61,693	1.941	1.000	119,731
1987	53,945	2.785	0.900	135,213

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Calculation of the Policy Limit Adjustment Factor Using
A Lognormal Model With CV=3.0

Accident Year	Average Pol Lmt	Ultimate Severity	Unlimited Severity	76 to 86 Fit	Model Severity	Pol Lmt Adj Factor
1975	780,000	134,807	174,937			
1976	805,000	183,587	263,261	282,879		
1977	830,000	210,770	317,174	317,676		
1978	855,000	221,449	336,382	356,574		
1979	880,000	269,693	448,585	400,638		
1980	895,000	270,535	446,257	449,920		
1981	910,000	313,945	563,696	505,265		
1982	925,000	312,938	554,450	567,417		
1983	939,000	330,590	602,237	637,215		
1984	955,000	382,906	771,980	715,598		
1985	969,000	399,021	823,260	803,264		
1986	981,000	399,154	814,598	902,477		
1987	986,000	500,789	1,286,396	1,013,491	448,755	0.896

(9)

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Adjusted Average Incurred Loss (Net of Catastrophes)

Accident Year	Evaluation Date In Months												
	12	24	36	48	60	72	84	96	108	120	132	144	156
1975				20,545	24,481	27,401	31,045	34,073	35,478	36,745	37,492	41,613	40,442
1976			23,067	30,455	34,848	38,854	42,736	45,521	49,634	51,822	54,945	55,076	
1977		17,770	30,710	37,087	41,996	45,825	48,725	51,595	53,082	57,433	60,220		
1978	10,080	27,924	39,581	45,963	49,768	52,278	55,079	58,256	61,513	60,231			
1979	18,753	34,303	47,510	54,560	59,715	64,595	69,623	72,920	71,600				
1980	21,959	41,126	55,715	60,810	68,049	71,268	72,935	70,759					
1981	27,066	43,289	57,239	68,648	76,909	81,283	81,333						
1982	30,037	46,720	64,851	74,959	79,217	79,831							
1983	28,183	49,966	70,558	78,080	81,493								
1984	37,686	60,465	79,089	89,884									
1985	39,246	59,811	83,245										
1986	45,630	61,693											
1987	53,945												

In Thousands

(10)

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Adjusted Average Incurred Loss (Net of Catastrophes)

Accident Year	Period-to-Period Factors												
	12 to 24	24 to 36	36 to 48	48 to 60	60 to 72	72 to 84	84 to 96	96 to 108	108 to 120	120 to 132	132 to 144	144 to 156	156 to Ult
1975				1.192	1.119	1.133	1.098	1.041	1.036	1.020	1.110	0.972	
1976			1.320	1.144	1.115	1.100	1.065	1.090	1.044	1.060	1.002		
1977		1.728	1.208	1.132	1.091	1.063	1.059	1.029	1.082	1.049			
1978	2.770	1.417	1.161	1.083	1.050	1.054	1.058	1.056	0.979				
1979	1.829	1.385	1.148	1.094	1.082	1.078	1.047	0.982					
1980	1.873	1.355	1.091	1.119	1.047	1.023	0.970						
1981	1.599	1.322	1.199	1.120	1.057	1.001							
1982	1.555	1.388	1.156	1.057	1.008								
1983	1.773	1.412	1.107	1.044									
1984	1.604	1.308	1.136										
1985	1.524	1.392											
1986	1.352												
1987													
3 Yr Avg	1.493	1.371	1.133	1.074	1.037	1.034	1.025	1.022	1.035	1.043	1.056	0.972	
2 Yr Avg	1.438	1.350	1.122	1.050	1.032	1.012	1.009	1.019	1.031	1.054	1.056	0.972	
3 of 5 Avg	1.561	1.367	1.133	1.090	1.052	1.047	1.055	1.042	1.040	1.043	1.056	0.972	
3 Yr $ Wgt	1.485	1.368	1.133	1.072	1.037	1.031	1.022	1.019	1.032	1.046	1.046	0.972	
2 Yr $ Wgt	1.432	1.350	1.122	1.050	1.032	1.011	1.008	1.015	1.027	1.054	1.046	0.972	
Selected	1.435	1.350	1.125	1.050	1.035	1.015	1.010	1.015	1.025	1.050	1.050	1.000	1.000
Cumulative	2.785	1.941	1.438	1.278	1.217	1.176	1.158	1.147	1.130	1.103	1.050	1.000	1.000

(11)

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Adjusted Outstanding Losses (Net of Catastrophes)

Accident Year	Evaluation Date In Months												
	12	24	36	48	60	72	84	96	108	120	132	144	156
1975				28,815	35,399	37,664	40,053	40,840	36,238	31,617	29,734	33,555	24,490
1976			55,603	80,808	88,412	94,692	87,111	83,880	87,063	82,729	84,688	79,633	
1977		26,927	72,911	98,760	108,379	113,076	104,380	98,024	91,171	93,476	90,900		
1978	7,434	51,673	106,123	142,857	150,942	140,594	140,730	132,079	123,963	107,663			
1979	14,357	62,330	133,411	173,750	186,140	196,307	208,047	197,727	171,279				
1980	18,345	83,626	173,954	219,911	247,137	248,543	235,424	199,516					
1981	21,960	85,811	182,074	255,639	289,743	297,116	273,429						
1982	25,159	97,614	218,568	294,256	311,971	299,134							
1983	25,498	102,701	226,119	286,460	299,678								
1984	25,658	110,145	202,621	261,851									
1985	28,602	96,144	200,427										
1986	33,528	88,377											
1987	39,355												

In Thousands

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Average Outstanding Claim (Net of Catastrophes)

Accident Year	Evaluation Date In Months												
	12	24	36	48	60	72	84	96	108	120	132	144	156
1975				28,757	36,381	45,161	56,572	71,150	84,668	92,718	106,957	151,833	159,026
1976			33,455	44,013	52,720	64,813	71,344	88,762	111,334	136,292	179,044	225,589	
1977		26,270	43,271	53,528	63,158	72,161	81,356	94,984	108,408	142,711	174,808		
1978	12,288	38,648	54,562	67,006	76,118	85,833	100,521	119,313	145,326	162,879			
1979	20,365	44,745	63,318	75,708	88,218	105,712	129,786	154,354	171,450				
1980	23,580	61,309	77,936	88,961	105,976	120,945	136,005	148,229					
1981	32,630	63,282	79,962	97,984	117,210	136,668	151,233						
1982	35,286	71,512	92,106	110,747	127,439	138,809							
1983	34,833	74,692	104,202	122,210	139,710								
1984	36,307	83,859	107,235	117,718									
1985	39,039	75,565	105,887										
1986	27,128	76,194											
1987	20,549												
1975													
1976				53.0%	44.9%	43.5%	26.1%	24.8%	31.5%	47.0%	67.4%	48.6%	
1977			29.3%	21.6%	19.8%	11.3%	14.0%	7.0%	-2.6%	4.7%	-2.4%		
1978		47.1%	26.1%	25.2%	20.5%	18.9%	23.6%	25.6%	34.1%	14.1%			
1979	65.7%	15.8%	16.0%	13.0%	15.9%	23.2%	29.1%	29.4%	18.0%				
1980	15.8%	37.0%	23.1%	17.5%	20.1%	14.4%	4.8%	-4.0%					
1981	38.4%	3.2%	2.6%	10.1%	10.6%	13.0%	11.2%						
1982	8.1%	13.0%	15.2%	13.0%	8.7%	1.6%							
1983	-1.3%	4.4%	13.1%	10.4%	9.6%								
1984	4.2%	12.3%	2.9%	-3.7%									
1985	7.5%	-9.9%	-1.3%										
1986	-30.5%	0.8%											
1987	-24.3%												
Average	25.4%	14.7%	14.0%	12.8%	13.0%	14.2%	16.5%	16.6%	20.2%	21.9%	32.5%	48.6%	

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Outstanding Losses (Net of Catastrophes)

Accident Year	Evaluation Date In Months												
	12	24	36	48	60	72	84	96	108	120	132	144	156
1975				28,815	35,399	37,664	40,053	40,840	36,238	31,617	29,734	33,555	24,490
1976			55,603	80,808	88,412	94,692	87,111	83,880	87,063	82,729	84,688	79,633	
1977		26,927	72,911	98,760	108,379	113,076	104,380	98,024	91,171	93,476	90,900		
1978	7,434	51,673	106,123	142,857	150,942	140,594	140,730	132,079	123,963	107,663			
1979	14,357	62,330	133,411	173,750	186,140	196,307	208,047	197,727	171,279				
1980	18,345	83,626	173,954	219,911	247,137	248,543	235,424	199,516					
1981	21,960	85,811	182,074	255,639	289,743	297,116	273,429						
1982	25,159	97,614	218,568	294,256	311,971	299,134							
1983	25,498	102,701	226,119	286,460	299,678								
1984	21,312	97,444	173,291	207,184									
1985	22,213	66,648	147,183										
1986	15,734	53,717											
1987	12,165												

In Thousands

(14)

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Outstanding Claim Counts (Net of Catastrophes)

Accident Year	Evaluation Date In Months												
	12	24	36	48	60	72	84	96	108	120	132	144	156
1975				1,002	973	834	708	574	428	341	278	221	154
1976			1,662	1,836	1,677	1,461	1,221	945	782	607	473	353	
1977		1,025	1,685	1,845	1,716	1,567	1,283	1,032	841	655	520		
1978	605	1,337	1,945	2,132	1,983	1,638	1,400	1,107	853	661			
1979	705	1,393	2,107	2,295	2,110	1,857	1,603	1,281	999				
1980	778	1,364	2,232	2,472	2,332	2,055	1,731	1,346					
1981	673	1,356	2,277	2,609	2,472	2,174	1,808						
1982	713	1,365	2,373	2,657	2,448	2,155							
1983	732	1,375	2,170	2,344	2,145								
1984	587	1,162	1,616	1,760									
1985	569	882	1,390										
1986	580	705											
1987	592												

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Reported Claim Counts (Net of Catastrophes)

Accident Year	Evaluation Date In Months												
	12	24	36	48	60	72	84	96	108	120	132	144	156
1975				1,511	1,645	1,725	1,775	1,818	1,856	1,885	1,920	1,956	1,973
1976			2,455	2,855	2,986	3,087	3,149	3,249	3,324	3,389	3,434	3,451	
1977		1,533	2,428	2,859	3,028	3,141	3,232	3,308	3,386	3,444	3,502		
1978	739	1,885	2,741	3,266	3,415	3,527	3,634	3,716	3,777	3,827			
1979	781	1,850	2,925	3,438	3,647	3,791	3,913	4,005	4,076				
1980	839	2,046	3,180	3,817	4,014	4,126	4,241	4,303					
1981	813	2,025	3,268	3,894	4,137	4,278	4,397						
1982	838	2,106	3,419	4,083	4,295	4,451							
1983	905	2,063	3,262	3,785	4,001								
1984	682	1,836	2,621	3,076									
1985	752	1,636	2,457										
1986	735	1,444											
1987	730												

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Reported Claim Counts (Net of Catastrophes)

Accident Year	Period-to-Period Factors												
	12 to 24	24 to 36	36 to 48	48 to 60	60 to 72	72 to 84	84 to 96	96 to 108	108 to 120	120 to 132	132 to 144	144 to 156	156 to Ult
1975				1.089	1.049	1.029	1.024	1.021	1.016	1.019	1.019	1.009	
1976			1.163	1.046	1.034	1.020	1.032	1.023	1.020	1.013	1.005		
1977		1.584	1.178	1.059	1.037	1.029	1.024	1.024	1.017	1.017			
1978	2.551	1.454	1.192	1.046	1.033	1.030	1.023	1.016	1.013				
1979	2.369	1.581	1.175	1.061	1.039	1.032	1.024	1.018					
1980	2.439	1.554	1.200	1.052	1.028	1.028	1.015						
1981	2.491	1.614	1.192	1.062	1.034	1.028							
1982	2.513	1.623	1.194	1.052	1.036								
1983	2.280	1.581	1.160	1.057									
1984	2.692	1.428	1.174										
1985	2.176	1.502											
1986	1.965												
1987													
3 Yr Avg	2.277	1.504	1.176	1.057	1.033	1.029	1.020	1.019	1.017	1.016	1.012	1.009	
2 Yr Avg	2.070	1.465	1.167	1.054	1.035	1.028	1.019	1.017	1.015	1.015	1.012	1.009	
3 of 5 Avg	2.323	1.566	1.186	1.057	1.034	1.029	1.023	1.021	1.016	1.016	1.012	1.009	
3 Yr $ Wgt	2.266	1.507	1.177	1.057	1.033	1.029	1.020	1.019	1.016	1.016	1.010	1.009	
2 Yr $ Wgt	2.071	1.463	1.166	1.054	1.035	1.028	1.019	1.017	1.015	1.015	1.010	1.009	
Selected	2.100	1.500	1.175	1.055	1.035	1.025	1.020	1.015	1.015	1.015	1.010	1.005	1.000
Cumulative	4.485	2.136	1.424	1.212	1.149	1.110	1.083	1.061	1.046	1.030	1.015	1.005	1.000

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Ultimate Incurred Losses Using Unadjusted Reported Losses

Accident Year	Earned Exposures	Incurred Losses	Loss Dev Factor	Ultimate Incurred	Pure Premium	Cat Losses	Total Incurred
1975	14,792	79,792	1.000	79,792	5,394	0	79,792
1976	30,411	190,066	1.000	190,066	6,250	0	190,066
1977	31,451	210,889	1.050	221,433	7,041	0	221,433
1978	31,551	230,503	1.118	257,760	8,170	7,053	264,813
1979	31,794	291,843	1.163	339,408	10,675	1,343	340,751
1980	31,634	304,476	1.204	366,493	11,585	0	366,493
1981	31,462	357,623	1.240	443,379	14,093	0	443,379
1982	30,398	355,327	1.296	460,357	15,144	0	460,357
1983	26,564	326,055	1.386	452,002	17,016	0	452,002
1984	22,404	221,817	1.539	341,325	15,235	0	341,325
1985	20,664	151,288	1.923	290,996	14,082	0	290,996
1986	20,210	54,425	3.943	214,603	10,619	0	214,603
1987	20,334	12,190	12.618	153,812	7,564	0	153,812
Total	343,669	2,786,294		3,811,426	11,090	8,396	3,819,822

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Incurred Losses (Net of Catastrophes)

Accident Year	Evaluation Date In Months												
	12	24	36	48	60	72	84	96	108	120	132	144	156
1975				31,043	40,271	47,267	55,105	61,944	65,847	69,264	71,984	81,395	79,792
1976			56,630	86,949	104,055	119,942	134,577	147,897	164,985	175,624	188,681	190,066	
1977		27,242	74,564	106,033	127,165	143,936	157,479	170,676	179,734	197,799	210,889		
1978	7,449	52,637	108,491	150,115	169,959	184,384	200,158	216,480	232,335	230,503			
1979	14,646	63,461	138,967	187,577	217,780	244,878	272,434	292,044	291,843				
1980	18,424	84,144	177,173	232,110	273,150	294,050	309,318	304,476					
1981	22,005	87,661	187,056	267,315	318,174	347,730	357,623						
1982	25,171	98,393	221,727	306,056	340,236	355,327							
1983	25,506	103,079	230,160	295,533	326,055								
1984	21,356	98,313	177,962	221,817									
1985	23,124	68,355	151,288										
1986	15,744	54,425											
1987	12,190												

In Thousands

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Incurred Losses (Net of Catastrophes)

Accident Year	Period-to-Period Factors												
	12 to 24	24 to 36	36 to 48	48 to 60	60 to 72	72 to 84	84 to 96	96 to 108	108 to 120	120 to 132	132 to 144	144 to 156	156 to Ult
1975				1.297	1.174	1.166	1.124	1.063	1.052	1.039	1.131	0.980	
1976			1.535	1.197	1.153	1.122	1.099	1.116	1.064	1.074	1.007		
1977		2.737	1.422	1.199	1.132	1.094	1.084	1.053	1.101	1.066			
1978	7.066	2.061	1.384	1.132	1.085	1.086	1.082	1.073	0.992				
1979	4.333	2.190	1.350	1.161	1.124	1.113	1.072	0.999					
1980	4.567	2.106	1.310	1.177	1.077	1.052	0.984						
1981	3.984	2.134	1.429	1.190	1.093	1.028							
1982	3.909	2.253	1.380	1.112	1.044								
1983	4.041	2.233	1.284	1.103									
1984	4.604	1.810	1.246										
1985	2.956	2.213											
1986	3.457												
1987													
3 Yr Avg	3.672	2.085	1.304	1.135	1.071	1.064	1.046	1.042	1.052	1.060	1.069	0.980	
2 Yr Avg	3.206	2.012	1.265	1.107	1.069	1.040	1.028	1.036	1.046	1.070	1.069	0.980	
3 of 5 Avg	3.802	2.193	1.325	1.150	1.085	1.077	1.079	1.063	1.058	1.060	1.069	0.980	
3 Yr $ Wgt	3.671	2.074	1.307	1.133	1.070	1.059	1.040	1.036	1.047	1.065	1.041	0.980	
2 Yr $ Wgt	3.159	1.975	1.268	1.108	1.068	1.039	1.025	1.031	1.039	1.070	1.041	0.980	
Selected	3.200	2.050	1.250	1.110	1.070	1.045	1.030	1.035	1.040	1.065	1.050	1.000	1.000
Cumulative	12.618	3.943	1.923	1.539	1.386	1.296	1.240	1.204	1.163	1.118	1.050	1.000	1.000

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Calculation of Reserve Discount Factors Using 8% Rate

Payment Year	Cumulative Paid	Increment Paid	Reverse Sum of Col (3)	Present Value of Col (3)	Reverse Sum of Col (5)	Discount Factor at T=Year-1
1	0.000	0.000	1.000	0.0001	0.4593	0.459
2	0.003	0.003	1.000	0.0025	0.4592	0.496
3	0.011	0.008	0.997	0.0066	0.4567	0.534
4	0.030	0.019	0.989	0.0145	0.4501	0.573
5	0.078	0.048	0.970	0.0339	0.4356	0.611
6	0.144	0.066	0.922	0.0433	0.4017	0.640
7	0.230	0.086	0.856	0.0524	0.3584	0.665
8	0.328	0.098	0.769	0.0550	0.3060	0.682
9	0.418	0.090	0.671	0.0469	0.2510	0.692
10	0.485	0.067	0.581	0.0322	0.2041	0.702
11	0.551	0.066	0.514	0.0292	0.1719	0.722
12	0.606	0.055	0.449	0.0227	0.1427	0.741
13	0.667	0.061	0.394	0.0232	0.1199	0.767
14		0.059	0.333	0.0209	0.0968	0.790
15		0.054	0.274	0.0177	0.0759	0.814
16		0.051	0.220	0.0155	0.0582	0.839
17		0.047	0.169	0.0132	0.0427	0.867
18		0.044	0.122	0.0114	0.0295	0.896
19		0.040	0.078	0.0096	0.0181	0.928
20		0.038	0.038	0.0085	0.0085	0.962

(21)

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Paid Losses (Net of Catastrophes)

Accident Year	Period-to-Period Factors												
	12 to 24	24 to 36	36 to 48	48 to 60	60 to 72	72 to 84	84 to 96	96 to 108	108 to 120	120 to 132	132 to 144	144 to 156	156 to Ult
1975				2.187	1.971	1.567	1.402	1.403	1.271	1.122	1.132	1.156	
1976			5.980	2.547	1.614	1.880	1.349	1.217	1.192	1.119	1.062		
1977		5.248	4.400	2.583	1.643	1.721	1.368	1.219	1.178	1.150			
1978	64.267	2.456	3.065	2.620	2.303	1.357	1.420	1.284	1.134				
1979	3.913	4.912	2.489	2.288	1.535	1.326	1.465	1.278					
1980	6.557	6.214	3.790	2.132	1.749	1.624	1.420						
1981	41.111	2.693	2.344	2.435	1.780	1.663							
1982	64.917	4.055	3.735	2.395	1.988								
1983	47.250	10.690	2.245	2.907									
1984	19.750	5.375	3.133										
1985	1.874	2.405											
1986	70.800												
1987													
3 Yr Avg	30.808	6.157	3.038	2.579	1.839	1.538	1.435	1.260	1.168	1.131	1.097	1.156	
2 Yr Avg	36.337	3.890	2.689	2.651	1.884	1.644	1.443	1.281	1.156	1.135	1.097	1.156	
3 of 5 Avg	43.972	4.041	3.071	2.373	1.839	1.548	1.403	1.260	1.185	1.131	1.097	1.156	
3 Yr $ Wgt	3.403	4.339	2.991	2.552	1.842	1.538	1.435	1.263	1.164	1.134	1.082	1.156	
2 Yr $ Wgt	2.622	3.407	2.721	2.618	1.884	1.645	1.441	1.281	1.153	1.136	1.082	1.156	
Selected	35.000	3.750	2.750	2.600	1.850	1.600	1.425	1.275	1.160	1.135	1.100	1.100	1.500
Cumulative	12060.147	344.576	91.887	33.413	12.851	6.947	4.342	3.047	2.390	2.060	1.815	1.650	1.500

CASUALTY LOSS RESERVE SEMINAR
Session 6G - Advanced Case Study

Paid Losses (Net of Catastrophes)

Accident Year	Evaluation Date In Months												
	12	24	36	48	60	72	84	96	108	120	132	144	156
1975				2,228	4,872	9,603	15,052	21,104	29,609	37,647	42,250	47,840	55,302
1976			1,027	6,141	15,643	25,250	47,466	64,017	77,922	92,895	103,993	110,433	
1977		315	1,653	7,273	18,786	30,860	53,099	72,652	88,563	104,323	119,989		
1978	15	964	2,368	7,258	19,017	43,790	59,428	84,401	108,372	122,840			
1979	289	1,131	5,556	13,827	31,640	48,571	64,387	94,317	120,564				
1980	79	518	3,219	12,199	26,013	45,507	73,894	104,960					
1981	45	1,850	4,982	11,676	28,431	50,614	84,194						
1982	12	779	3,159	11,800	28,265	56,193							
1983	8	378	4,041	9,073	26,377								
1984	44	869	4,671	14,633									
1985	911	1,707	4,105										
1986	10	708											
1987	25												

In Thousands

MR. WESTERHOLM: Dean Anderson will be our next speaker. Dean is a Principal at Tillinghast and manages the risk management casualty practice in the Minneapolis office. Prior to joining Tillinghast in 1980, he acquired 10 years of property casualty insurance company experience. Dean's a FCAS, a CPCU and he holds an associate in risk management designation. He is also a member of the American Academy's Committee on Property & Liability Insurance Financial Reporting.

MR. ANDERSON: Dick has already given you a good deal of background on the New York doctors' situation, so I will not go into that much detail, unless I have some areas I think he did not cover. This database, as Dick said, is made up of two companies, MLMIC and MMIA; MLMIC is Dick's client and MMIA is my client. So, we both are very familiar with this database.

The first thing we did was to employ a simple incurred loss development technique, and this is the summary page from that analysis. If you want to see the back up, it's on page 17. If you want to see the backup data, the triangle is on page 18 and the development factor calculation is on page 19.

There are two things I'd like to point out on this exhibit. First of all, in the second to the right column, we've separated out the catastrophe losses. All of the analysis we've done is net of catastrophes, then we've added it back in, because we do not expect any additional development on those claims. It's kind of irrelevant in this exercise because the amount is so small compared to the total losses, but in general practice it would be good to separate these types of claims.

The other thing I'd like to point out is, as a reasonableness check on this analysis, we've included exposure units, and calculated the implied pure premium from the development technique; and, as you can see, the last three years, or four years, have been showing a decrease and then a pretty dramatic decrease.

Now, there have been some changes in the New York situation the last few years, but nothing to the degree that we would expect the pure premium in 198' to be half of what it had been a few years before, and the 1986 to be a little over half of what it was four years before that. So, we felt that there may have been some decline in the reserve adequacy, despite the fact that the various claims departments had indicated that they really hadn't changed any procedures.

This is page 12. We developed a triangle of average outstandings, and as you can see in the first column, at 12 months' evaluation, there has been a pretty dramatic and steady decline in the average outstanding claim by accident year, and it has continued for the first three or four development periods. The bottom half of the page shows the year-to-year increase or decrease in the average outstanding.

So for the 1987 year the minus 24.3 percent is just from the top half of the page, the 20,549 divided by 27,128. Now, this is on an accident year basis. We also have the data on a report year basis which was not sent to you. That data shows the reserve adequacy decline a little bit clearer than this data set does. I would prefer to do the reserve analysis for the case reserve adequacy on a report year basis if I could

Down at the very bottom line we've taken an average of what the year-to-year changes were for the five years prior to accident year 1984. This is a pretty simplistic way of looking at it, but we did it primarily for demonstration purposes. You can use various fittings to try to develop trend rates to make a decision as to what level of trend you

should be expecting. You can also look at some paid loss data, although in New York, the payment pattern is so slow that looking at paid losses in the earlier periods does not really give you a lot of information.

Also, although it was not given in the data that was sent out to you, we do know that in New York there have been some significant tort law changes. Some laws were enacted in 1981, additional laws were enacted in 1985 and the last set in 1986. So in doing this analysis for trend, you should take into account the benefits from the tort law changes. In this case, we did not because it was not sent out to you.

What we ended up concluding for this study was that for the accident years 1984 and subsequent had been a reserve adequacy decline. We made an adjustment to the data triangle by assuming that there should be approximately a 15 percent trend, and we came up with new average outstandings for 1984 and subsequent accident years for each of the evaluations by projecting the older years forward and taking an average, looking at the individual values and making a final selection. We replaced the actual values for those years with the values that we thought should be there, based upon what the data triangle development factors would expect as the reserve adequacy level.

This is page 7. What we're doing in this initial section is a separate frequency and severity analysis, and we've calculated the severities based on our adjusted incurred losses from the case reserve adequacy adjustment. The data triangle of average severity is based on the adjusted incurred losses is on page 9 and the development factors are on page 10.

The first column, shows the average severity at the current evaluation and the development factors come from the analysis on page 10.

One additional column we have in here is the policy limits effect. As Dick mentioned to you, there is a million dollar policy limit, and that has been the maximum policy limit since 1975. Most of the policies now are on the million dollar limit. For the last several years, most of the policies have been at that level and there has been a steady increase to finally bring the average policy limit up, at about the million dollar level.

Because the severity in relationship to the policy limit has been increasing very dramatically, it is now up to the area where the average severity on a closed with indemnity basis is about 40 or 50 percent of the policy limit.

We expect that there will not be as much development out at the tail on these more recent accident years because a number of the claims will start hitting the policy limits cap and will not be able to develop any further. So, we tried to come up with some estimate of what that effect would be on our development factors.

This is page 8. In our analysis in this area, we made an assumption of a lognormal model. Of course, a different statistical distribution can be used if the underlying data indicates something different, or a different CV with the log normal distribution.

The first column shows the average policy limit and the next column shows the unlimited severity. What we have done here is take the value we get from the straight development technique and divided it by .3 to try to get it on a closed with indemnity basis.

Now, by doing this, we are not getting quite as good results as when we've done this study on behalf of MMIA, because, as Dick mentioned, the closed with indemnity ratio is not constant year by year. In fact, for the older years the ratio is higher than what the current level is. So, by assuming a constant rate, I am somewhat deflating the actual underlying trend. What we have done in the middle column is take the ultimate severity off the development technique and using a log normal model, moving it up to an unlimited severity basis.

Now, in that column, if we are not having any effect of policy limits, of the average severity by year should not be that different in relationship to policy limits. The average severity should stay at basically a constant level of the policy limits and we should expect a fairly consistent trend over time.

One approach you can use is by looking at that trend and going down the line and seeing if you get to a point where the trend starts increasing significantly. For example, if the trend is fairly consistent at 20 percent through all of the years and then all of a sudden it takes off to 25 and then to 30. We've made the assumption that that is probably due to the cause of the average policy limit in relationship to the severity being too close and we expect some capping at that point.

So, when we looked at those trend rates from 1976 through 1986, we saw what seems to be at a fairly reasonable increase. However, because of the constant closed with indemnity ratio, we get some bouncing up and down, and starting in 1987, do we show a jump in the trend.

We have used the 1976 to 1986 period to fit a line, including the 1987 expected level. Then in the model severity we brought that unlimited severity for 1987 back down to a limited basis and compared that to the 500,000 that we get off the development technique. We then selected an adjustment factor, implying that, if we use a straight development technique, we need to adjust the development factors by a factor of .9 to take into account the effects of policy limits on development out in the tail.

When we did this with the actual data on behalf of MMIA, using the correct closed with indemnity ratios, this adjustment was actually applied to the last three or four accident years. It was not just the latest year, as in this example. I think the reason for that is that we have dampened the trend rate by assuming a constant closed with indemnity ratio.

This is the frequency calculation. It is shown on page 6, and the triangles and development factors are on the next two pages. All of the data we had on claims in this analysis was on a reported basis. I think because of all the adjustments we have to make, it would really be better to do the analysis on a closed with indemnity frequency basis rather than a reported basis.

This exhibit is pretty straightforward. One thing you should notice is the frequency in the last column. We are showing the flattening and somewhat decline in frequency that Dick mentioned. When we did this analysis for MMIA, we did it using a frequency/severity by report year lag method.

What we've discovered is, we are not really seeing a downward trend in the frequency. What appears to have happened is that, starting in report year 1986, we had a very dramatic, about 25 percent, drop in frequency. Therefore, accident years 1986 and subsequent are fully on that new level, while accident years 1983, 1984 and 1985 are affected to somewhat of a degree because they still have a significant number of their

claims being reported during 1986 and later. But now our big question going forward is to decide whether this new lower plateau that we seem to be on is permanent or whether it's a temporary phenomenon.

Page 5, all we have done here is combine the frequency and severity that we have already calculated, and derive the ultimate losses to which we then added back the catastrophe losses.

On page 2, we have basically the same analysis, using just the adjusted incurred losses. The development factors and triangles are on the next two pages. The policy limits adjustment factor that we are using is the same as we developed in the frequency and severity calculation; and, again, we are showing the pure premiums as a reasonableness check.

Generally, we would not use the development technique for the 1987 year, since the factor at 12 months is so high. We would use some projecting technique using older years where we are more comfortable with our developed ultimate. But since the value that was generated with the development factor for this example came in at a level that we probably would select after looking at the older years, we just left it and did not make an adjustment.

This is page 1. What we've done here is show the ultimate values that we have developed using the three techniques: the reported incurred losses that are unadjusted; the incurred development technique using adjusted losses; and the frequency severity technique using adjusted losses; and then made a selection.

Again, we show the pure premium as a reasonableness check and then subtract out the paid losses to get the loss reserves. We are use a discount factor that is calculated in the last three pages of the handout using an 8 percent interest rate, and show the discounted reserve in the last column.

Well, that ends my part of the presentation.

MR. WESTERHOLM: Our next speaker will be Professor Ben Zehnwirth. Professor Zehnwirth is not a new face at the CLRS meetings. This is the second panel he has participated on at this meeting alone, and he's been a guest speaker at four prior loss reserve seminars.

Mr. Zehnwirth lectures in statistics and actuarial science at Macquarie University in Sydney, Australia, and is the author of over 30 research papers on statistics, econometrics and actuarial science, published in international scientific journals. He is also an editor and referee for more than 10 scientific journals and has been an invited guest speaker at a number of international scientific meetings.

His company, Insureware Ltd. provides systems and software solutions to property and casualty insurance. ICRFS, Integrated Claims Reserving Forecasting Systems, of which he is the author, is the system which he used to analyze this case study.

(Taping problems resulted in making the remainder of the presentation inaudible. Mr. Zehnwirth's handout material is included.)

ANALYSIS OF MEDICAL

MALPRACTICE PAYMENTS

SESSION 6G

CASUALTY LOSS RESERVE SEMINAR 1989

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1. INTRODUCTION AND SUMMARY

In the present report we analyse medical malpractice development arrays supplied by the organisers of the CLRS.

The primary objective is to analyse the data for the purpose of providing projections of outstanding reserves for each of the accident years 1975 to 1987.

The loss development arrays are analysed within the integrated and consistent modelling framework discussed in "**Stochastic Regression Models with Applications to Loss Reserving**" presented in Session 4G. Indeed, it is assumed that the reader is familiar with the modelling framework, before reading the present paper.

The medical malpractice development arrays are used as a vehicle for illustrating concepts including:

* NON-ORTHOGONAL SYSTEMATIC TRENDS
* PARSIMONY
* TESTABILITY
* VALIDATION
* STABILITY

Varying parameter stochastic (probabilistic) models are used to explain the behaviour of the loss development arrays in order to:

* separate the random components in the data from the systematic components;
* identify and estimate any heterogeneity in the data;
* identify and estimate changes in payment (calendar) year inflation;
* identify and estimate changing systematic trends across accident years;

* separate changing payment year trends from changing accident year trends.

Separate analyses were conducted of the:

(a) incremental paid losses array based on 'accident' years 1963-1987, adjusted for exposures;
(b) incremental paid losses array based on accident years 1975-1987, adjusted for exposures;

The loss development array (a) was of primary interest since it contains more information resulting in a more accurate forecast of the tail.

The final identified model based on array (a) was **VALIDATED** and tested for **STABILITY**. This was conducted by assigning zero weights to

(i) the last payment year, 1987;
(ii) the last two payment years, 1986 and 1987;
(iii) the last three payment years, 1985, 1986 and 1987.

We investigated whether the model would forecast the last three payment years had we used the model at year end 1984, and moreover, tested the outstanding reserves for stability.

Array (b) was also analysed in order to check for consistency between the two sets of forecasts.

By way of summary, we have identified and estimated a <u>constant</u> annual payment year inflation of 24.49% (± 3.69%) from payment year 1979 to payment year 1987.

<u>However</u>, there are substantial changes in systematic trends across accident years. For example, from accident year 1982 to accident year 1983, there is a <u>downward</u> trend of 54.6% (±22.46%). Recall that from the arguments presented in Session 4G, it is the resultant trend that is relevant.

Most of the variation (90.1%) in the payments is explained by:

* constant payment year inflation;
* changing systematic trends across accident years;
* systematic development over development years.

The remaining 9.1% of the variation in the payments represents the random component. Projections (forecasts) and standard errors have been derived for each accident year subdivided according to development year. The various detailed projections are presented and discussed in Section 4.

We present a summary here of the forecast totals (undiscounted) for accident years 1968-1987.

TABLE 1.1

YEARS INCLUDED IN ESTIMATION	FORECAST ($M)	STANDARD ERROR ($M)
1979 - 1987	3177.8	491.3
1979 - 1986	3468.1	788.2
1979 - 1985	3414.0	1066.0
1979 - 1984	3099.0	1116.0

Note that forecasts of outstanding payments beyond payment year 1987 remain stable (within one standard error) as we remove the recent payment years from the estimation. Stability is gauged by comparing changes in forecasts with standard errors. Forecasts for accident years 1975-1987 are:

TABLE 1.2

YEARS INCLUDED IN ESTIMATION	FORECAST ($M)
1979 - 1987	3127.4
1979 - 1986	3413.5
1979 - 1985	3367.0
1979 - 1984	3051.0

Estimates of constant payment year inflation as we remove the most recent payment years are:

TABLE 1.3

YEARS INCLUDED IN ESTIMATION	INFLATION (%)	STANDARD ERROR (%)
1979 - 1987	24.49	3.69
1979 - 1986	26.11	3.75
1979 - 1985	26.09	4.12
1979 - 1984	28.07	4.49

The most striking feature of the above results is that after removal of 32% of the information we are essentially obtaining the same answers.

Forecasts discounted at 9% for accident years 1975-1987 based on all the payment years 1979-1987 are set out in the following Table.

TABLE 1.4

ACCI YEAR	FORECAST ($000)	PMNT YEAR	FORECAST ($000)
		1988	218366
		1989	220448
		1990	216096
		1991	205039
		1992	188943
		1993	168504
		1994	146520
1975	17405	1995	124475
1976	53893	1996	102036
1977	83447	1997	81683
1978	112235	1998	63532
1979	146614	1999	48745
1980	153929	2000	37127
1981	210719	2001	26506
1982	254427	2002	18166
1983	170289	2003	11817
1984	197980	2004	7687
1985	138457	2005	4590
1986	162103	2006	2657
1987	192619	2007	1178
TOTAL	1894117	TOTAL	1894117

The above figures are extracted from Appendix J1 which also provides details of standard errors. The future liability payment stream with associated standard errors can be used for optimal **ASSET/LIABILITY** matching.

The forecast obtained by using the smaller array (b) is ($M) 3372 ± 957. The forecast horizon is 21 development years, yet we only use data up to development year 14. Hence, the relatively large standard error. The two forecasts based on the two arrays (a) and (b) are relatively (within standard errors) close to one another.

2. DATA (Appendix A)

2.1 DATA SUPPLIED

Data sets were supplied in two separate batches The second batch was supplied on request when it was recognised that the first batch (containing data beginning in accident year 1975) provided little information in respect of the long tail.

First batch

* cumulative paid indemnity (Appendix A1);
* reported claim counts (Appendix A2);
* outstanding claim counts (Appendix A3);
* closed claim counts (Appendix A4);
* incurred indemnity (Appendix A5);
* outstanding indemnity losses (Appendix A6);
* exposures (Appendix A7).

Link ratios and other ratios based on above loss development arrays were also supplied, but these were not found to be useful.

Second batch

* cumulative paid losses for (accident) years prior to 1975, but subdivided according to policy years rather than accident years (Appendix A8).

2.2 DATA ANALYSED

A number of incremental paid losses arrays were created based on the data sets supplied.

* incremental paid losses array: payment years 1979-1987, accident years 1975-1987, labelled P1;

* incremental paid losses array: payment years 1979-1986, accident years 1963-1986, up to delay 20, labelled P2;

* incremental paid losses array: payment years 1979-1987, accident years 1963-1987, up to delay 20, labelled P3.

Array P1

This array was obtained by decumulating the data of the array in Appendix A1.

Array P2

This array was obtained by merging array P1 with the incremental paid losses obtained from Appendix A8. The array P2 contains payments only to payment year 1986. Moreover, we have mixed policy years (prior to 1975) with accident years (post 1974). We do this in order to obtain improved accuracy of the long tail.

Array P3

This array is an augmented version of array P2. It contains the additional payment year 1987. Payments for payment year 1987, prior to accident year 1975 were obtained from a forecasting model based on array P2. These values are assigned zero weight in the analysis of P3, so that they do not affect the estimation of the model.

Exposures represent the 'relative' volume of business written in each accident year. We adjust each accident year's payments according to the corresponding exposure in order to make accident years compatible in terms of levels of payments. We use 'Number of Base Doctors Reported' (Appendix A7) as a measure of relative exposure. Using exposures is a form of adjustment. The models that we identify and estimate also adjust for any changing systematic trends across accident years, so that exposures are only important in that they may reduce the forecasts' standard errors, that is, the uncertainty associated with the estimates of outstandings. Moreover, they are also relevant in separating payment year trends from accident year trends.

Refer to the discussion on non-orthogonality of payment year and accident year trends presented in the paper given in Session 4G. If it is assumed that accident year trends are removed (adjusted for) by using exposures, then the systematic trends in the payment year direction can be regarded solely as payment year effects. Otherwise, they are the resultant of both accident year effects and payment year effects. These properties of loss development arrays are fundamental.

Before discussing the preliminary exploratory analysis, we provide a description of the terms standard error and uncertainty.

Standard Error and Uncertainty

Since an estimate is based on information obtained from a 'sample', it is subject to sampling variability; that is, it differs from the figure that would have been produced if all the population values had been observed. A measure of the likely difference is given by the standard error. There are about two chances in three that a sample estimate will differ by less than one standard error from the true figure that would have been obtained if all population values had been observed, and about nineteen chances in twenty that the difference will be less than two standard errors. The standard error measures the uncertainty associated with the estimate. The same arguments apply to the standard error of a mean forecast.

3. PRELIMINARY ANALYSIS (Appendix B)

We discuss at length the analysis of the array P3.

3.1 PLOTS

In order to obtain some preliminary ideas of what indications there are in the data, we plot (graph) the data in a number of different ways.

(i) Appendix B1 presents a plot of normalised (adjusted for exposures) payments for accident years 1963 to 1987 against delay (development year). The peak is around development year six, payments subsequently decreasing quickly. The letter 'A' represents a (normalised) payment in respect of accident year 1963, whereas the letter 'B' represents a (normalised) payment in respect of accident year 1964, and so on. Note again, that in view of the fact that payment year trends are projected onto the development year direction, this type of display may not tell the story truthfully and/or may not tell all of it. We use formal regression analysis in order to discover the systematic patterns in the three directions in the data.

(ii) Appendix B1 also gives a plot of the logarithms of the normalised payments against delay. By examining the logarithms of the payments, we derive some insight into the % variability in the data.

The last plot reveals six unusual observations, viz., values at (accident year 1963, delay 18); (1964,16); (1964,19); (1965,17); (1965,20) and (1966,15). Some of these observations are subsequently assigned zero weight.

The plot also reveals variability in % variability in the data as follows:

* high % variability in delay 0;
* less % variability in delays 2-8;
* increasing % variability from delay 9 to 20.

3.2 TRENDS AND STRUCTURE (Appendix C)

In order to obtain some preliminary ideas of the structure (systematic patterns) in the data, we estimate a model that assumes:

* homogeneity in systematic development factors across accident years;
* constant inflation across payment years.

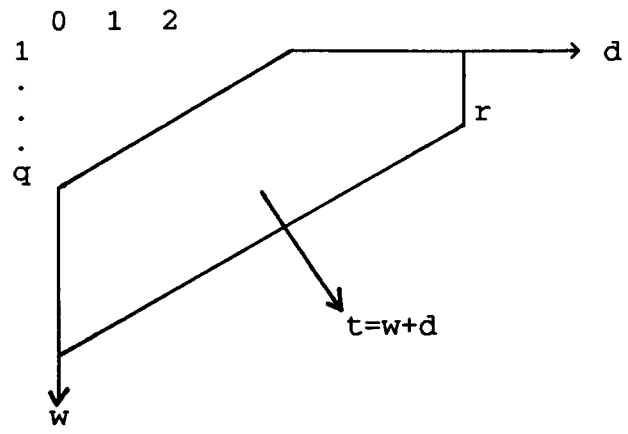
We subsequently examine displays of the observed (logarithmic) payments about the fitted model. The distribution of the observations about the fitted model (surface) should appear random if the two assumptions:

* homogeneity of systematic development factors;
* constant inflation,

are valid. Otherwise, any systematic departure from randomness facilitates the diagnostic identification of heterogeneity (apart from constant inflation).

We estimate the model:

$$y(w,d) = \log[p(w,d)] = \alpha + \beta*\log(1+d) + \gamma*d + \iota*(w+d-q) + \varepsilon \quad (1)$$



where:

w is the variable denoting accident year, w=1,2,...,25;

d denotes delay (development year), d=0,1,2,...,20;

t denotes payment year, t=16,...,25;

p(w,d) is the normalised payment in respect of accident year w and delay d.

The data starts at payment year q=16 and note that the variable t (representing payment year) = w+d.

The parameter α (alpha) represents the base level of the curve (surface).

The parameters β (beta) and γ (gamma) represent the 'smoothed' systematic base development factors. The systematic development factors are represented by the parameters β and $\gamma+\iota$.

The parameter ι (iota) represents the annual (force of) inflation (in the payment year direction).

Appendix C1 presents some of the (regression) results. We note:

(i) the parameter β (beta) is positive, and the parameter γ (gamma) is negative;

(ii) average annual (force of) payment year inflation is 22.89% $\pm$ 3.02%, and is significant. The parameter iota measures inflation;

(iii) Note that the tail is represented by the quantity γ_{+1} (=-0.567), so that here the payments do ultimately decay.

We now examine the residuals (observed - predicted), given in Appendix C2, in order to diagnostically identify any systematic departures from homogeneity:

(i) residuals against delay are indicative of heteroscedasticity, that is, the magnitudes of the residuals change with delay. For example, magnitudes at delay 0 are higher than magnitudes at delays 5-8;

(ii) we need to adjust for heteroscedasticity before determining diagnostically whether there are any systematic trends across accident years and whether inflation across payment years is constant.

4. THE BEST IDENTIFIED MODEL (Appendix D)

We have identified a (varying parameter) stochastic model that has one constant inflation rate across payment years, adjusts for changing systematic trends across accident years, and adjusts for heteroscedasticity. The model is **VALIDATED** and tested for **STABILITY**.

Each accident year has three parameters α (alpha), β (beta) and γ (gamma). Between every two contiguous payment years there is an ι (iota) (inflation) parameter.

1. The β (beta) and γ (gamma) parameters are the same for each accident year. They represent the smoothed systematic <u>base</u> development factors.

2. Each accident year has a level (α (alpha)) parameter. The α parameters adapt from year to year according to values given in Appendix D1.

3. There is a single iota (inflation) parameter. See Appendix D3.

4. Accident years are homogeneous with respect to systematic development factors represented by the parameters β and $\gamma+\iota$.

Much of the variability in the payments, viz., 89.6% (Appendix D4), is explained by the <u>systematic</u> components in the data, viz.,

(i) constant inflation rate;
(ii) changing systematic trends across accident years;
(iii) systematic development of the payments over development years.

Indeed the correlation between the observed (logarithmic normalised) payments and model payments is 0.947 ($\surd$.896). (See Appendix D4).

The % random (variability) in the payments about the systematic structure is just under 11% (10.4%).

Appendix D1

Here is presented the estimates of the systematic base development factors β (beta) and γ (gamma) and also the levels α (alpha) for each accident year. Each accident year has the same systematic base development factors and the same systematic development factors.

Appendix D2

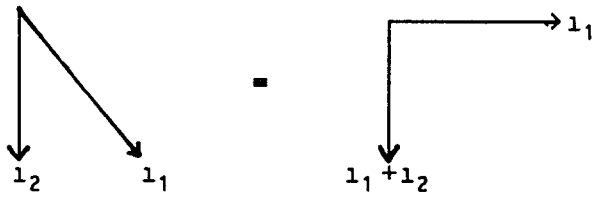
Changes in α (alpha) represent changes in % levels between any two contiguous accident years, equivalently, linear trends on a logarithmic scale. For example, the changes in % (force of) level from accident years 1982 to 1983 is -54.6% ± 2[illegible].46%. The Table gives all the % changes (trends) between any two contiguous accident years. The T-ratios do not measure the significance of differences in levels as we are estimating a varying parameter model.

Appendix D3

Here we present the (constant) payment year inflation estimate, viz., 24.49% ± 3.69%.

We also tested formally the hypothesis that inflation rates change between some of the payment years. The hypothesis was rejected.

Recall that the resultant trend of



For example, if we want to compute the trend, say, from an observation corresponding to accident year 1982, delay 3, to an observation corresponding to accident year 1983, delay 3, we compute it as follows:

(i) inflation is 24.49% (±3.69%) (See Appendix D3);
(ii) trend from accident year 1982 to 1983 (see Appendix D2) is -54.6% (± 22.46%). Therefore resultant trend is -32.14%.

Appendix D4

Here we present some additional regression output.

Explanations:

--- R-squared denotes the proportion of the variation in the data explained by the model. It is also the square of the correlation between observed and expected;

--- S-squared is the mean square error and S is the root mean square error;

--- AIC is Akaike Information Criterion which is based on information theory. It is used to guard against overparametrisation and compare the predictive powers of models;

--- SSPE is the sum of squares of the one-step-ahead prediction errors. It is used to compare the predictive power of models.

The second page of this Table should be juxtaposed at the right of the first page.

Expected values and forecasts are estimates of means of lognormal distributions. Standard errors are estimates of standard deviations of lognormal distributions.

Forecasts are based on the assumed future payment year inflation rate of 24.49% ± 3.69%. That is, it is assumed that inflation rates will fluctuate in the future with a standard deviation of 3.69% about a mean of 24.49%.

Appendix E2

Here we present a quality of fit table comparing the original observed payments with the model expected payments. For each accident year and for each payment year, we compute the ratio of the difference in total observed and total expected to the total expected. The quality of fit is high.

The following Table presents the projected reserves discounted at 9% for accident years 1968-1987 and payment years 1979-1987. The Table is extracted from Appendix J1 (or Appendix J2).

TABLE

FORECAST RESERVES DISCOUNTED AT 9%

(Payments are in $000's)

ACCI YEAR	FORECAST RESERVES	PMNT YEAR	FORECAST RESERVES
1968	462	1988	232625
1969	992	1989	230683
1970	1866	1990	223294
1971	3955	1991	209946
1972	7813	1992	192067
1973	14427	1993	170214
1974	12479	1994	147082
1975	17405	1995	124475
1976	53893	1996	102036
1977	83447	1997	81683
1978	112235	1998	63532
1979	146614	1999	48745
1980	153929	2000	37127
1981	210719	2001	26506
1982	254427	2002	18166
1983	170289	2003	11817
1984	197980	2004	7687
1985	138457	2005	4590
1986	162103	2006	2657
1987	192619	2007	1178
TOTAL	1936110		1936110

5. COMPARISON WITH ARRAY P1

A separate analysis was conducted of array P1 which comprises the normalised payments, accident years 1975-1987.

Appendix F1 presents the forecasts Table, whereas Appendix F2 presents the quality of fit Table.

Here the forecasts are a little higher, by less than one standard error though, than those obtained from the larger array P3.

Forecast based on P3 = 3127.4 (± < 491.2)
Forecast based on P1 = 3372.0 (± 957.4)

Analysis based on P3 appears to give better results in so far as the long tail is concerned. The forecasts are more compatible with the outstanding indemnity losses given in Appendix A6.

The standard errors associated with P1 are naturally higher than those associated with P3. We use the results based on analysis of P3.

6. DISCUSSION OF OTHER DATA ARRAYS SUPPLIED

The only data arrays that have been analysed are the two incremental paid losses arrays. The small case reserves array (Appendix A6) is potentially useful in determining payments beyond delay 12. Note that forecasts given in Appendix E1 for accident years 1975-1987 are consistent with the case reserves given in Appendix A6. In particular, the outstanding of 22066 ± 7515 for accident year 1975 (Appendix E1) is consistent with outstanding case reserves of 24490 (Appendix A6).

The authors requested from the organisers of the CLRS, paid losses and case reserves by report year, in order to track case reserves à la Fisher and Lang. This information could not be made available. Accordingly, the value of case reserves is questionable. Incurred losses do not really lend themselves to sound statistical analysis - case reserves and paid losses should be analysed separately. Recall that adding payments across development years masks any systematic changes across payment years. Indeed, there is not a single sound statistical reason for cumulating the data.

Analysis based on 'averages' (e.g. average losses and corresponding counts) are usually subject to higher instabilities (standard errors) than analysis of payments. In the former we need to analyse two arrays separately. In any case, geometric means should be analysed in place of arithmetic means. Geometric means could not be computed from the data supplied.

7. VALIDATION AND STABILITY

We would like to **VALIDATE** the final model and also test it for **STABILITY.**

VALIDATION

The important question is whether the estimated model can predict outside the sample. Since we don't have any data beyond the 1987 payment year, we re-estimate the same model for

(i) payment years 1979-1986, that is, we remove payment year 1987 to determine if the model forecasts it;

(ii) payment years 1979-1985, that is, we remove the last two payments years to determine if the model forecasts them;

(iii) payment years 1979-1984, that is, we remove the last three payment years (to determine if the model forecasts them).

Validation of the last three years is conducted by assigning zero weights to the years rather than physically removing them from the array. In this way, the residuals for the payment years being validated can be used to assess the quality of the forecasts relative to observed experience.

Appendix G1 presents residuals for all payment years. Bear in mind that the last payment year 1987 is omitted from the estimation. The residuals for 1987 appear random about zero. Appendix G2 presents the forecasting table. The Expected values for 1987 are actually now forecasts. The Table in Appendix G3 shows that the model overforecasts 1987 by 2%.

Appendices H1-H3 and Appendices I1-I3 indicate that all the last three years are validated very well.

STABILITY

The concept of validation is also related to the concept of **STABILITY**. If we don't use the last payment years' data to estimate the model, the ultimate losses should not differ from that obtained by using the last payment years' data by more than one standard error. We would like to use a model that delivers **STABILITY** of reserve calculations from year to year.

The following Table displays forecasts and corresponding standard errors of the array P3 and three 'truncations' thereof based on removal of recent payment years. The information in the Table is extracted from Appendices G2, H2 and I2.

TABLE 7.1

YEARS INCLUDED IN ESTIMATION	FORECAST ($M)	STANDARD ERROR ($M)
1979 - 1987	3177.8	491.3
1979 - 1986	3468.1	788.2
1979 - 1985	3414.0	1066.0
1979 - 1984	3099.0	1116.0

After removing the last three payment year's data (1985-87), that is, 32% of the observations, we are essentially obtaining the same forecasts. This is because the systematic trends in the data are stable.

8. DISCOUNTED FORECASTS

We discount the forecasts obtained in Appendix E1 using a discount rate of 9%. The forecasting Table appears in Appendix J1. The Table below is a summary extracted from the margins of Appendix J1.

TABLE

ACCI YEAR	FORECAST RESERVES	PMNT YEAR	FORECAST RESERVES
1968	462	1988	232625
1969	992	1989	230683
1970	1866	1990	223294
1971	3955	1991	209946
1972	7813	1992	192067
1973	14427	1993	170214
1974	12479	1994	147082
1975	17405	1995	124475
1976	53893	1996	102036
1977	83447	1997	81683
1978	112235	1998	63532
1979	146614	1999	48745
1980	153929	2000	37127
1981	210719	2001	26506
1982	254427	2002	18166
1983	170289	2003	11817
1984	197980	2004	7687
1985	138457	2005	4590
1986	162103	2006	2657
1987	192619	2007	1178
TOTAL	1936110		1936110
TOTAL (OMITTING ACCI YEARS 1968-74)	1894117		1894117

9. SUMMARY AND CONCLUSIONS

We have used the integrated modelling framework described in Session 4G to analyse medical malpractice payments.

The following concepts were demonstrated in practice:

* PARSIMONY
* PREDICTIVE POWER
* VALIDATION
* STABILITY
* STANDARD ERRORS

We have provided sufficient information to conduct optimal **ASSET/LIABILITY** matching and have highlighted the many advantages to be had by using varying parameter stochastic regression models.

PAID INDEMNITY LOSSES ($'000's)
(INCLUDING CATASTROPHE CLAIMS)*

ACCIDENT YEAR	EVALUATION POINT (in years) 1	2	3	4	5	6	7	8	9	10	11	12	13
1975				2228	4872	9603	15052	21104	29609	37647	42250	47840	55302
1796			1027	6141	15643	25250	47466	64017	77922	92895	103993	110433	
1977		315	1653	7273	18786	30860	53099	72652	88563	104323	119989		
1978	15	964	3436	11456	25914	50696	65928	90312	115281	129748			
1979	289	1626	6069	14352	32165	48571	65112	95080	121418				
1980	79	518	3219	12199	26013	45507	73894	104960					
1981	45	1850	4982	11676	28431	50614	84194						
1982	12	779	3159	11800	28265	56193							
1983	8	378	4041	9073	26377								
1984	44	869	4671	14633									
1985	911	1707	4105										
1986	10	700											
1987	25												

* CATASTROPHE LOSSES INCLUDED IN ABOVE FIGURES:

1978	0	0	1068	4198	6897	6906	6500	5911	6909	6908
1979	0	495	513	525	669	725	763	854		

REPORTED CLAIM COUNTS
(EX CATASTROPHE CLAIMS)

ACCIDENT YEAR	EVALUATION POINT (in years) 1	2	3	4	5	6	7	8	9	10	11	12	13
1975				1511	1645	1725	1775	1818	1856	1885	1920	1956	1973
1976			2455	2855	2986	3087	3149	3249	3324	3389	3434	3451	
1977		1533	2428	2859	3028	3141	3232	3308	3386	3444	3502		
1978	739	1885	2741	3266	3415	3527	3634	3716	3777	3827			
1979	781	1850	2925	3438	3647	3791	3913	4005	4076				
1980	839	2046	3180	3817	4014	4126	4241	4303					
1981	813	2025	3268	3894	4137	4278	4397						
1982	838	2106	3419	4083	4295	4451							
1983	905	2063	3262	3785	4001								
1984	682	1836	2621	3076									
1985	752	1636	2457										
1986	735	1444											
1987	730												

OUTSTANDING CLAIM COUNTS
(EX CATASTROPHE CLAIMS)

ACCIDENT YEAR	EVALUATION POINT (in years) 1	2	3	4	5	6	7	8	9	10	11	12	13
1975				1002	973	834	708	574	428	341	278	221	154
1976			1662	1836	1677	1461	1221	945	782	607	473	353	
1977		1025	1685	1845	1716	1567	1283	1032	841	655	520		
1978	605	1337	1945	2132	1983	1638	1400	1107	853	661			
1979	705	1393	2107	2295	2110	1857	1603	1281	999				
1980	778	1364	2232	2472	2332	2055	1731	1346					
1981	673	1356	2277	2609	2472	2174	1808						
1982	713	1365	2373	2657	2448	2155							
1983	732	1375	2170	2344	2145								
1984	587	1162	1616	1760									
1985	569	882	1390										
1986	500	705											
1987	592												

CLOSED CLAIM COUNTS
(EX CATASTROPHE CLAIMS)

ACCIDENT YEAR	EVALUATION POINT (in years) 1	2	3	4	5	6	7	8	9	10	11	12	13
1975				509	672	891	1067	1244	1428	1544	1642	1735	1819
1976			793	1019	1309	1626	1928	2304	2542	2782	2961	3098	
1977		508	743	1014	1312	1574	1949	2276	2545	2789	2982		
1978	134	548	796	1134	1432	1889	2234	2609	2924	3166			
1979	76	457	818	1143	1537	1934	2310	2724	3077				
1980	61	682	948	1345	1682	2071	2510	2957					
1981	140	669	991	1285	1665	2104	2589						
1982	125	741	1046	1426	1847	2296							
1983	173	688	1092	1441	1856								
1984	95	674	1005	1316									
1985	183	754	1067										
1986	155	739											
1987	138												

INCURRED INDEMNITY LOSSES ($000's)
(INCLUDING CATASTROPHE CLAIMS)*

ACCIDENT YEAR	EVALUATION POINT (in years) 1	2	3	4	5	6	7	8	9	10	11	12	13
1975				31043	40271	47267	55105	61944	65847	69264	71984	81395	79792
1976			56360	86949	104055	119942	134577	147897	164985	175624	188681	190066	
1977		27242	74564	106033	127165	143936	157479	170676	179734	197799	210889		
1978	7449	52637	114847	157477	177118	191537	207243	223565	239410	237556			
1979	14646	63991	139497	189407	219540	246256	273761	293370	293186				
1980	18424	84144	177173	232110	273150	294050	309318	304746					
1981	22005	87661	187056	267315	318174	347730	357623						
1982	25171	98393	221727	306056	340236	355327							
1983	25506	103079	230160	295533	326055								
1984	21356	98313	177962	221817									
1985	23124	68355	151288										
1986	15744	54425											
1987	12190												

* CATASTROPHE LOSSES INCLUDED IN ABOVE FIGURES:

1978	0	0	6356	7362	7159	7153	7085	7085	7075	7053

APPENDIX A7

MMIA

Report Year by Lag Projection Method

Earned Base Doctor Counts

Exposure Period	Number of Base Doctors Reported	Number of Base Doctors by Accident Year
(1)	(2)	(3)
1949 (a)	24127	12064
1950	22585	23356
1951	21041	21813
1952	23543	22292
1953	23329	23436
1954	21798	22563
1955	19320	20559
1956	17710	18515
1957	18515	18113
1958	17892	18203
1959	20083	18988
1960	23332	21708
1961	24797	24065
1962	25766	25282
1963	26937	26352
1964	27505	27221
1965	28914	28210
1966	29647	29280
1967	29360	29503
1968	33060	31210
1969	34987	34023
1970	34881	34934
1971	34193	34537
1972	33464	33829
1973	33008	33236
1974 (b)	17203	33925
1975 (c)	18074	
1975 (d)	14792	32648
1976	30411	30411
1977	31451	31451
1978	31551	31551
1979	31794	31794
1980	31634	31634
1981	31462	31462
1982	30398	30398
1983	26564	26564
1984	22404	22404
1985	20664	20664
1986	20210	20210

TOTAL PAID INDEMNITY ($'000's)
BY POLICY YEAR

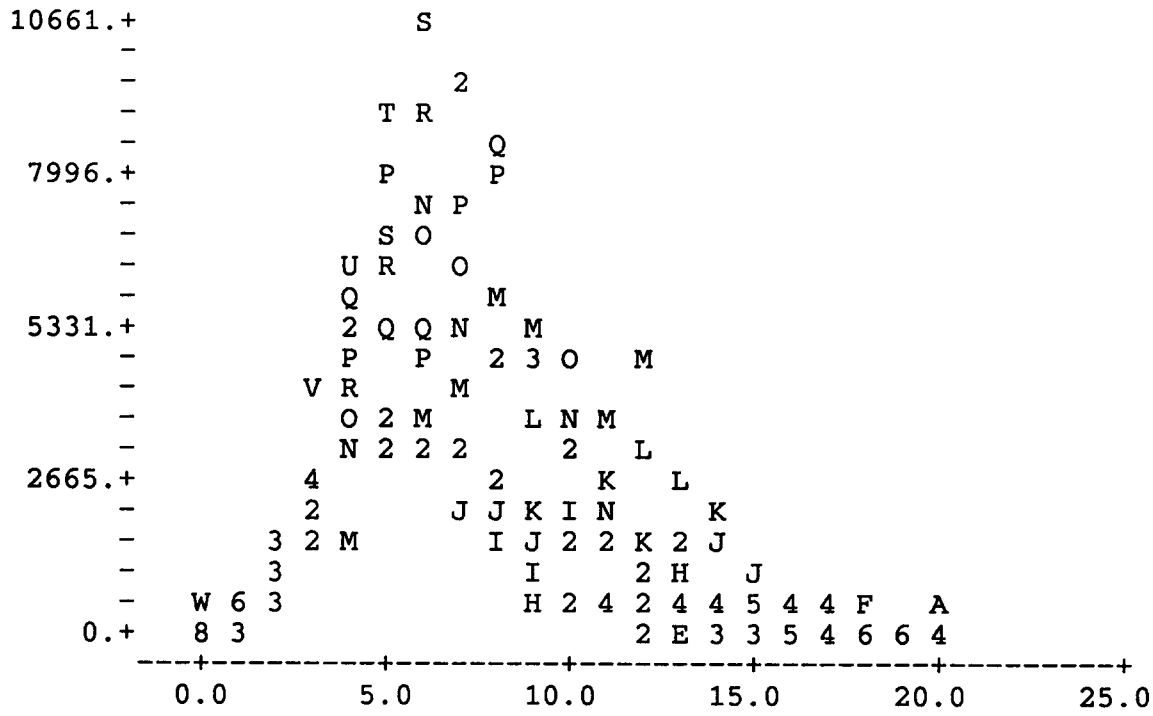
POLICY YEAR	DELAY 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1963												4612	4994	5000	5004
1964											6391	6601	6701	6882	6950
1965										7346	7891	8288	8663	8672	9090
1966									8388	8666	9419	9846	10191	11720	12170
1967								10131	11263	12247	12918	13130	13575	13672	13820
1968							12421	13342	14628	15647	17128	19682	20928	22247	23532
1969						15092	18687	20518	22667	25570	28083	30215	30622	31616	33172
1970					12756	16082	18315	23016	27754	29466	31591	33291	34656	37777	39209
1971				9988	14750	19137	23880	31390	37316	40459	46942	48999	52474	34914	56727
1972			4636	7662	12940	21281	30734	38617	46119	52224	57729	62429	65628	70252	74873
1973		1015	3179	7939	16192	27405	37592	47525	56597	62753	67559	75536	81085	87123	
1974	351	642	2148	6371	12974	19419	24897	30585	35013	41642	47096	50032	55820		

CONTINUED

PLOICY YEAR	15	16	17	18	19	20	21	22	23
1963	5129	5279	5589	5589	5924	6674	6787	7037	7557
1964	7076	7116	7830	8144	8144	8853	9353	10053	
1965	9808	9943	9962	10204	10607	10617	11877		
1966	12185	12445	13177	13487	13787	14222			
1967	14692	15061	16197	16513	16813				
1968	25700	26986	29619	31454					
1969	34147	35614	36655						
1970	41980	44448							
1971	58765								
1972									
1973									
1974									

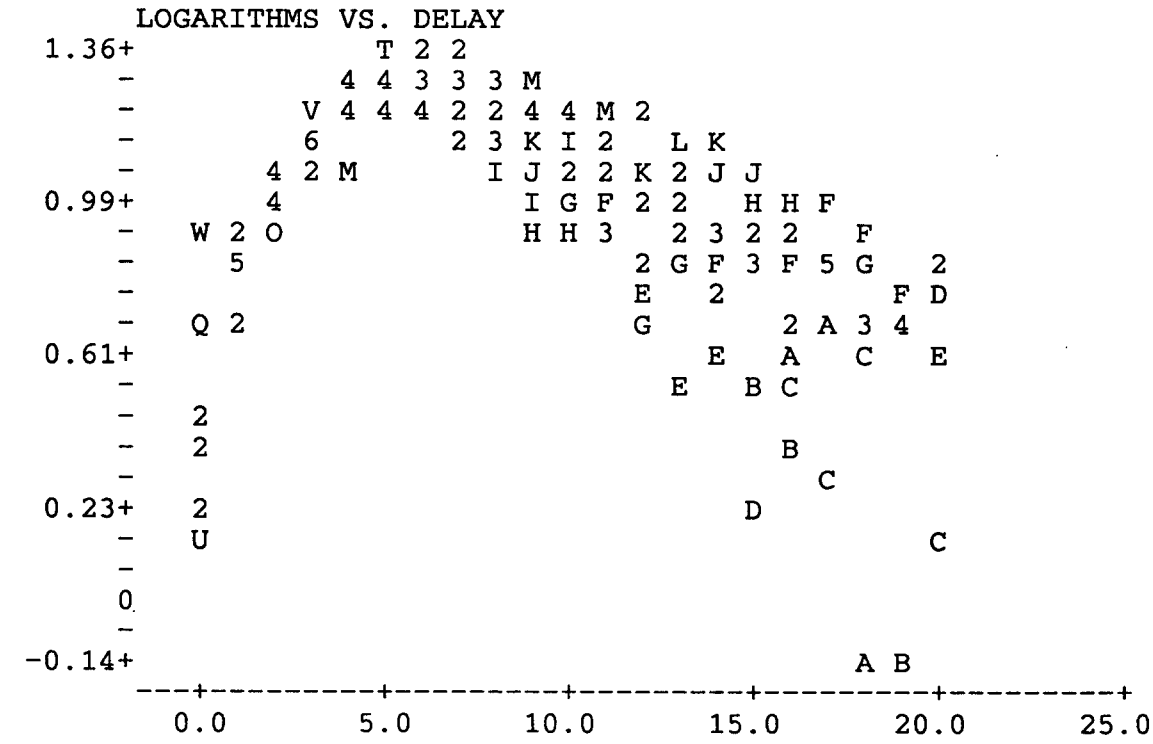
APPENDIX B1

NORMALISED DATA VS. DELAY FOR ACCIDENT YEARS 1963-1987



R E S I D U A L D I S P L A Y S

APPENDIX B2



APPENDIX C1

REGRESSION FOR ACCIDENT YEARS 1969-1980

PARAMETER	ESTIMATE	ST. ERR OF ESTIM.	T-RATIO
ALPHA	1.992	0.2937	6.78
BETA	5.272	0.2512	20.99
GAMMA	-0.796	0.0349	-22.82
IOTA	0.2289	0.0302	7.58

S = 0.9694 S-SQUARED = 0.9398

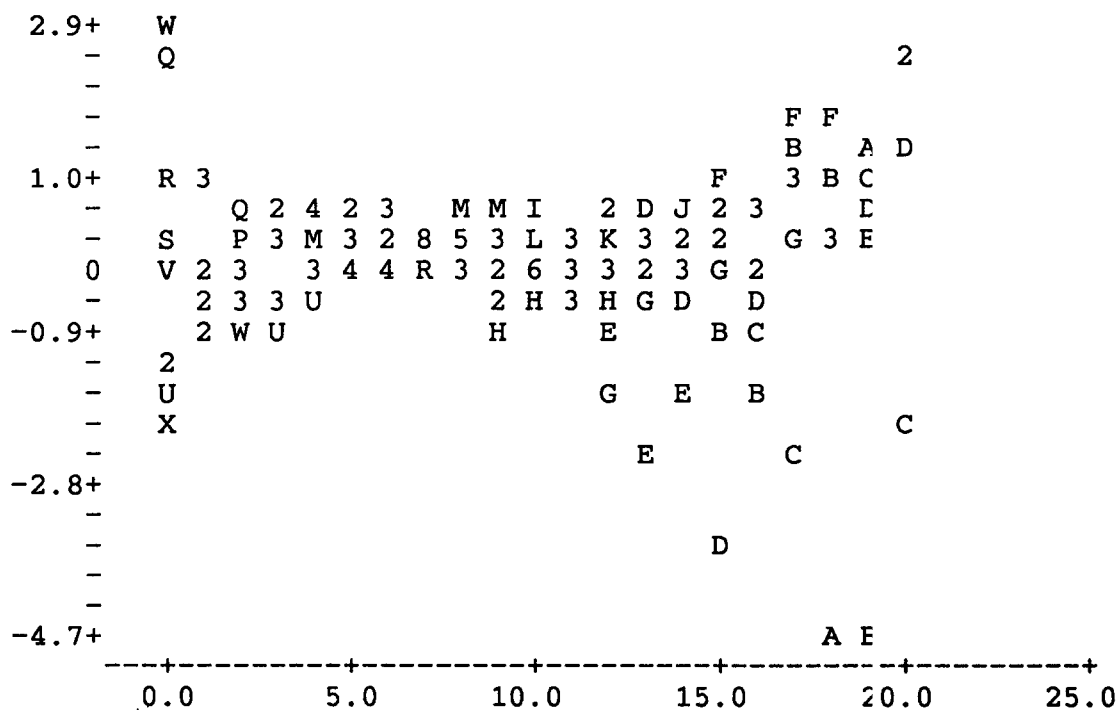
R-SQUARED = 77.2 PERCENT

SCALE = 1.00 A = 1.00

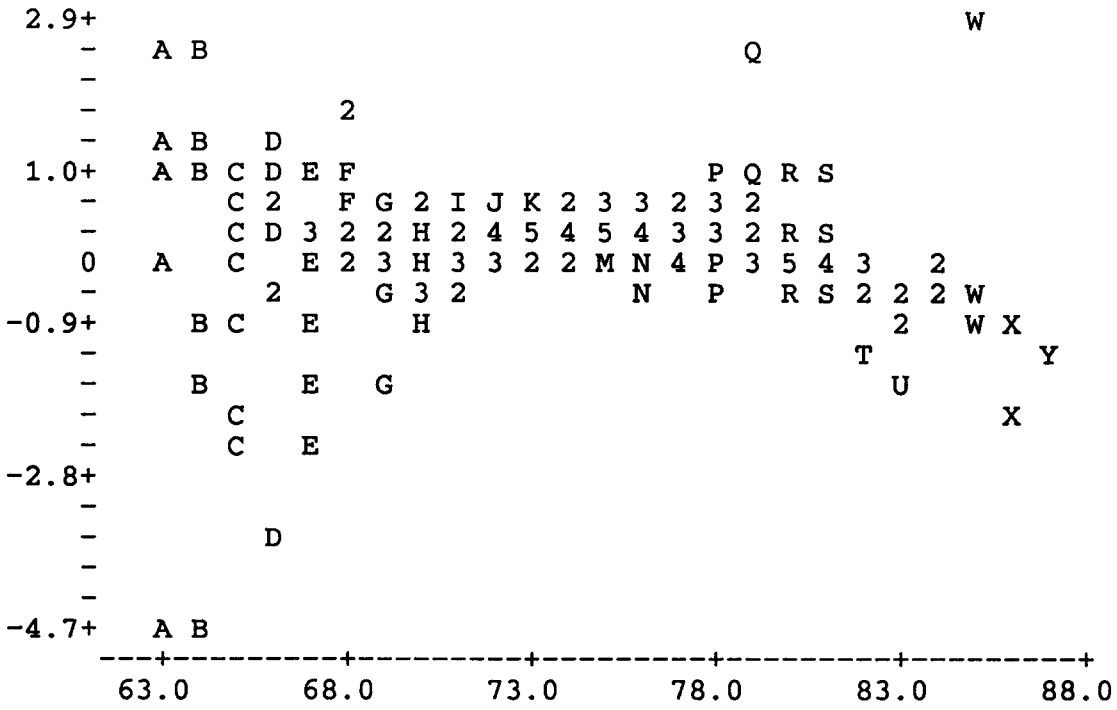
APPENDIX C2

W E I G H T E D R E S I D U A L D I S P L A Y S

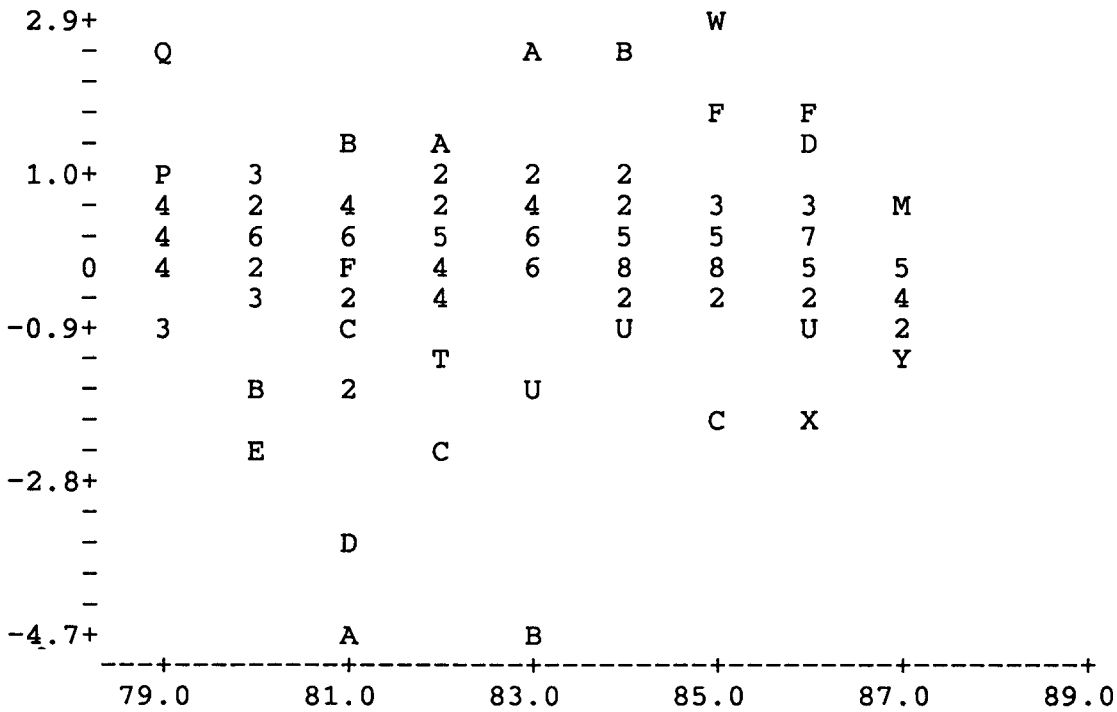
WEIGHTED STANDARDISED RESIDUALS VS. DELAY



WEIGHTED STANDARDISED RESIDUALS VS. ACCIDENT YEARS



WEIGHTED STANDARDISED RESIDUALS VS. PAYMENT YEARS



APPENDIX D1

REGRESSION TABLE

ACCI YEAR	PARAMETER ESTIMATES ALPHA	S.E.	T-RATIO	BETA	S.E.	T-RATIO	GAMMA	S.E.	T-RATIO
1963	4.107	0.6946	5.91	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1964	3.044	0.5981	5.09	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1965	3.044	0.5955	5.11	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1966	3.294	0.5673	5.81	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1967	2.494	0.5237	4.76	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1968	3.308	0.4932	6.71	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1969	2.973	0.4717	6.30	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1970	2.858	0.4067	7.03	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1971	2.988	0.3931	7.60	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1972	3.110	0.3764	8.26	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1973	3.201	0.3575	8.95	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1974	3.201	0.3575	8.95	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1975	3.205	0.3095	10.35	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1976	3.205	0.3095	10.35	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1977	3.205	0.3095	10.35	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1978	3.108	0.2946	10.55	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1979	3.000	0.2910	10.31	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1980	2.709	0.2828	9.58	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1981	2.703	0.2828	9.56	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1982	2.629	0.2892	9.09	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1983	2.083	0.3339	6.24	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1984	2.158	0.3650	5.91	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1985	1.667	0.3786	4.40	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1986	1.667	0.3786	4.40	4.523	0.2456	18.41	-0.728	0.0480	-15.18
1987	1.667	0.3786	4.40	4.523	0.2456	18.41	-0.728	0.0480	-15.18

ALL PARAMETERS ARE SIGNIFICANT

APPENDIX D2

DIFFERENCES IN PARAMETER ESTIMATES

ACCI YEAR	ALPHA	S.E.	T-RATIO	BETA	S.E.	T-RATIO	GAMMA	S.E.	T-RATIO
1964	-1.063	0.4197	-2.53	0.000	0.0000	0.00	0.000	0.0000	0.00
1965	0.000	0.0929	0.00	0.000	0.0000	0.00	0.000	0.0000	0.00
1966	0.250	0.3276	0.76	0.000	0.0000	0.00	0.000	0.0000	0.00
1967	-0.800	0.3105	-2.58	0.000	0.0000	0.00	0.000	0.0000	0.00
1968	0.814	0.2521	3.23	0.000	0.0000	0.00	0.000	0.0000	0.00
1969	-0.335	0.2366	-1.42	0.000	0.0000	0.00	0.000	0.0000	0.00
1970	-0.116	0.2055	-0.56	0.000	0.0000	0.00	0.000	0.0000	0.00
1971	0.130	0.0840	1.55	0.000	0.0000	0.00	0.000	0.0000	0.00
1972	0.123	0.0817	1.50	0.000	0.0000	0.00	0.000	0.0000	0.00
1973	0.091	0.0805	1.13	0.000	0.0000	0.00	0.000	0.0000	0.00
1974	0.000	0.0000	0.00	0.000	0.0000	0.00	0.000	0.0000	0.00
1975	0.003	0.1313	0.02	0.000	0.0000	0.00	0.000	0.0000	0.00
1976	0.000	0.0000	0.00	0.000	0.0000	0.00	0.000	0.0000	0.00
1977	0.000	0.0000	0.00	0.000	0.0000	0.00	0.000	0.0000	0.00
1978	-0.096	0.1319	-0.73	0.000	0.0000	0.00	0.000	0.0000	0.00
1979	-0.109	0.1421	-0.77	0.000	0.0000	0.00	0.000	0.0000	0.00
1980	-0.291	0.1399	-2.08	0.000	0.0000	0.00	0.000	0.0000	0.00
1981	-0.006	0.0296	-0.20	0.000	0.0000	0.00	0.000	0.0000	0.00
1982	-0.074	0.0856	-0.86	0.000	0.0000	0.00	0.000	0.0000	0.00
1983	-0.546	0.2246	-2.43	0.000	0.0000	0.00	0.000	0.0000	0.00
1984	0.075	0.3018	0.25	0.000	0.0000	0.00	0.000	0.0000	0.00
1985	-0.490	0.3391	-1.45	0.000	0.0000	0.00	0.000	0.0000	0.00
1986	0.000	0.0000	0.00	0.000	0.0000	0.00	0.000	0.0000	0.00
1987	0.000	0.0000	0.00	0.000	0.0000	0.00	0.000	0.0000	0.00

NOT ALL PARAMETERS ARE SIGNIFICANT

APPENDIX D3

PARAMETER ESTIMATES

PMNT YEAR	IOTA	S.E.	T-RATIO	DIFFERENCE IN IOTA	S.E.	T-RATIO
1980	0.2449	0.0369	6.63			
1981	0.2449	0.0369	6.63	0.0000	0.0000	0.00
1982	0.2449	0.0369	6.63	0.0000	0.0000	0.00
1983	0.2449	0.0369	6.63	0.0000	0.0000	0.00
1984	0.2449	0.0369	6.63	0.0000	0.0000	0.00
1985	0.2449	0.0369	6.63	0.0000	0.0000	0.00
1986	0.2449	0.0369	6.63	0.0000	0.0000	0.00
1987	0.2449	0.0369	6.63	0.0000	0.0000	0.00

ALL PARAMETERS ARE SIGNIFICANT

APPENDIX D4

S = 0.3000 S-SQUARED = 0.0900 S-SQUARED(SCI) = 0.9083

S(0) = 0.3000 S(0)-SQUARED = 0.0900 DELTA = 0.0000

R-SQUARED = 89.6 PERCENT SSPE = 28.815 N = 159 P = 8.1

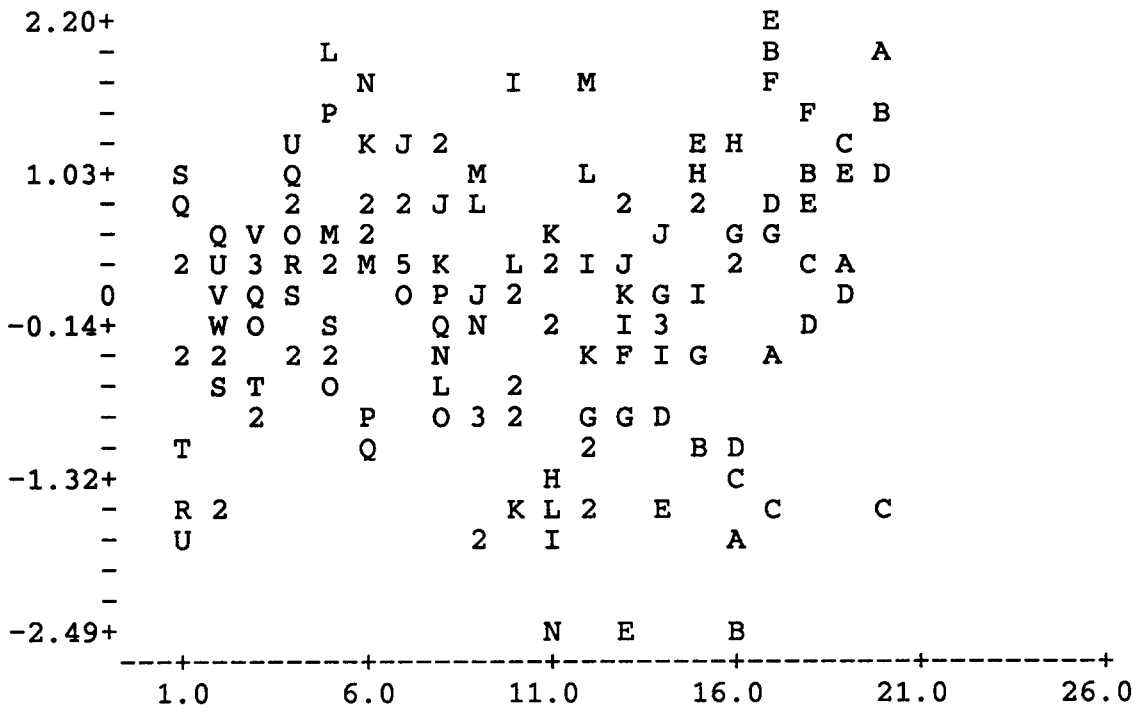
AIC = 192.93 AIC(SCI) = 494.72 SCALE = 1.00 A = 1.00

	ESTIMATED PERCENTAGE CHANGE IN LEVEL	STANDARD ERROR
1963-1987	-91.28	7.87
ANNUAL	-9.67	3.40

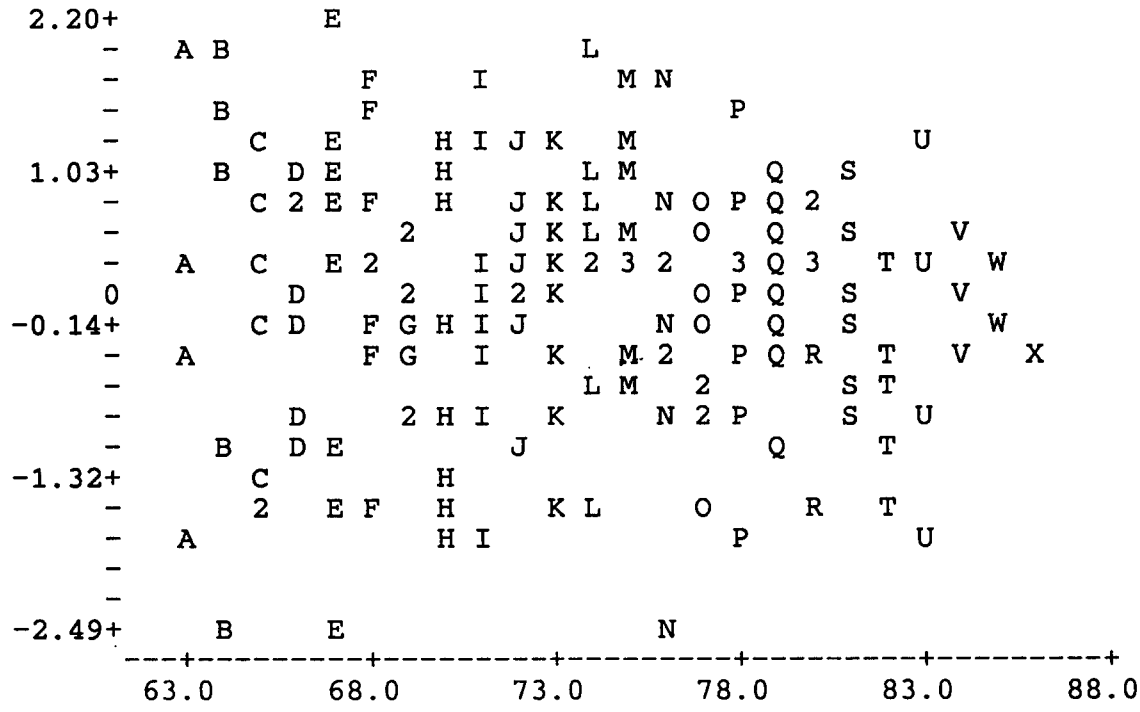
APPENDIX D5

W E I G H T E D R E S I D U A L D I S P L A Y S

WEIGHTED STANDARDISED RESIDUALS VS. DELAY

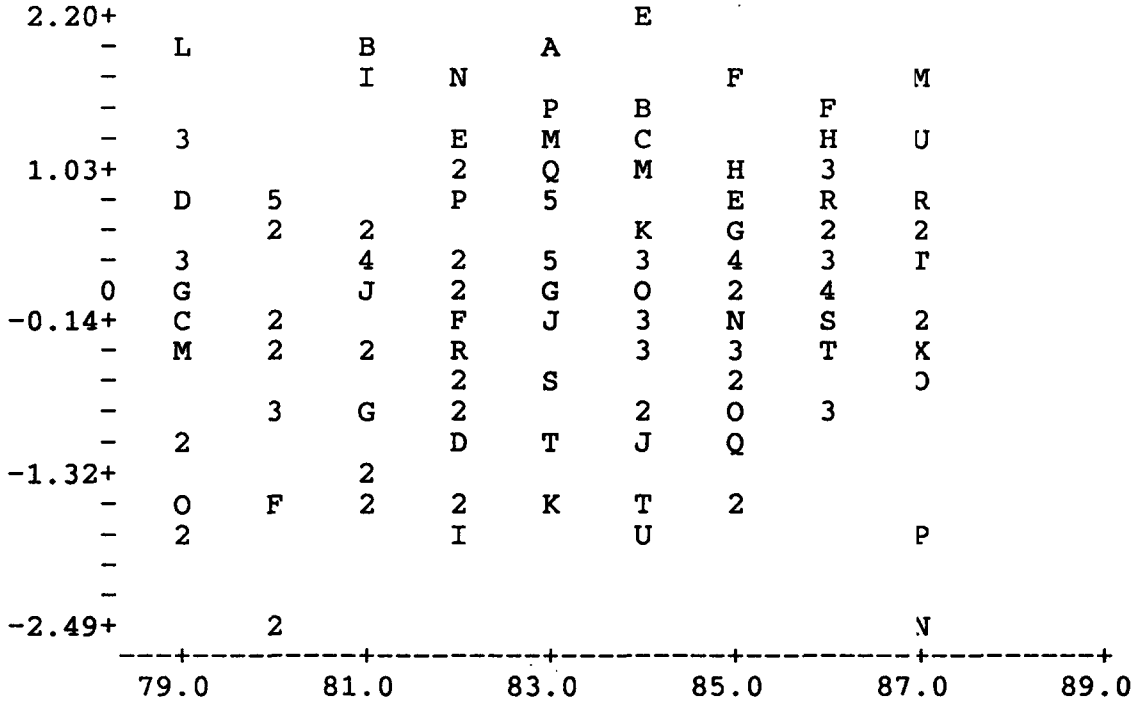


WEIGHTED STANDARDISED RESIDUALS VS. ACCIDENT YEARS



APPENDIX D5

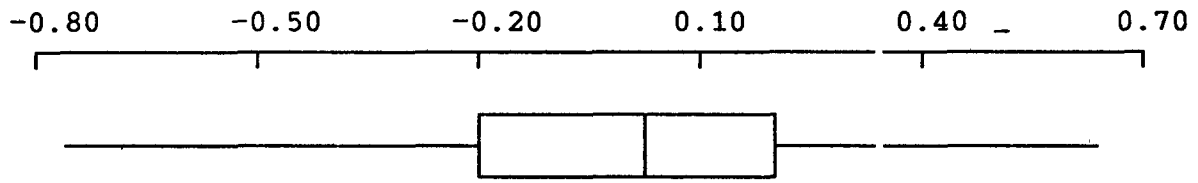
WEIGHTED STANDARDISED RESIDUALS VS. PAYMENT YEARS



APPENDIX D6

O U T L I E R A N A L Y S I S

BOXPLOT OF WEIGHTED RESIDUALS

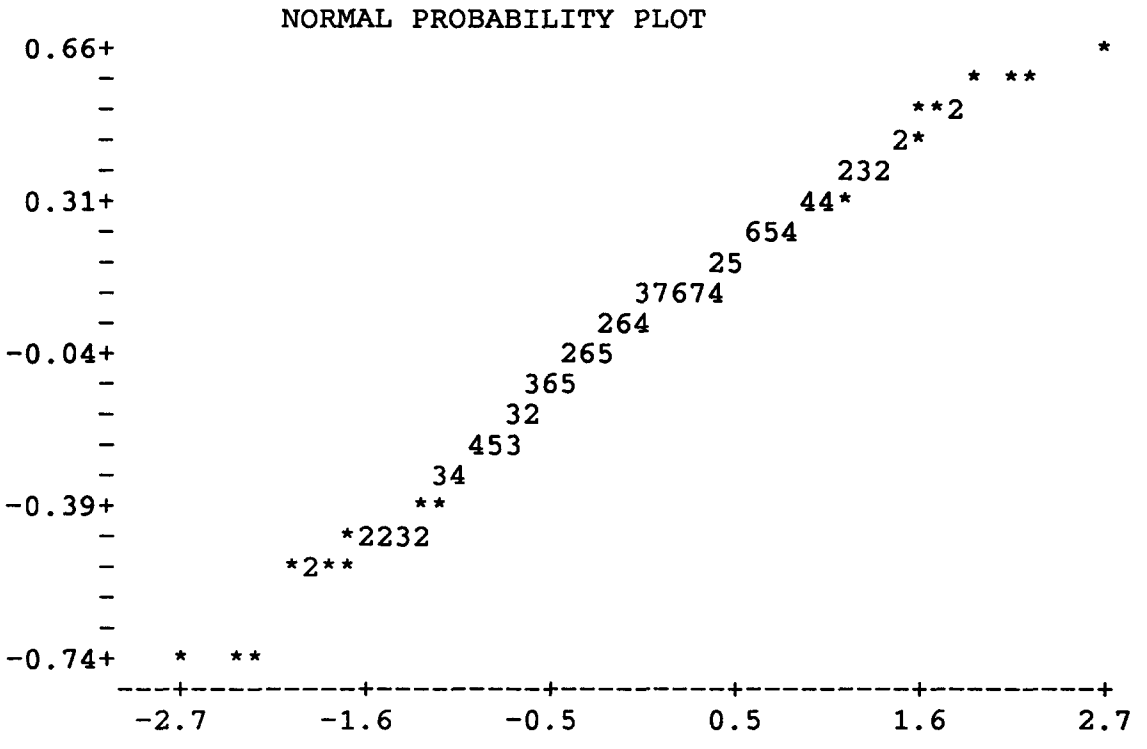


N = 159 P = 8.1 DELTA = 0.0000 SIGMA(0)-SQUARED ML: = 0.0854

LOWER QUARTILE = -0.1972 MEDIAN = 0.0455 UPPER QUARTIL: = 0.2104

MIDSPREAD = 0.4076 ROBUST SIGMA(0)-SQUARED EST.= 0.0913

T E S T I N G N O R M A L I T Y



SQUARED CORRELATION OF WEIGHTED RESIDUALS
AND EXPECTED NORMAL SCORES = 0.987

(APPROXIMATE) P-VALUE = 0.144

APPENDIX E1

EXPECTED PAYMENTS/OBSERVED PAYMENTS ←——→ FORECAST MEAN PAYMENTS/STANDARD ERRORS

(PAYMENTS IN $000's)

YEAR													
1968	EXP:												2424
	OBS:												2554
1969	EXP:											2563	2343
	OBS:											2513	2132
1970	EXP:										1036	2880	2633
	OBS:										712	2125	1700
1971	EXP:									4350	5319	4099	3748
	OBS:									5926	5143	6483	2057
1972	EXP:								5852	6147	5105	5795	5299
	OBS:								7883	7502	5105	5505	4700
1973	EXP:							7147	8061	8468	7411	7986	7304
	OBS:							10187	9933	9072	6156	4806	7977
1974	EXP:						3844	4759	5369	5641	5603	5320	4867
	OBS:						6445	5478	5688	4428	5629	5454	2956
1975	EXP:					3011	4235	5244	5917	6217	6177	5866	5367
	OBS:					2644	4731	5449	6052	8505	8038	4603	5590
1976	EXP:				4916	7896	11105	13753	15518	16308	15205	15391	14083
	OBS:				5114	9502	9607	22216	16551	13905	14973	11098	6440
1977	EXP:			2880	6510	10456	14708	18217	20558	21607	21474	20397	18667
	OBS:			1338	5620	11513	12074	22239	19553	15911	13760	15666	5871
1978	EXP:		875	3357	7591	12198	17162	21262	23997	25226	23073	23819	21800
	OBS:		949	2472	8020	14458	24782	15232	24384	24969	14467	7679	7101
1979	EXP:	69	1009	3871	8756	14072	19802	24535	27696	29117	23943	27497	25168
	OBS:	289	1337	4443	8283	17813	16406	16541	29968	26338	9367	8971	8300
1980	EXP:	65	954	3664	8293	13331	18763	23252	26249	27598	27434	26065	23857
	OBS:	79	439	2701	8980	13814	19494	28387	31066	8765	9769	8402	7776
1981	EXP:	82	1207	4636	10493	16871	25748	29433	33232	34944	34741	33011	30219
	OBS:	45	1805	3132	6694	16755	22183	33580	10517	11130	11152	10701	9917
1982	EXP:	94	1385	5319	12042	19364	27261	33792	38158	40128	39900	37916	34713
	OBS:	12	767	2380	8641	16465	27928	10947	12445	13184	15220	12692	11767
1983	EXP:	61	905	3482	7892	12700	17888	22178	25047	26341	25190	24886	22780
	OBS:	8	370	3663	5032	17304	6513	8134	9246	9784	9791	9573	8657
1984	EXP:	71	1059	4083	9266	14922	21029	26082	29461	30986	30807	29270	26789
	OBS:	44	825	3802	9962	5988	8528	10666	12128	12826	12819	12247	11281
1985	EXP:	51	766	2960	6727	10843	15289	18967	21427	22536	22404	21282	19473
	OBS:	911	796	2398	3642	4507	6440	8068	9178	9703	9686	9238	8490
1986	EXP:	64	955	3692	8391	13527	19075	23668	26741	28128	27967	26570	24315
	OBS:	10	698	1980	4554	5647	8076	10126	11530	12200	12191	11637	10705
1987	EXP:	82	1228	4749	10794	17402	24542	30455	34414	36204	36001	34208	31309
	OBS:	25	662	2567	5906	7363	10536	13220	15064	15953	15953	15242	14032
TOT. FOR PAYMENT YRS:		242868	262516	276976	283858	283056	273427	257532	237565	222264		185218	157025
STANDARD ERRORS:		28908	34076	39797	45108	50086	52885	55545	57611	54830		52499	47942

APPENDIX E1

1963	EXP:					706	563	443	345	265	0
	OBS:					150	310	0	335	750	0
1964	EXP:				378	306	245	193	150	115	0
	OBS:				126	40	714	314	0	709	0
1965	EXP:			615	507	411	328	259	201	155	0
	OBS:			418	718	135	19	242	403	10	0
1966	EXP:		1236	1040	858	696	555	438	341	262	0
	OBS:		1529	450	15	260	732	310	300	435	0
1967	EXP:	664	694	584	482	391	313	247	192	148	0
	OBS:	445	97	148	872	369	1136	316	300	172	0
1968	EXP:	2146	2243	1891	1563	1269	1016	802	625	482	482
	OBS:	1246	1319	1285	2168	1286	2633	1835	732	401	401
1969	EXP:	2075	2170	1830	1513	1229	984	777	606	468	1074
	OBS:	407	994	1556	975	1467	1041	895	503	392	663
1970	EXP:	2333	2441	2059	1703	1385	1109	876	684	528	2089
	OBS:	1365	3121	1432	2771	2468	1257	709	559	437	1059
1971	EXP:	3322	3475	2932	2426	1973	1580	1249	975	754	4558
	OBS:	3475	2440	1813	2038	2217	1265	1009	796	623	2040
1972	EXP:	4697	4916	4149	3433	2792	2237	1769	1382	1068	9247
	OBS:	3199	4624	4621	3825	2222	1794	1432	1131	885	3785
1973	EXP:	6476	6778	5721	4735	3852	3087	2441	1907	1474	17498
	OBS:	5549	6038	6313	3748	3070	2480	1981	1565	1225	6660
1974	EXP:	4316	4518	3814	3157	2569	2059	1628	1272	983	15481
	OBS:	5788	4991	3012	2507	2055	1661	1327	1049	822	5576
1975	EXP:	4759	4983	4207	3483	2834	2272	1797	1404	1086	22066
	OBS:	7462	3919	3325	2770	2271	1837	1468	1161	910	7515
1976	FOR:	12491	13079	11045	9145	7444	5968	4721	3690	2854	70437
	STE:	3921	10291	8736	7280	5972	4832	3864	3057	2397	20686
1977	FOR:	16559	17341	14646	12129	9873	7917	6264	4897	3788	112081
	STE:	5280	13700	11634	9700	7961	6444	5155	4081	3201	29454
1978	FOR:	19340	20255	17107	14168	11534	9249	7318	5721	4426	154736
	STE:	6386	16142	13710	11432	9382	7595	6075	4809	3772	38400
1979	FOR:	22329	23387	19754	16361	13320	10681	8452	6608	5112	207614
	STE:	7468	18703	15888	13250	10876	8806	7044	5576	4374	48174
1980	FOR:	21166	22168	18724	15507	12624	10123	8009	6262	4844	224384
	STE:	6997	17675	15014	12520	10275	8318	6653	5265	4129	46865
1981	FOR:	26814	28087	23727	19653	16001	12833	10155	7941	6143	317500
	STE:	8936	22448	19076	15914	13067	10582	8467	6704	5259	63215
1982	FOR:	30804	32270	27262	22583	18389	14749	11672	9127	7062	398526
	STE:	10603	26017	22114	18452	15154	12274	9822	7778	6103	81844
1983	FOR:	20211	21167	17878	14805	12051	9662	7644	5975	4621	279324
	STE:	7766	17611	14953	12461	10220	8265	6604	5222	4090	71701
1984	FOR:	23762	24881	21008	17392	14152	11342	8969	7008	5418	343280
	STE:	10086	21393	18142	15099	12365	9985	7966	6287	4916	104925
1985	FOR:	17268	18074	15255	12623	10267	8224	6500	5076	3922	256156
	STE:	7570	15713	13307	11058	9041	7289	5804	4573	3569	82180
1986	FOR:	21564	22574	19055	15770	12828	10278	8124	6346	4904	323517
	STE:	9554	19709	16698	13883	11356	9158	7296	5750	4489	105065
1987	FOR:	27771	29076	24547	20318	16530	13245	10472	8180	6322	417767
	STE:	12532	25573	21676	18029	14753	11903	9486	7479	5841	139528
		131321	109025	84841	63377	44938	31864	20739	13084	6322	3177817
		44854	44438	36668	29442	22883	17742	13117	9374	5841	491294

APPENDIX E2

TABLE OF OBSERVED AND EXPECTED BY YEAR
(WEIGHTED)

ACC. YEAR	EXPECTED	OBSERVED	DIFFERENCE	%ER	PMNT YEAR	EXPECTED	OBSERVED	DIFFERENCE	%ER
	(PAYMENTS IN $1'S)					(PAYMENTS IN $1's)			
63	341	281	-60	-17	63				
64	208	246	38	18	64				
65	379	349	-30	-7	65				
66	830	730	-100	-12	66				
67	1191	1033	-158	-13	67				
68	6166	5712	-454	-7	68				
69	6366	5752	-614	-9	69				
70	12261	8681	-3580	-29	70				
71	21442	22227	785	3	71				
72	35541	36573	1032	2	72				
73	55084	54777	-307	0	73				
74	39718	42846	3128	7	74				
75	46793	53074	6281	13	75				
76	112492	106615	-5877	-5	76				
77	131682	115876	-15806	-12	77				
78	130287	123488	-6799	-5	78				
79	121415	113453	-7962	-6	79	37361	44074	6713	17
80	87460	98265	10805	12	80	48290	50368	2078	4
81	77472	77800	328	0	81	59809	61908	2099	3
82	55138	49747	-5391	-9	82	79753	80857	1104	1
83	18277	21421	3144	17	83	101224	116973	15749	15
84	6543	6626	83	1	84	124041	109346	-14695	-11
85	1692	1451	-241	-14	85	148974	129638	-19336	-12
86	434	317	-117	-26	86	174703	167992	-6711	-3
87	0	0	0	0	87	195059	186181	-8878	-4

APPENDIX F1

EXPECTED PAYMENTS/OBSERVED PAYMENTS — FORECAST MEAN PAYMENTS/STANDARD ERRORS

(PAYMENTS IN $000'S)

YEAR													
1975	EXP:					3476	5274	6887	8062	8683	6037	5671	5103
	OBS:					2644	4731	5449	6052	8505	8038	4603	5590
1976	EXP:				4386	8280	12575	16439	19264	14315	14191	13348	12027¦
	OBS:				5114	9502	9607	22216	16551	13905	14973	11098	6440¦
1977	EXP:			2007	5243	9909	15067	19719	15940	16885	16754	15774¦	14225
	OBS:			1338	5620	11513	12074	22239	19553	15911	15760	15666¦	3352
1978	EXP:		605	2846	7440	14070	21410	19335	22286	23635	23480¦	22133	19985
	OBS:		949	2472	8020	14458	24782	15232	24384	24969	14467¦	5204	5038
1979	EXP:	29	703	3307	8655	16387	17208	22150	25556	27130¦	26978	25454	23004
	OBS:	289	1337	4443	8283	17813	16406	16541	29968	26338¦	6261	6292	6147
1980	EXP:	32	798	3759	9848	12862	19255	24814	28661¦	30459	30322	28641	25912
	OBS:	79	439	2701	8980	13814	19494	28387	31066¦	7112	7510	7629	7497
1981	EXP:	37	919	4334	7831	14587	21860	28199¦	32603	34682	34558	32672	29588
	OBS:	45	1805	3132	6694	16755	22183	33580¦	7502	8446	9023	9234	9108
1982	EXP:	42	1027	3339	8606	16049	24076¦	31089	35980	38311	38211	36159	32775
	OBS:	12	767	2380	8641	16465	27928¦	7214	8818	10028	10774	11049	10895
1983	EXP:	42	718	3330	8594	16042¦	24092	31140	36075	38449	38385	36358	32986
	OBS:	8	370	3663	5032	17304¦	5747	7834	9657	11029	11861	12148	11945
1984	EXP:	35	843	3921	10131¦	18930	28446	36785	42626	45440	45369	42975	38989
	OBS:	44	825	3802	9962¦	5152	8048	10884	13260	14937	15834	15989	15514
1985	EXP:	27	670	3127¦	8100	15159	22807	29517	34225	36500	36453	34535	31333
	OBS:	911	796	2398¦	2538	4938	7730	10415	12593	14044	14714	14673	14059
1986	EXP:	30	745¦	3483	9031	16919	25481	33012	38314	40900	40886	38771	35209
	OBS:	10	698¦	1301	2907	5713	9015	12226	14861	16639	17483	17468	16755
1987	EXP:	35¦	855	4002	10390	19487	29379	38100	44263	47296	47324	44918	40829
	OBS:	25¦	457	1536	3503	6934	11003	14988	18278	20514	21588	21588	20711
TOT. FOR PAYMENT YRS:		227135	258461	285060	303497	310921	306365	290811	266656	236469	203210	170008	
STANDARD ERRORS:		24827	34411	45890	58118	69492	78528	84251	86325	84802	80179	73395	

APPENDIX F1

1975 EXP:	4431	3733	3065	2461	1939	1502	1147	865	645	15356
OBS:	7462	939	837	738	642	549	463	385	315	3706
1976 FOR:	10455	8818	7249	5829	4598	3567	2728	2059	1536	46840
STE:	2540	2324	2096	1861	1623	1391	1173	973	796	11087
1977 FOR:	12378	10450	8598	6920	5464	4243	3247	2453	1832	69807
STE:	3141	2897	2624	2332	2033	1741	1466	1214	992	16005
1978 FOR:	17410	14716	12123	9769	7723	6004	4600	3480	2602	120546
STE:	4773	4424	4013	3563	3102	2650	2225	1840	1500	28208
1979 FOR:	20059	16971	13993	11286	8930	6949	5329	4034	3020	166007
STE:	5850	5431	4925	4367	3794	3235	2711	2238	1822	38706
1980 FOR:	22619	19157	15813	12768	10113	7878	6048	4583	3434	217749
STE:	7150	6635	6004	5311	4601	3913	3272	2695	2190	52641
1981 FOR:	25851	21914	18106	14632	11600	9044	6949	5271	3953	281423
STE:	8696	8066	7291	6438	5568	4726	3946	3245	2634	69266
1982 FOR:	28663	24320	20111	16267	12908	10073	7747	5881	4415	342908
STE:	10384	9607	8658	7623	6575	5567	4637	3807	3085	89062
1983 FOR:	28873	24521	20296	16431	13050	10193	7846	5962	4479	369135
STE:	11345	10456	9388	8237	7082	5980	4969	4071	3294	104166
1984 FOR:	34125	28978	23981	19411	15413	12036	9262	7036	5285	455088
STE:	14557	13273	11805	10273	8769	7360	6084	4961	3998	143542
1985 FOR:	27424	23285	19267	15593	12378	9663	7434	5645	4238	373558
STE:	13031	11745	10336	8908	7539	6278	5154	4177	3348	137435
1986 FOR:	30845	26214	21710	17585	13973	10918	8406	6389	4801	422847
STE:	15537	14003	12318	10609	8972	7466	6124	4961	3973	166966
1987 FOR:	35801	30454	25244	20466	16276	12729	9810	7463	5613	490699
STE:	19200	17295	15201	13081	11051	9187	7530	6094	4878	209842
	138369	109815	84924	63741	46143	32065	20437	12264	5613	3371965
	65063	56028	46862	37935	29552	22073	15253	9812	4878	957354

TABLE OF OBSERVED AND EXPECTED BY YEAR

APPENDIX F2

TABLE OF OBSERVED AND EXPECTED BY YEAR
(WEIGHTED)

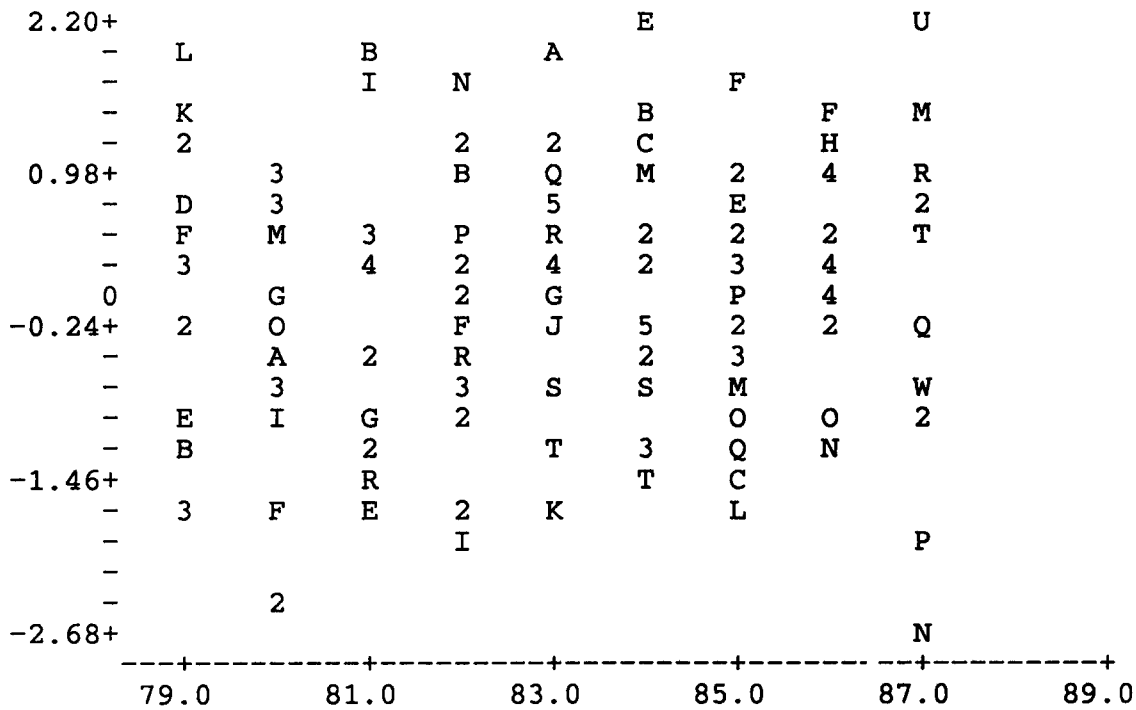
ACC. YEAR	EXPECTED	OBSERVED	DIFFERENCE	%ER	PMNT YEAR	EXPECTED	OBSERVED	DIFFERENCE	%ER
	(PAYMENTS IN $1'S)					(PAYMENTS IN $1's)			
75	53626	53074	-552	-1	75				
76	114825	109406	-5419	-4	76				
77	116323	119024	2701	2	77				
78	133247	127784	-5463	-4	78				
79	118935	117917	-1018	0	79	9022	8647	-375	-4
80	97542	103223	5681	5	80	20409	21407	998	4
81	74900	81205	6305	8	81	38681	36967	-1714	-4
82	50666	54420	3754	7	82	64421	64854	433	0
83	26501	24298	-2203	-8	83	97758	100643	2885	2
84	12326	12092	-234	-1	84	95396	94944	-452	0
85	1750	1402	-348	-19	85	125523	123360	-2163	-1
86	158	148	-10	-6	86	157871	161576	3705	2
87	0	0	0	0	87	191717	191594	-123	0

*** WARNING ***

THE VALUE OF "% ER" IN THE FOLLOWING ACCIDENT YEARS ARE TOO LARGE TO DISPLAY,
AND HAVE BEEN SET TO ZERO.

APPENDIX G1

VALIDATION RESIDUALS VS. PAYMENT YEARS



APPENDIX G2

EXPECTED PAYMENTS/OBSERVED PAYMENTS (PAYMENTS IN $000'S) FORECAST MEAN PAYMENTS/STANDARD ERRORS

YEAR													
1968	EXP:												2363
	OBS:												2554
1969	EXP:											2502	2309
	OBS:											2513	2132
1970	EXP:										2937	2811	2596
	OBS:										1712	2125	1700
1971	EXP:									4224	4227	4047	3737
	OBS:									5926	3143	6483	2057
1972	EXP:								5697	6020	6024	5769	5328
	OBS:								7883	7502	6105	5505	4700
1973	EXP:							6975	7899	8348	8355	8003	7393
	OBS:							10187	9933	9072	6156	4806	7977
1974	EXP:						3806	4720	5346	5651	5657	5419	5006
	OBS:						6445	5478	5688	4428	6629	5454	2936
1975	EXP:					2998	4208	5220	5914	6252	6260	5999	5544
	OBS:					2644	4731	5449	6052	8505	8038	4603	5590
1976	EXP:				4997	7988	11214	13911	15764	16669	16693	15998	14787
	OBS:				5114	9502	9607	22216	16551	13905	14973	11098	6440
1977	EXP:			3020	6723	10751	15095	18728	21225	22448	22484	21551	19923
	OBS:			1338	5620	11513	12074	22239	19553	15911	15760	15666	6198
1978	EXP:		972	3620	8065	12902	18122	22491	25495	26969	27015	25897	23943
	OBS:		949	2472	8020	14458	24782	15232	24384	24969	14467	8285	7759
1979	EXP:	77	1059	3943	8790	14066	19762	24530	27811	29422	29476	28258	26127
	OBS:	289	1337	4443	8283	17813	16406	16541	29968	26338	9485	9188	8608
1980	EXP:	68	939	3502	7812	12507	17576	21822	24744	26180	26229	25146	23249
	OBS:	79	439	2701	8980	13814	19494	28387	31066	8293	8382	8121	7608
1981	EXP:	88	1206	4499	10037	16072	22590	28051	31813	33664	33732	32344	29908
	OBS:	45	1805	3132	6694	16755	22183	33580	10050	10734	10867	10546	9894
1982	EXP:	102	1399	5222	11653	18665	26240	32591	36966	39124	39208	37599	34771
	OBS:	12	767	2380	8641	16465	27928	10581	12122	12961	13132	12750	11964
1983	EXP:	52	729	2730	6106	9793	13779	17123	19427	20562	20604	19755	18264
	OBS:	8	370	3663	5032	17304	5480	6882	7876	8399	8475	8185	7630
1984	EXP:	71	993	3726	8343	13391	18851	23432	26589	28144	28201	27036	24991
	OBS:	44	825	3802	9962	5814	8300	10428	11932	12713	12812	12352	11487
1985	EXP:	71	990	3723	8347	13410	18888	23485	26654	28214	28271	27099	25045
	OBS:	911	796	2398	5399	7288	10390	13035	14891	15840	15934	15327	14217
1986	EXP:	90	1256	4722	10590	17015	23970	29810	33838	35825	35902	34420	31816
	OBS:	10	698	3026	6881	9309	13282	16676	19065	20296	20431	19668	18257
1987	EXP:	118	1642	6178	13855	22266	31373	39022	44302	46911	47019	45085	41681
	OBS:	25	1053	3994	9086	12336	17612	22128	25316	26968	27167	26170	24309
TOT. FOR PAYMENT YRS:		241993	263941	282312	294064	298165	292659	279916	262026	236933	209229	180576	
STANDARD ERRORS:		31164	38599	47867	57342	66133	71846	75928	78029	74518	70687	66728	

APPENDIX G2

1963	EXP:					677	547	437	345	269	0
	OBS:					150	310	0	335	750	0
1964	EXP:				362	297	240	192	151	118	0
	OBS:				126	40	714	314	0	709	0
1965	EXP:			590	493	405	328	262	206	161	0
	OBS:			418	718	135	19	242	403	10	0
1966	EXP:		1166	993	829	681	551	441	348	272	0
	OBS:		1529	450	15	260	732	310	300	435	0
1967	EXP:	643	674	574	480	395	320	256	202	158	0
	OBS:	445	97	148	872	369	1136	316	300	172	0
1968	EXP:	2115	2216	1890	1582	1302	1056	846	669	524	524
	OBS:	1246	1319	1285	2168	1286	2633	1835	732	423	423
1969	EXP:	2067	2167	1849	1548	1275	1035	829	656	514	1170
	OBS:	407	994	1556	975	1467	1041	895	530	420	705
1970	EXP:	2325	2437	2081	1744	1437	1166	935	740	580	2256
	OBS:	1365	3121	1432	2771	2468	1257	736	590	468	1118
1971	EXP:	3348	3511	2998	2512	2070	1681	1348	1068	838	4935
	OBS:	3475	2440	1813	2038	2217	1310	1060	850	675	2161
1972	EXP:	4774	5008	4278	3585	2955	2401	1925	1526	1197	10004
	OBS:	3199	4624	4621	3825	2287	1874	1518	1218	969	4007
1973	EXP:	6625	6951	5939	4979	4105	3335	2675	2121	1664	18879
	OBS:	5549	6038	6313	3830	3182	2609	2116	1698	1352	7032
1974	EXP:	4487	4709	4024	3374	2782	2261	1813	1438	1128	16819
	OBS:	5788	4991	3088	2606	2166	1777	1441	1158	922	5928
1975	EXP:	4970	5217	4460	3740	3085	2508	2012	1596	1253	23870
	OBS:	7462	3995	3435	2902	2415	1983	1610	1294	1032	8044
1976	FOR:	13260	13920	11901	9983	8236	6696	5373	4263	3347	76979
	STE:	4119	10670	9179	7759	6459	5307	4312	3468	2765	22648
1977	FOR:	17868	18760	16042	13459	11105	9030	7248	5751	4516	123702
	STE:	5654	14450	12438	10519	8761	7202	5853	4710	3757	32983
1978	FOR:	21475	22548	19281	16176	13347	10853	8711	6912	5428	174570
	STE:	7074	17546	15103	12771	10636	8742	7103	5714	4557	44505
1979	FOR:	23435	24607	21043	17655	14567	11845	9508	7544	5924	219989
	STE:	7849	19235	16558	14002	11661	9584	7787	6264	4995	53033
1980	FOR:	20853	21894	18721	15705	12957	10535	8455	6707	5267	221897
	STE:	6935	17079	14698	12425	10344	8498	6902	5550	4423	48939
1981	FOR:	26830	28174	24094	20216	16681	13564	10888	8639	6784	317331
	STE:	9031	22057	18991	16062	13378	10996	8934	7186	5730	67646
1982	FOR:	31195	32761	28020	23512	19402	15778	12665	10050	7893	401536
	STE:	10918	25932	22332	18892	15737	12936	10512	8456	6742	89296
1983	FOR:	16379	17193	14698	12326	10165	8261	6627	5254	4123	224539
	STE:	6910	14441	12409	10472	8700	7131	5778	4633	3682	69998
1984	FOR:	22408	23516	20097	16848	13890	11284	9048	7172	5626	320523
	STE:	10373	20462	17563	14802	12280	10051	8130	6508	5164	114713
1985	FOR:	22451	23555	20124	16865	13899	11287	9046	7167	5619	329425
	STE:	12797	22545	19324	16260	13467	11001	8880	7093	5614	157463
1986	FOR:	28525	29932	25576	21438	17670	14351	11504	9116	7148	423168
	STE:	16445	28826	24719	20809	17241	14090	11378	9092	7199	204625
1987	FOR:	37375	39225	33522	28102	23167	18818	15088	11957	9378	555966
	STE:	21911	38120	32702	27541	22829	18664	15077	12052	9546	274252
		153742	130388	103603	79254	57859	43115	29823	19106	9378	3468081
		64157	64887	54545	44790	35859	28693	22167	15686	9546	788151

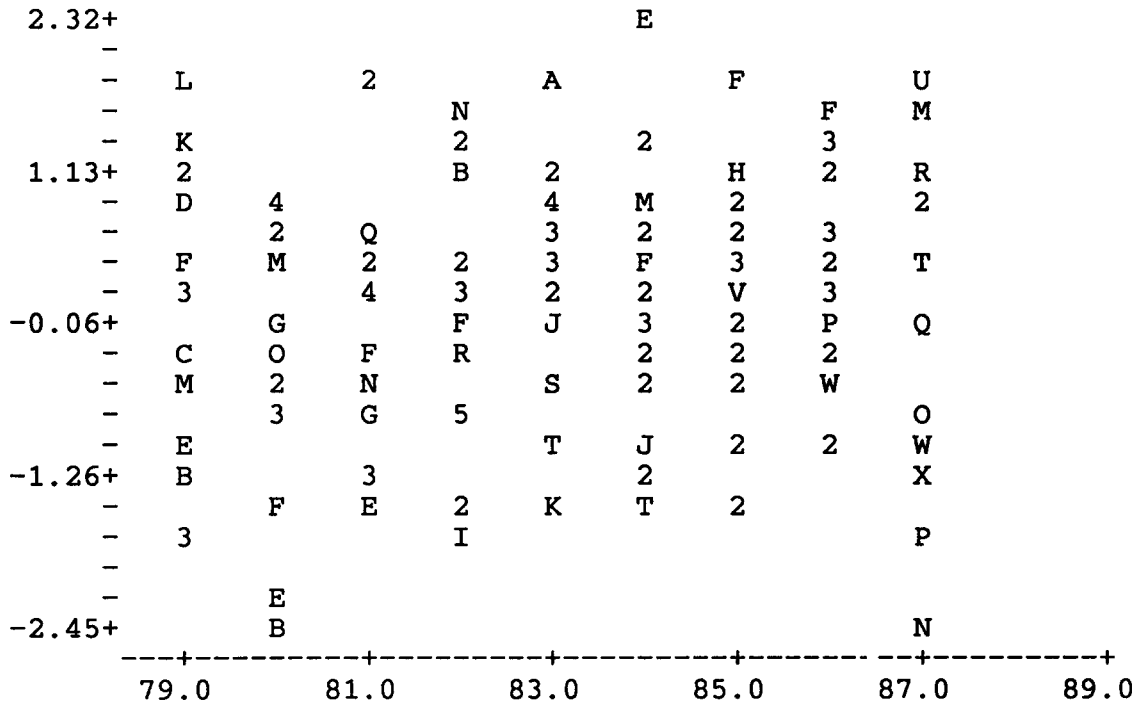
APPENDIX G3

TABLE OF OBSERVED AND EXPECTED BY YEAR

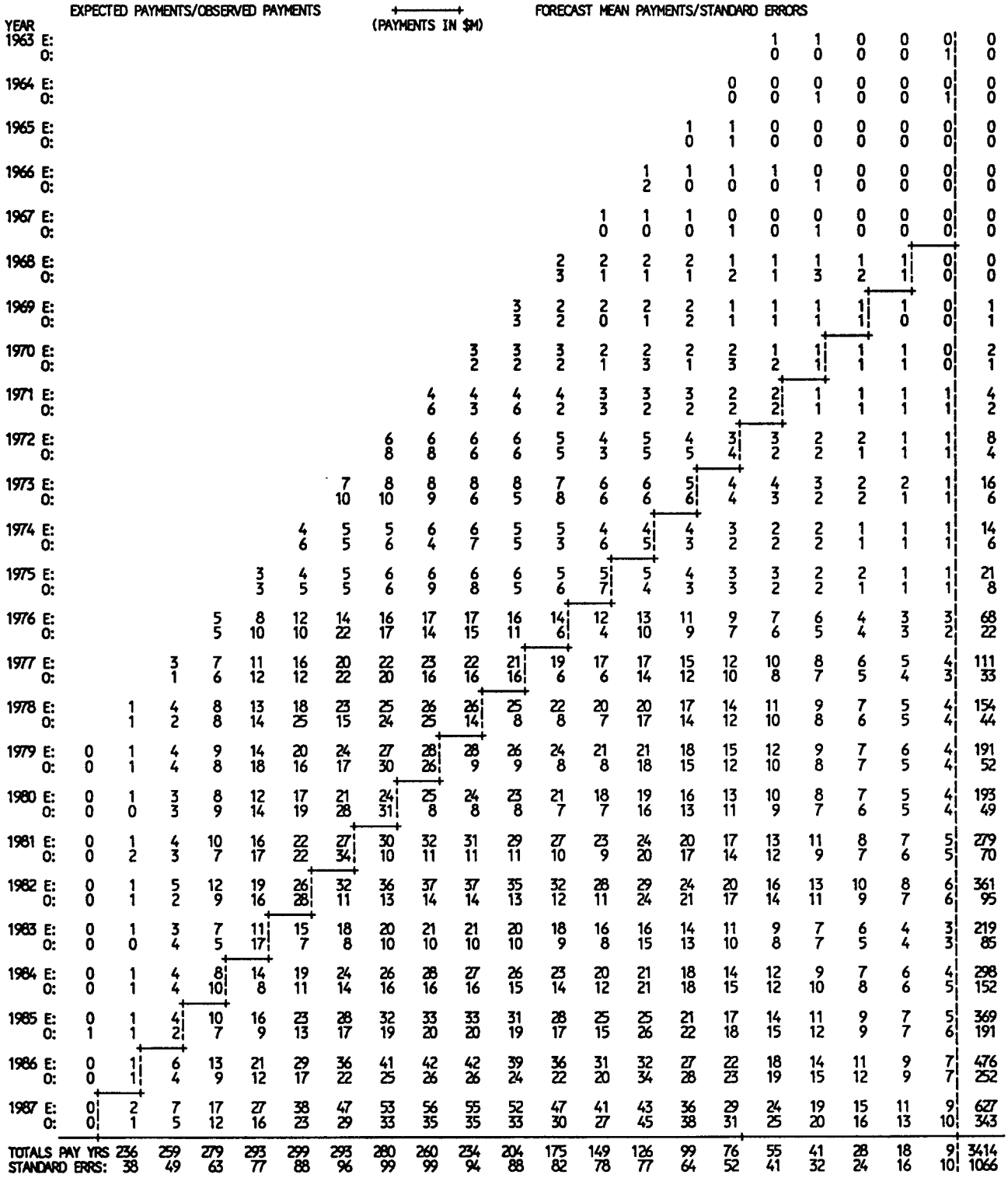
ACC. YEAR	EXPECTED	OBSERVED	DIFFERENCE	%ER	PMNT YEAR	EXPECTED	OBSERVED	DIFFERENCE	%ER
	(PAYMENTS IN $1'S)					(PAYMENTS IN $1's)			
63	2274	1545	-729	-32	63				
64	1360	1903	543	39	64				
65	2445	1945	-500	-20	65				
66	5281	4031	-1250	-23	66				
67	3703	3855	152	4	67				
68	14040	15058	1018	7	68				
69	15581	11980	-3601	-23	69				
70	19534	17951	-1583	-8	70				
71	30674	29592	-1082	-3	71				
72	46483	47964	1481	3	72				
73	66487	66031	-456	0	73				
74	44800	47837	3037	6	74				
75	47365	53074	5709	12	75				
76	118022	109406	-8616	-7	76				
77	142026	119674	-22352	-15	77				
78	145651	129733	-15918	-10	78				
79	129461	121418	-8043	-6	79	44006	50222	6216	14
80	88972	104960	15988	17	80	56771	56915	144	0
81	82542	84194	1652	2	81	73349	71302	-2047	-2
82	63280	56193	-7087	-11	82	93342	91191	-2151	-2
83	19410	26377	6967	35	83	116528	131325	14797	12
84	13133	14633	1500	11	84	142086	121757	-20329	-14
85	4784	4105	-679	-14	85	168738	149120	-19618	-11
86	1346	708	-638	-47	86	194814	188624	-6190	-3
87	118	25	-93	-78	87	219141	213736	-5405	-2

APPENDIX H1

VALIDATION RESIDUALS VS. PAYMENT YEARS



APPENDIX H2


EXPECTED PAYMENTS/OBSERVED PAYMENTS
(PAYMENTS IN $M)
FORECAST MEAN PAYMENTS/STANDARD ERRORS
YEAR
1963 E: 1 1 0 0 0 0
O: 0 0 0 0 1 0
1964 E: 0 0 0 0 0 0
O: 0 1 0 0 0 0
1965 E: 1 1 0 0 0 0 0
O: 0 1 0 0 0 0 0
1966 E: 1 1 1 0 0 0 0
O: 2 0 0 0 0 0 0
1967 E: 1 1 1 0 0 0 0
O: 0 0 0 1 0 0 0
1968 E: 2 2 2 2 1 1 1 1 0
O: 3 1 1 1 2 1 3 2 1 0
1969 E: 3 2 2 2 2 1 1 1 1 1 0
O: 3 2 0 1 2 1 1 1 1 0 1
1970 E: 3 3 3 2 2 3 2 1 1 0 2
O: 2 2 2 1 3 1 3 2 1 1 1
1971 E: 4 4 4 4 3 3 3 2 2 1 1 1 4
O: 6 3 6 2 3 2 2 2 1 1 1 1 2
1972 E: 6 6 6 6 5 4 5 4 3 2 2 1 1 8
O: 8 8 6 6 5 3 5 5 4 3 2 2 1 1 4
1973 E: 7 8 8 8 8 7 6 6 5 4 4 3 2 2 1 16
O: 10 10 9 6 5 8 6 6 6 4 4 3 2 2 1 1 6
1974 E: 4 5 5 6 6 5 5 4 4 3 2 2 1 1 1 14
O: 6 5 6 4 7 5 3 6 5 3 2 2 2 1 1 1 6
1975 E: 3 4 5 6 6 6 5 5 5 4 3 3 2 2 1 1 21
O: 3 5 5 6 9 8 6 7 4 3 3 2 2 1 1 1 8
1976 E: 5 8 12 14 16 17 17 16 14 12 13 11 9 7 6 4 3 3 68
O: 5 10 10 22 17 14 15 11 6 4 10 9 7 6 5 4 3 2 22
1977 E: 3 7 11 16 20 22 23 22 21 19 17 17 15 12 10 8 6 5 4 111
O: 1 6 12 12 22 20 16 16 16 6 6 14 12 10 8 7 5 4 3 33
1978 E: 1 4 8 13 18 23 25 26 26 25 22 20 20 17 14 11 9 7 5 4 154
O: 1 2 8 14 25 15 24 25 14 8 8 7 17 14 12 10 8 6 5 4 44
1979 E: 0 1 4 9 14 20 24 27 28 28 26 24 21 21 18 15 12 9 7 6 4 191
O: 0 1 4 8 18 16 17 30 26 9 9 8 8 18 15 12 10 8 7 5 4 52
1980 E: 0 1 3 8 12 17 21 24 25 24 23 21 18 19 16 13 10 8 7 5 4 193
O: 0 0 3 9 14 19 28 31 8 8 8 7 7 16 13 11 9 7 6 5 4 49
1981 E: 0 1 4 10 16 22 27 30 32 31 29 27 23 24 20 17 13 11 8 7 5 279
O: 0 2 3 7 17 22 34 10 11 11 11 10 9 20 17 14 12 9 7 6 5 70
1982 E: 0 1 5 12 19 26 32 36 37 37 35 32 28 29 24 20 16 13 10 8 6 361
O: 0 1 2 9 16 28 11 13 14 14 13 12 11 24 21 17 14 11 9 7 6 95
1983 E: 0 1 3 7 11 15 18 20 21 21 20 18 16 16 14 11 9 7 6 4 3 219
O: 0 0 4 5 17 7 8 10 10 10 10 9 8 15 13 10 8 7 5 4 3 85
1984 E: 0 1 4 8 14 19 24 26 28 27 26 23 20 21 18 14 12 9 7 6 4 298
O: 0 1 4 10 8 11 14 16 16 16 15 14 12 21 18 15 12 10 8 6 5 152
1985 E: 0 1 4 10 16 23 28 32 33 33 31 28 25 25 21 17 14 11 9 7 5 369
O: 1 1 2 7 9 13 17 19 20 20 19 17 15 26 22 18 15 12 9 7 6 191
1986 E: 0 1 6 13 21 29 36 41 42 42 39 36 31 32 27 22 18 14 11 9 7 476
O: 0 1 4 9 12 17 22 25 26 26 24 22 20 34 28 23 19 15 12 9 7 252
1987 E: 0 2 7 17 27 38 47 53 56 55 52 47 41 43 36 29 24 19 15 11 9 627
O: 0 1 5 12 16 23 29 33 35 35 33 30 27 45 38 31 25 20 16 13 10 343
TOTALS PAY YRS 236 259 279 293 299 293 280 260 234 204 175 149 126 99 76 55 41 28 18 9 3414
STANDARD ERRS: 38 49 63 77 88 96 99 99 94 88 82 78 77 64 52 41 32 24 16 10 1066

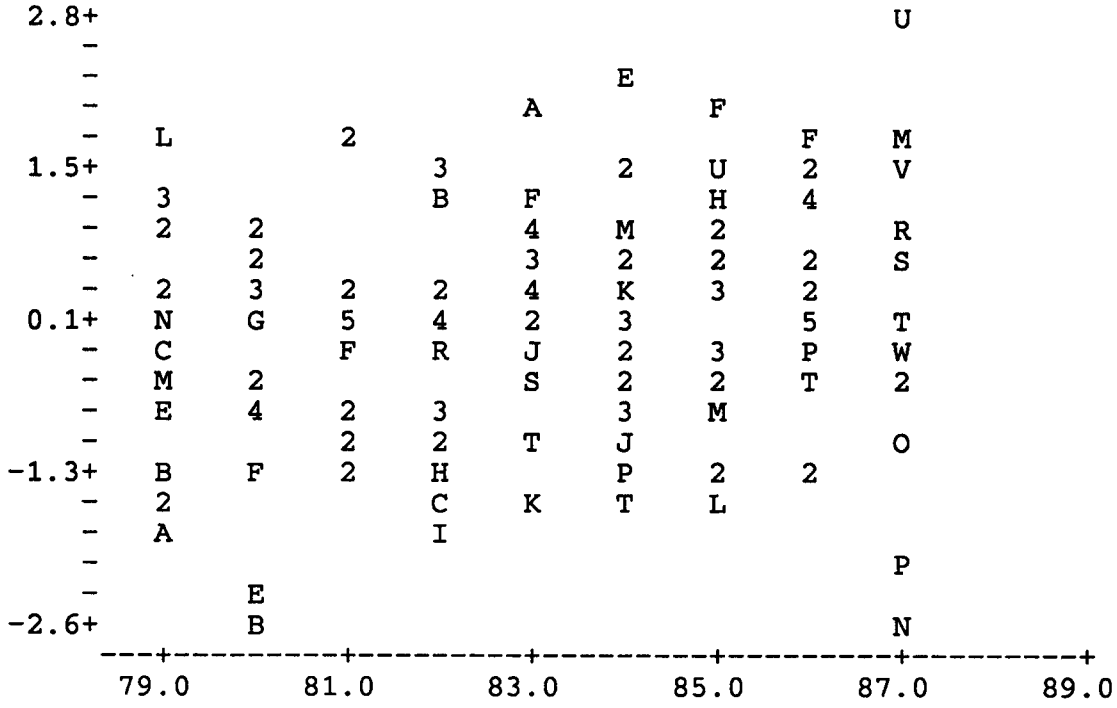
APPENDIX H3

TABLE OF OBSERVED AND EXPECTED BY YEAR

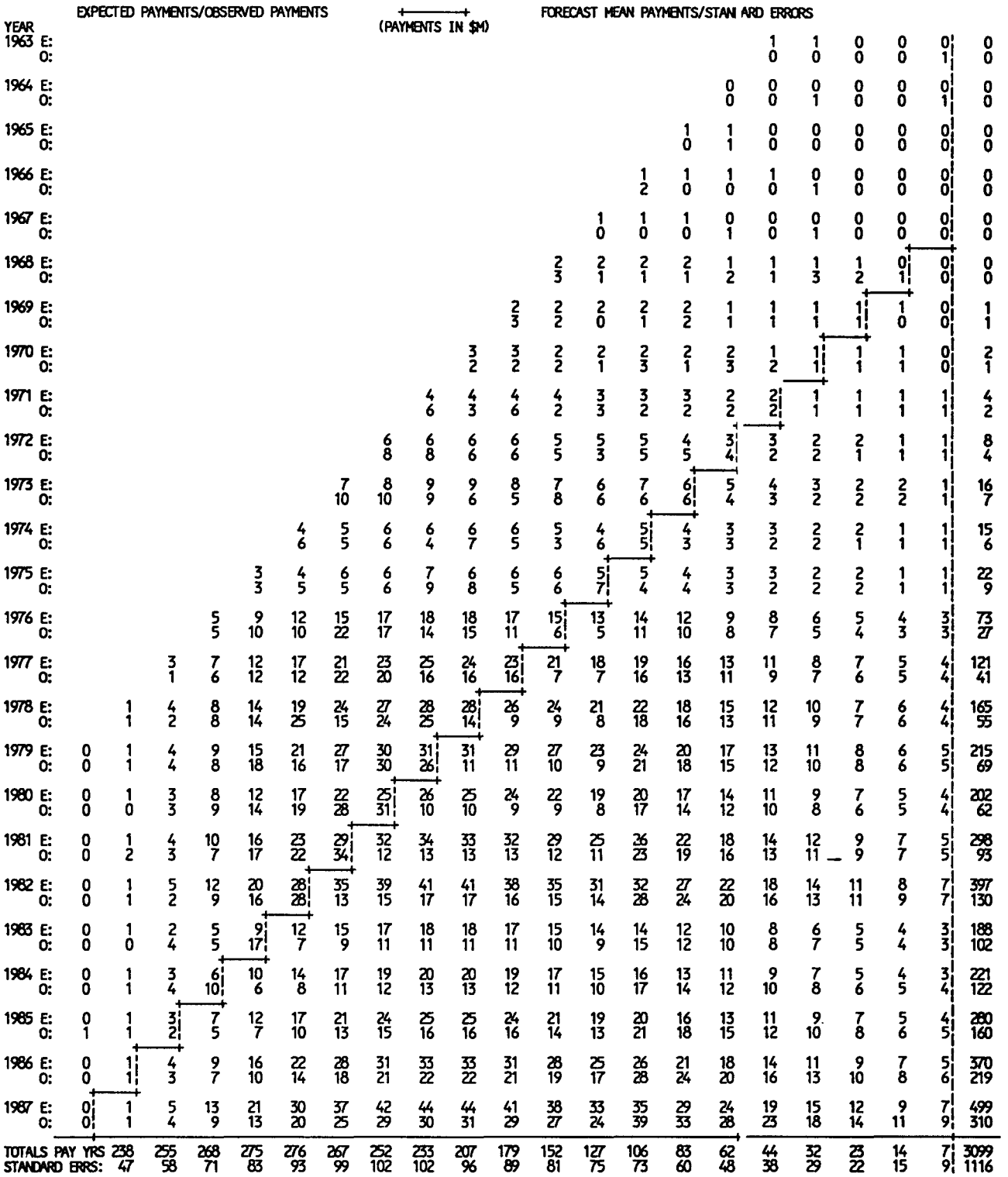
ACC. YEAR	EXPECTED (PAYMENTS IN $M)	OBSERVED	DIFFERENCE	%ER	PMNT YEAR	EXPECTED (PAYMENTS IN $M)	OBSERVED	DIFFERENCE	%ER
63	2	2	0	-34	63				
64	1	2	1	39	64				
65	2	2	0	-22	65				
66	5	4	-1	-17	66				
67	3	4	1	11	67				
68	13	15	2	16	68				
69	15	12	-3	-19	69				
70	19	18	-1	-3	70				
71	30	30	0	0	71				
72	45	48	3	6	72				
73	64	66	2	2	73				
74	44	48	4	8	74				
75	48	53	5	11	75				
76	120	109	-11	-8	76				
77	145	120	-25	-17	77				
78	145	130	-15	-10	78				
79	126	121	-5	-3	79	45	50	5	10
80	86	105	19	21	80	58	57	-1	-2
81	81	84	3	4	81	75	71	-4	-4
82	63	56	-7	-10	82	94	91	-3	-3
83	21	26	5	26	83	116	131	15	12
84	13	15	2	10	84	141	122	-19	-13
85	6	4	-2	-28	85	166	149	-17	-10
86	2	1	-1	-54	86	190	189	-1	0
87	0	0	0	0	87	213	214	1	0

APPENDIX I1

VALIDATION RESIDUALS VS. PAYMENT YEARS



APPENDIX I2


EXPECTED PAYMENTS/OBSERVED PAYMENTS
(PAYMENTS IN $M)
FORECAST MEAN PAYMENTS/STANDARD ERRORS
YEAR
1963 E: 1 1 0 0 0 0
0: 0 0 0 0 1 0
1964 E: 0 0 0 0 0 0
0: 0 1 0 0 1 0
1965 E: 1 1 0 0 0 0 0
0: 0 1 0 0 0 0 0
1966 E: 1 1 1 0 0 0 0
0: 2 0 0 0 0 0 0
1967 E: 1 1 1 0 0 0 0
0: 0 0 0 1 0 0 0
1968 E: 2 2 2 2 1 1 1 0 0
0: 3 1 1 1 2 1 3 2 1 0
1969 E: 2 2 2 2 2 1 1 1 1 1 0
0: 3 2 0 1 2 1 1 1 1 0 1
1970 E: 3 3 2 2 2 2 1 1 1 1 0
0: 2 2 1 3 1 3 2 1 1 0 1
1971 E: 4 4 4 4 3 3 2 2 1 1 1 1
0: 6 3 6 2 3 2 2 2 1 1 1 1 2
1972 E: 6 6 6 6 5 5 5 4 3 3 2 2 1 1
0: 8 8 6 6 5 3 5 5 4 2 2 1 1 1 4
1973 E: 7 8 9 9 8 7 6 7 6 5 4 3 2 2 1
0: 10 10 9 6 5 8 6 6 6 4 3 2 2 2 1 16
1974 E: 4 5 6 6 6 6 5 5 4 3 3 2 2 1 1
0: 6 5 6 4 7 5 3 6 5 3 3 2 2 1 1 15
1975 E: 3 4 6 6 7 6 6 6 5 5 4 3 3 2 2 2 1 1
0: 3 5 5 6 9 8 5 6 7 4 4 3 2 2 2 1 1 22
1976 E: 5 9 12 15 17 18 18 17 15 13 14 12 9 8 6 5 4 3
0: 5 10 10 22 17 14 15 11 6 5 11 10 8 7 5 4 3 3 73
1977 E: 3 7 12 17 21 23 25 24 23 21 18 19 16 13 11 8 7 5 4
0: 1 6 12 12 22 20 16 16 16 7 7 16 13 11 9 7 6 5 4 121
1978 E: 1 4 8 14 19 24 27 28 28 26 24 21 22 18 15 12 10 7 6 4
0: 1 2 8 14 25 15 24 25 14 9 9 8 18 16 13 11 9 7 6 4 165
1979 E: 0 1 4 9 15 21 27 30 31 31 29 27 23 24 20 17 13 11 8 6 5
0: 0 1 4 8 18 16 17 30 26 11 11 10 9 21 18 15 12 10 8 6 5 215
1980 E: 0 1 3 8 12 17 22 25 26 25 24 22 19 20 17 14 11 9 7 5 4
0: 0 0 3 9 14 19 28 31 10 10 9 9 8 17 14 12 10 8 6 5 4 202
1981 E: 0 1 4 10 16 23 29 32 34 33 32 29 25 36 22 18 14 12 9 7 5
0: 0 2 3 7 17 22 34 12 13 13 13 12 11 23 19 16 13 11 9 7 5 298
1982 E: 0 1 5 12 20 28 35 39 41 41 38 35 31 32 27 22 18 14 11 8 7
0: 0 1 2 9 16 28 13 15 17 17 16 15 14 28 24 20 16 13 11 9 7 397
1983 E: 0 1 2 5 9 12 15 17 18 18 17 15 14 14 12 10 8 6 5 4 3
0: 0 0 4 5 17 7 9 11 11 11 11 10 9 15 12 10 8 7 5 4 3 188
1984 E: 0 1 3 6 10 14 17 19 20 20 19 17 15 16 13 11 9 7 5 4 3
0: 0 1 4 10 6 8 11 12 13 13 12 11 10 17 14 12 10 8 6 5 4 221
1985 E: 0 1 3 7 12 17 21 24 25 25 24 21 19 20 16 13 11 9 7 5 4
0: 1 1 2 5 7 10 13 15 16 16 16 14 13 21 18 15 12 10 8 6 5 280
1986 E: 0 1 4 9 16 22 28 31 33 33 31 28 25 26 21 18 14 11 9 7 5
0: 0 1 3 7 10 14 18 21 22 22 21 19 17 28 24 20 16 13 10 8 6 370
1987 E: 0 1 5 13 21 30 37 42 44 44 41 38 33 35 29 24 19 15 12 9 7
0: 0 1 4 9 13 20 25 29 30 31 29 27 24 39 33 28 23 18 14 11 9 499
TOTALS PAY YRS 238 255 268 275 276 267 252 233 207 179 152 127 106 83 62 44 32 23 14 7 3099
STANDARD ERRS: 47 58 71 83 93 99 102 102 96 89 81 75 73 60 48 38 29 22 15 9 1116

APPENDIX I3

TABLE OF OBSERVED AND EXPECTED BY YEAR

ACC. YEAR	EXPECTED (PAYMENTS IN $M)	OBSERVED	DIFFERENCE	%ER	PMNT YEAR	EXPECTED (PAYMENTS IN $M)	OBSERVED	DIFFERENCE	%ER
63	2	2	0	-34	63				
64	1	2	1	40	64				
65	3	2	-1	-23	65				
66	5	4	-1	-14	66				
67	3	4	1	18	67				
68	12	15	3	27	68				
69	14	12	-2	-16	69				
70	18	18	0	0	70				
71	29	30	1	1	71				
72	45	48	3	5	72				
73	66	66	0	0	73				
74	46	48	2	3	74				
75	49	53	4	8	75				
76	125	109	-16	-12	76				
77	154	120	-34	-22	77				
78	152	130	-22	-14	78				
79	139	121	-18	-12	79	45	50	5	10
80	88	105	17	19	80	59	57	-2	-2
81	83	84	1	1	81	76	71	-5	-6
82	66	56	-10	-14	82	97	91	-6	-5
83	17	26	9	55	83	121	131	10	8
84	9	15	6	59	84	147	122	-25	-16
85	4	4	0	4	85	173	149	-24	-13
86	1	1	0	-32	86	197	189	-8	-4
87	0	0	0	0	87	218	214	-4	-2

F O R E C A S T I N G W I T H I N F L. / D I S C.

YEAR	FUTURE INFLATION RATE (PERCENT)	FUTURE DISCOUNT RATE (PERCENT)
1988	0.0000	9.0000
1989	0.0000	9.0000
1990	0.0000	9.0000
1991	0.0000	9.0000
1992	0.0000	9.0000
1993	0.0000	9.0000
1994	0.0000	9.0000
1995	0.0000	9.0000
1996	0.0000	9.0000
1997	0.0000	9.0000
1998	0.0000	9.0000
1999	0.0000	9.0000
2000	0.0000	9.0000
2001	0.0000	9.0000
2002	0.0000	9.0000
2003	0.0000	9.0000
2004	0.0000	9.0000
2005	0.0000	9.0000
2006	0.0000	9.0000
2007	0.0000	9.0000

APPENDIX J1

EXPECTED PAYMENTS/OBSERVED PAYMENTS ←——→ FORECAST MEAN PAYMENTS/STANDARD ERRORS

(PAYMENTS IN $000'S)

YEAR													
1968	EXP:												2424
	OBS:												2554
1969	EXP:											2563	2343
	OBS:											2513	2132
1970	EXP:										3036	2880	2633
	OBS:										1712	2125	1700
1971	EXP:									4350	4319	4099	3748
	OBS:									5926	3143	6483	2057
1972	EXP:								5852	6147	6105	5795	5299
	OBS:								7883	7502	6105	5505	4700
1973	EXP:							7147	8061	8468	8411	7986	7304
	OBS:							10187	9953	9072	6156	4806	7977
1974	EXP:						3844	4759	5369	5641	5603	5320	4867
	OBS:						6445	5478	5688	4428	6629	5454	2936
1975	EXP:					3011	4235	5244	5917	6217	6177	5866	5367
	OBS:					2644	4731	5449	6052	8505	8038	4603	5590
1976	EXP:				4916	7896	11105	13753	15518	16308	16205	15391	14083
	OBS:				5114	9502	9607	22216	16551	13905	14973	11098	6440
1977	EXP:			2880	6510	10456	14708	18217	20558	21607	21474	20397	17879
	OBS:			1338	5620	11513	12074	22239	19553	15911	15760	15666	5624
1978	EXP:		875	3357	7591	12198	17162	21262	23997	25226	25073	22814	19156
	OBS:		949	2472	8020	14458	24782	15252	24384	24969	14467	7356	6240
1979	EXP:	69	1009	3871	8756	14072	19802	24535	27696	29117	27722	24163	20290
	OBS:	289	1337	4443	8283	17813	16406	16541	29968	26338	8972	7883	6692
1980	EXP:	65	954	3664	8293	13331	18763	23252	26249	26434	24108	21013	17645
	OBS:	79	439	2701	8980	13814	19494	28387	31066	8395	7706	6774	5751
1981	EXP:	82	1207	4636	10493	16871	23748	29433	31830	30706	28008	24415	20505
	OBS:	45	1805	3132	6694	16755	22183	33580	10073	9781	8991	7915	6729
1982	EXP:	94	1385	5319	12042	19364	27261	32366	33531	32351	29510	25728	21610
	OBS:	12	767	2380	8641	16465	27928	10485	10936	10628	9778	8612	7325
1983	EXP:	61	905	3482	7892	12700	17133	19489	20192	19482	17771	15492	13010
	OBS:	8	370	3663	5032	17304	6239	7148	7454	7236	6644	5835	4944
1984	EXP:	71	1059	4083	9266	14293	18479	21027	21790	21025	19178	16717	14036
	OBS:	44	825	3802	9962	5736	7494	8599	8970	8703	7980	6994	5911
1985	EXP:	51	766	2960	6443	9528	12325	14029	14540	14029	12795	11151	9361
	OBS:	911	796	2398	3489	3961	5192	5967	6228	6040	5532	4840	4081
1986	EXP:	64	955	3536	7374	10905	14108	16060	16647	16065	14654	12772	10723
	OBS:	10	698	1897	4002	4553	5973	6871	7178	6968	6387	5594	4721
1987	EXP:	82	1177	4173	8702	12871	16653	18959	19655	18970	17306	15086	12667
	OBS:	25	634	2256	4761	5446	7149	8230	8604	8359	7669	6722	5677
TOT. FOR PAYMENT YRS:		232625	230683	223294	209946	192067	170214	147082	124475	102036	81683	63532
STANDARD ERRORS:		27689	29944	32084	33363	33986	32922	31723	30186	26357	23153	19397

APPENDIX J1

1963 EXP:					706	563	443	345	265	0
OBS:					150	310	0	335	750	0
1964 EXP:				378	306	245	193	150	115	0
OBS:				126	40	714	314	0	709	0
1965 EXP:			615	507	411	328	259	201	155	0
OBS:			418	718	135	19	242	403	10	0
1966 EXP:		1236	1040	858	696	555	438	341	262	0
OBS:		1529	450	15	260	732	310	300	435	0
1967 EXP:	664	694	584	482	391	313	247	192	148	0
OBS:	445	97	148	872	369	1136	316	300	172	0
1968 EXP:	2146	2243	1891	1563	1269	1016	802	625	462	462
OBS:	1246	1319	1285	2168	1286	2633	1835	732	384	384
1969 EXP:	2075	2170	1830	1513	1229	984	777	581	411	992
OBS:	407	994	1556	975	1467	1041	895	482	345	616
1970 EXP:	2333	2441	2059	1703	1385	1109	839	601	426	1866
OBS:	1365	3121	1432	2771	2468	1257	679	491	352	957
1971 EXP:	3322	3475	2932	2426	1973	1514	1098	786	557	3955
OBS:	3475	2440	1813	2038	2217	1212	887	642	461	1805
1972 EXP:	4697	4916	4149	3433	2675	1966	1426	1022	725	7813
OBS:	3199	4624	4621	3825	2128	1577	1154	836	600	3287
1973 EXP:	6476	6778	5721	4535	3385	2489	1805	1294	918	14427
OBS:	5549	6038	6313	3590	2698	2000	1465	1062	763	5689
1974 EXP:	4316	4518	3653	2774	2071	1523	1105	792	562	12479
OBS:	5788	4991	2885	2203	1657	1229	900	653	469	4689
1975 EXP:	4759	4773	3697	2808	2096	1542	1119	802	569	17405
OBS:	7462	3754	2922	2233	1680	1246	914	663	477	6228
1976 FOR:	11964	11493	8904	6764	5051	3715	2696	1934	372	53893
STE:	3756	9043	7042	5384	4052	3008	2207	1602	152	15933
1977 FOR:	14551	13980	10832	8230	6146	4522	3282	2354	671	83447
STE:	4640	11045	8605	6582	4956	3680	2701	1962	412	21297
1978 FOR:	15591	14981	11608	8820	6587	4846	3518	2523	791	112235
STE:	5148	11939	9303	7117	5359	3980	2920	2121	526	26470
1979 FOR:	16515	15869	12297	9344	6979	5135	3727	2674	898	146614
STE:	5523	12691	9891	7567	5699	4233	3107	2256	624	31866
1980 FOR:	14362	13800	10694	8125	6068	4464	3241	2324	650	153929
STE:	4748	11003	8575	6560	4939	3668	2692	1954	406	29657
1981 FOR:	16692	16041	12432	9447	7057	5192	3769	2704	919	210719
STE:	5563	12820	9995	7650	5762	4281	3143	2283	643	38308
1982 FOR:	17593	16908	13105	9960	7440	5475	3975	2852	024	254427
STE:	6056	13632	10630	8138	6131	4556	3345	2430	749	47895
1983 FOR:	10590	10175	7884	5990	4473	3290	2388	1713	215	170289
STE:	4069	8466	6594	5042	3793	2815	2063	1497	375	41480
1984 FOR:	11423	10973	8500	6456	4819	3544	2571	1843	307	197980
STE:	4848	9434	7340	5605	4211	3120	2283	1653	186	58338
1985 FOR:	7615	7313	5662	4299	3208	2357	1709	1225	368	138457
STE:	3339	6357	4939	3766	2825	2089	1526	1103	790	43045
1986 FOR:	8725	8379	6489	4927	3677	2703	1960	1404	996	162103
STE:	3865	7316	5686	4337	3255	2408	1760	1273	912	50846
1987 FOR:	10308	9901	7669	5824	4347	3195	2318	1661	1178	192619
STE:	4652	8709	6772	5167	3879	2872	2100	1519	1088	62054
	48745	37127	26506	18166	11817	7687	4590	2657	1178	1936110
	16649	15133	11456	8439	6017	4280	2903	1903	1088	241433

APPENDIX J1

ACCI YEAR	FORECAST RESERVES	PMNT YEAR	FORECAST RESERVES
1968	462	1988	232625
1969	992	1989	230683
1970	1866	1990	223294
1971	3955	1991	209946
1972	7813	1992	192067
1973	14427	1993	170214
1974	12479	1994	147082
1975	17405	1995	124475
1976	53893	1996	102036
1977	83447	1997	81683
1978	112235	1998	63532
1979	146614	1999	48745
1980	153929	2000	37127
1981	210719	2001	26506
1982	254427	2002	18166
1983	170289	2003	11817
1984	197980	2004	7687
1985	138457	2005	4590
1986	162103	2006	2657
1987	192619	2007	1178
TOTAL	1936110		1936110

Casualty Loss Reserve Seminar
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