GENERAL LIABILITY RATEMAKING: AN UPDATE

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In the fourteen years since Jeffrey T. Lange wrote "General Liability Insurance Ratemaking," (1) the insurance industry has experienced a period of significant social and economic inflation. This has been evidenced by spiralling insurance claim costs, as well as by a rapidly growing number of claims, brought by an increasingly claims conscious public. The impact on the various General Liability lines of insurance has been a dramatic change in industry profitability, which in turn has presented severe challenges to the ratemaker.

Considering the turbulence of this fourteen year period, the adjustments that have been made to the actuarial methodology described by Lange have not been major, but they have served to improve the accuracy of the overall rate level calculation. The purpose of this paper is to present a summary of the adjustments that have been made in the basic limits ratemaking methodology and the reasons for their introduction. Recent revisions in increased limits ratemaking methodology are beyond the scope of this paper but are fully described in Robert S. Miccolis's paper "On the Theory of Increased Limits and Excess of Loss Pricing." (2)

Lange's excellent explanation of the general problems presented to the actuary by the various sublines and how the ratemaking methodology resolves them, especially with regard to classification ratemaking, should be read before reviewing the technical adjustments described in this paper. The methodology described is that of Insurance Services Office (ISO), which compiles ratemaking data and files rates for the great majority of General Liability insurers in the United States. The changes outlined in this paper were developed by ISO's Commercial Casualty Actuarial Subcommittee (CCAS) and its successor subcommittee, the General Liability Actuarial Subcommittee (GLAS), during the 1970's.

Before considering these changes, a review of the premium growth that has occurred in General Liability will help put the significance of ISO's General Liability ratemaking procedures into perspective.

Premium Growth

In 1966, according to Best's Executive Data Service, written premiums for General Liability (including Medical Malpractice) amounted to $1.2 billion, representing 5.7% of total Property/Casualty written premiums in the United States. By 1978, written premiums (including Medical Malpractice) had soared to $9.1 billion, comprising 11.2% of the industry's total writings.

On an individual risk basis, the rapid growth in the average premium that has resulted from the significant basic and increased limits rate increases implemented during this period has also made the application of experience rating plans much more frequent. As a result, their soundness has become more critical to overall industry profitability. While the technical adjustments that have been made to the General Liability Experience and Schedule Rating Plan are beyond the scope of this paper, the reader should be aware that significant revisions have been made to the plan, including higher premium eligibility requirements, introduction of trend and loss development factors, and revision of D-Ratios (3). In addition, the technical off-balance (the percentage difference between the actual charged premium—including Experience and Schedule Rating debits and credits—and the premium collectible at manual rate level) that existed in the plans was accommodated in the expected loss ratio. The impact of these changes on the actual premiums collected by the industry should not be underestimated, since as much as 75% of General Liability premiums are eligible for experience rating (4).

The adjustments made by ISO to the ratemaking procedures are described in the balance of this paper in two sections:

1. A description of general ratemaking adjustments that affect all General Liability sublines, and
2. An outline of specific adjustments that were made to the ratemaking process for each subline.

GENERAL RATEMAKING ADJUSTMENTS

Definition of Basic Limits

One of the first responses to the impact of inflation on General Liability ratemaking was the revision of the definition of basic limits for Bodily Injury (BI) coverages. Effective January 1, 1973, BI manual rates were revised to reflect a limit of $25,000 per occurrence, instead of the previous $5,000 per

person and $10,000 per accident. Similarly, manual rates for Professional Liability sublines were adjusted to limits of $25,000 per claim and $75,000 in annual aggregate from the previous limits of $5,000 per person and $15,000 aggregate. In both cases, revised manual rates were determined by multiplying the prior basic limit rates, by state and class, by the appropriate increased limits factors.

The major motivation for the change in basic limits was the small number of insureds buying limits less than $25,000 as a result of the eroding effect of inflation on liability claim costs. A further consideration in the Professional Liability sublines was the fact that average paid claim costs were approaching $3,000, when all payments were limited to the $5,000 basic limit. As an increasing number of claims penetrated the basic limit, the impact of basic limits ratemaking by state was being surpassed by that of countrywide increased limits ratemaking. At the time, this was not yet a significant concern for the other General Liability sublines.

From a ratemaking viewpoint, the effect of the adjustment of $5,000 manual rates to a $25,000 basis was to allow basic limits rates by state and class to reflect to a greater extent the different claim severity levels that existed from state to state and from class to class. This occurred because the countrywide increased limits factor previously used to adjust $5,000 manual rates to a $25,000 basis was effectively reevaluated by state and by class. Since ratemaking data by state and class being reviewed at the time was actually reprocessed to determine losses up to $25,000 per occurrence, excess of $5,000, this reevaluation had a prompt impact.

The impact on this loss experience of the small number of insureds that had purchased limits less than $25,000 was also approximated after an examination of current policy limits distributions by subline. The average increased limits factor for those insureds purchasing limits less than $25,000 was applied to those reported incurred losses insured with limits above $5,000 but below $25,000. The CCAS felt this adjustment would reasonably approximate the increase in reported losses had all insureds been required to purchase limits of at least $25,000.

The change in basic limits, as well as other elements, necessitated adjustments to General Liability loss development and trend procedures; these adjustments are discussed in the next two sections.

Loss Development

Adjustments to the General Liability loss development procedure became necessary because of

1. The increased number, and dollar impact, of liability claims subject to lengthy litigation, and
2. The increasingly liberal interpretations of various aspects of tort law, e.g., statutes of limitation, by the courts (5).

Also, as noted in Robert J. Finger's article "Estimating Pure Premiums by Layer—An Approach" (6), there is a theoretical problem in using data limited to a fixed dollar amount to calculate loss development factors because the value of the fixed limit, expressed in constant dollars, is changing over time due to the impact of inflation on insurance claim costs.

In the past, policy year loss development for General Liability (excluding Medical Malpractice) was measured by state and class up to 39 months of maturity; further development was measured on a countrywide basis by subline (with no class detail) up to 63 months of maturity, which was considered to be an ultimate evaluation for all practical purposes.

As the observed countrywide developments beyond 39 months became more and more significant, the CCAS decided in 1974 to begin accumulating actual loss development by state and class beyond 39 months. Although countrywide loss development factors are still used for the non-Professional sublines, detailed loss development data is now available up to 111 months of maturity for Products Liability and is being compiled up to 123 months of maturity for all General Liability sublines, because of increased concern about the magnitude of the development "tail" in recent years. The importance of loss development in Medical Malpractice experience has long been recognized, and the period of measurement has been extended gradually from 75 months in the late 1960's to 135 months of maturity at the present time (see Exhibit 1).

In a number of cases, notably for the Property Damage Liability coverages, no development data beyond 39 months had been compiled. While extended development histories were being compiled, a procedure was used which assumed development beyond the last observed development interval to be equal to development in that last interval. Thus if a development factor of 1.02 has been observed between 27 and 39 months, that same factor is used to develop losses from 39 months to ultimate. The propriety of this approximation procedure was substantiated by actual extended developments (75 months and subsequent) available for Medical Malpractice (see Exhibit 1).

Trend Factors (7)

As might be expected, the effects of social and economic inflation on General Liability claim costs have necessitated significant changes to the trending procedures. Until 1974, the procedure outlined by Benbrook (8) was followed: calendar year average paid claim costs were fitted to a straight line of best fit, using the least squares methodology, and the trend was calculated as the average annual dollar change in the average fitted cost (the slope) divided by the midpoint of the fitted line.

Of course this procedure effectively implied that trend was decreasing on a percentage basis, since a fixed dollar amount, the slope, was related to a constantly increasing base. Therefore, in 1974, at the peak of an inflationary period, ISO's Actuarial Committee decided that the procedure should be revised to replace the least squares straight line with a least squares exponential curve of best fit (9), which produces a constant annual percent change between each pair of fitted values (10). This procedure was expected to provide a much more realistic measurement of the effects of inflation on insurance loss costs, and is the procedure still in use at this time.

A further problem resulted from the fact that, in times of changing claim frequency, using calendar year average paid claim cost to measure severity trend for liability lines is theoretically improper. This is because the significant time lag between occurrence and settlement of liability claims will produce a mix of small and large claims that will be paid in any given calendar year period. More severe claims are usually subject to litigation and will frequently take several years to be settled. As long as claim frequency is unchanging, the mix of claims remains relatively constant from year to year, and there is no problem. When claim frequency is increasing, however, an undue proportion of low valued, easily settled claims will be included in the most recent experience, distorting the average claim cost. This very phenomenon was observed by the CCAS in the calendar year average paid claim cost data for Medical Malpractice for calendar years 1974 and 1975, as shown in Exhibit 2. While all indications at that time pointed to rapidly rising claim costs, actual calendar year average paid claim costs were *decreasing*. Further study showed that this was caused by the problem described above. A theoretical model presented to the CCAS to more fully describe this problem is included here as an Appendix.

This situation was resolved in 1976 when the CCAS decided to measure severity trend for General Liability sublines using policy year incurred claim

cost data rather than calendar year paid data. This procedure offers the following advantages over the prior methodology:

1. Policy year incurred claim costs present a more current indication of severity trends, since the most recent point includes only claims incurred in the most recent policy year, not claims incurred long ago and paid recently.
2. The distortion caused by changing claim frequencies is eliminated, since average costs are determined by the claims incurred in a given policy year, not by those that happen to be paid in a given calendar year.

The CCAS recognized that the introduction of outstanding losses into the trend procedure necessitated the application of loss development factors to obtain average severities for each policy year at comparable levels of maturity. While this does introduce some complexity into the procedure, the advantage of being able to use current outstanding losses was felt to overshadow this additional complexity. Any changes in individual company claim reserving practices were assumed to be negligible when experience was compiled on an industrywide basis. The CCAS also felt that the impact of this adjustment would be significant only for the most recent policy year or two.

While the change from calendar year to policy year data was being considered, detailed data by subline were reviewed, on both a paid and incurred basis. Significant differences between the magnitude of, and the rate of change in, average claim costs by subline were observed. Exhibit 3 details a comparison of these differences.

Until the time of this procedural change, separate trends had been calculated for all Professional Liability sublines combined, for Products Liability (when a trend procedure was initiated for that subline), and for all other sublines combined (based on calendar year average paid claim cost data combined for all sublines other than Professional and Products Liability). Because of the observed differences in trends between sublines, the CCAS decided that, coincident with the change to policy year incurred trend, the base for measuring trend would also be changed to reflect the experience of each individual subline.

One final revision was necessitated by the change to policy year incurred trend factors. Calendar year average paid claim cost data had been compiled on a semiannual basis and then, beginning in 1974, on a quarterly basis; these data were then combined so that the latest twelve overlapping quarterly year-ended points were used to calculate the trend. Since policy year data were available only for annual periods, the number of points to be used in the calculation

needed to be reconsidered. Based on a judgmental consideration relative to the desired degree of responsiveness and stability, the CCAS decided to use six policy years for all sublines except Professional Liability, where a trend based on eight policy years was believed to be more appropriate because of greater volatility in the average claim costs.

All of the above discussion has addressed the measurement of severity trends. Historically the measurement of frequency trend for General Liability sublines has been difficult because of the multiplicity of exposure bases used. In 1975, however, a claim frequency trend procedure for the Professional Liability sublines was developed: claim frequency trend was measured by subline on a policy year incurred basis after developing incurred claim counts to an ultimate reported value.

Claim frequencies for other sublines are now reviewed using premium at present rates as the denominator (adjusted to current exposure levels where necessary) to avoid the problem of multiple exposure bases. At this time, frequency trend has not been reflected in any other ISO General Liability filing because the frequencies have appeared to be fairly constant.

Classifications

One other general area that has experienced significant revisions in the 1970's is that of General Liability classifications. The scope of these changes is discussed in this section. In general the approach described by Lange for determining General Liability classification rates is still in effect, although the procedure for Products Liability has recently been revised.

A significant change was made to the classifications themselves, effective January 1, 1974, when 5-digit Industrial Classification Codes (ICC's) replaced the prior 4-digit codes. This change was intended to allow the collection of more refined statistical experience by class. It had been observed in several instances that, as tort liability concepts expanded rapidly in the late 1960's and early 1970's, many exposures of a quite dissimilar nature were listed under the same class code. The 5-digit ICC System was selected to provide compatibility with liability data collected under the Commercial Risk Statistical Plan, which applied to most package business, and to allow the comparison of insurance statistics to statistics published by the Federal Government in ICC detail.

The expansion of the number of classes was most significant in the Manufacturers and Contractors subline, where the number of classes jumped from 192 to 498. The number of Owners, Landlords, and Tenants classes grew more

modestly from 264 to 324. Classifications in the Products Liability Manual were extensively revised shortly after the introduction of the ICC System (effective May 29, 1974), creating classes for many newly developed products, so that a comparison of the number of classes before and after this change is not appropriate for this subline.

As several years of experience become available on the expanded class basis, improvements in the accuracy of General Liability class rates should become apparent.

OTHER DEVELOPMENTS

In addition to these general changes, there have been several other specific changes introduced by ISO for the individual General Liability sublines. This section describes these changes.

Owners, Landlords, and Tenants Liability

The procedure outlined by Lange for OL&T Bodily Injury ratemaking is still used today with the exception of the general changes described above and two other minor changes.

The number of class groups included in the statewide experience review increased to thirteen with the addition of the Hotel–Motel classifications. These classes were previously separately reviewed and filed. In 1971 the CCAS determined that they could be incorporated readily into the procedure used for the other twelve groups.

The second change affects the statewide rate level calculation in states with less than full credibility. The prior procedure, as described by Lange, had been to apply the complement of the state's credibility to the expected loss ratio (ELR) in such states. Of course this is equivalent to applying the complement of the credibility to no change in rate level. In times of rapidly rising costs, this procedure severely slowed movement towards an adequate rate level. In 1975, therefore, the CCAS adjusted the procedure; the ELR is now trended from the effective date of the last rate revision, or from the date of the last review if no revision was filed at that time. Thus, in the extreme example, if a state's experience had no credibility, rates would be adjusted by the overall trend since the last revision. Exhibit 4 provides an example of the new procedure.

Manufacturers and Contractors Liability

The unique three-way credibility weighting procedure suggested by Lange

has proven to be a methodology capable of handling the great diversity of exposure among M&C classifications, many of which can be accorded only low credibility.

There have been modest changes in the way statewide rate levels have been determined. The few smaller states that were previously grouped together have been individually reviewed since 1973. The calculation of the trended ELR to which the complement of the state's credibility is assigned in low-credibility states was introduced in M&C as in OL&T. Also, as premium volume has grown steadily, the number of states with territorial rates has increased to 5; California, Florida, Illinois and Pennsylvania now are divided into rating territories in addition to New York.

A trend procedure was introduced for M&C in 1973, as increases in the severity of M&C claims were observed to exceed the increases in the exposure base, payroll. Previously severity trend and payroll trend were assumed to be equal. M&C severity trends are calculated in the manner described above (see also Exhibit 3), while payrolls are adjusted to the current level based on movements in the average wages of manufacturing and contract construction workers, as published by the Bureau of Labor Statistics. Exhibit 5 shows how this information is compiled.

An improvement in the exposure trending procedure was introduced in 1977. The observed difference between the average wage level for each policy year and the latest published wage level is used to adjust experience to current level. Trend *beyond* the latest point is based on the usual exponential extrapolation approach. Exhibit 5 displays the details of these calculations.

One other significant revision to M&C ratemaking has been necessitated by the gradual movement to an unlimited payroll basis of exposure. Non-executive payrolls were originally limited to $100 per week; this cap has gradually been increased in recognition of inflation's impact on average wage levels. In most states, the limitation was raised to $300 in the early 1970's and eliminated entirely in recent years.

Since these changes paralleled similar changes in the Workers' Compensation exposure definition, detailed state-by-state wage information collected by the National Council on Compensation Insurance has been used to adjust manual rates to reflect the new definition of payroll. Since the change from a $100 limit to a $300 limit was of the greatest significance, adjustments were usually determined by classification. The adjustment from $300 to unlimited payrolls had a much smaller impact (two to three percent) and was usually assumed to

be the same for all classes in the state. Exhibit 6 provides an example of the procedure used by the National Council to calculate payroll offset factors.

Products Liability

The rapid increases in filed Products Liability rate levels in 1975 and 1976 were largely based on the procedure outlined in Lange's paper, with the addition of a trend procedure similar in approach to that outlined for M&C. Products exposures (sales or receipts for most classes) were adjusted using Consumer Price Index data for Commodities, which was found to represent a mix of products reasonably approximating that found in Products Liability Insurance data. This finding was made by the GLAS (11) following a review of the distribution of Products Liability premium for each major CPI Commodities component: food, apparel, other non-durables, durables, and all other. Elimination of the "all other" category produced the following comparison:

	Food	Apparel	Other Non-Durables	Durables
CPI Commodities Index	37.9%	12.5%	24.0%	25.6%
ISO Products Data	38.9	7.3	18.6	35.1

The GLAS felt these two sets of weights were sufficiently similar to permit the use of an unadjusted CPI Commodities index to measure Products Liability exposure trend.

As mentioned earlier, an extensive revision to the classifications in the Products Liability Manual was introduced in 1974. The main reasons for this revision were:

1. To create classifications for many newly developed products for which no current classification existed, and
2. To refine many existing classifications which were considered to be too broad in scope in the existing liability climate.

This classification revision presented severe challenges to the ratemaking process since experience was available only for the prior classifications, which in many cases were significantly different than the new classes. A careful mapping of new and old class codes was performed, and as much of the historical data as possible was used in subsequent rate reviews. For the newly erected classifications, manual rates, which were judgmentally established in

most cases, were adjusted by the overall trend factors as experience was compiled under the new class definitions.

The ratemaking procedure discussed here only applies to manually rated classifications, which account for less than one-half the total monoline Products Liability premium volume. The remaining classifications are (a) rated, which means that the rate is judgmentally determined after the insurer evaluates the specific characteristics of the individual risk. While (a) rated classifications exist in every General Liability subline, they are of overall minor importance, except in the Products Liability subline. This is due to the extreme variation in Products Liability exposure that can be presented by two different manufacturers of the same product, and to variations in the relationship of current sales to sales in prior years. Given two manufacturers making the same durable product and having roughly the same volume of current sales, the insurer's exposure would be significantly different for a firm which had been making the product for 20 years than for a firm which had been manufacturing it only in recent years. This is because coverage is provided for all occurrences in the current policy year, regardless of when the product involved in the occurrence was manufactured.

With the heightened interest in Products Liability in recent years, the classification ratemaking procedure mentioned by Lange has been carefully studied. A revised procedure recently filed groups classifications by average pure premium and average claim size, within type of activity: manufacturing, contract construction, and wholesale and retail sales. The credibility procedure has also been revised to utilize a number of credibility tables, with the observed variation in loss ratio and claim severity determining the credibility table to be used; the former procedure used the 683 claim credibility standard for all classes.

Professional Liability

The rapid escalation in the cost and frequency of Professional Liability claims in the 1970's has made the Professional Liability sublines a more significant and much more visible piece of General Liability, so much so that they have been shown separately in the Annual Statement since 1975.

The overall rate level calculation procedure for the two major sublines, Hospitals, and Physicians, Surgeons and Dentists, was significantly revised by the GLAS in 1977 after careful study. It was first decided to change the basis of the rate level calculation from a 30%–70% weighting of the two latest policy years (which had been adopted from other General Liability sublines in the early 1970's) to an averaging of the three latest policy years. This was done to achieve greater stability in rate level indications.

The extreme lags between accident, report, and settlement dates for these sublines has long made the loss development procedure an extremely critical part of the ratemaking process. After analyzing loss development data by state, it became apparent to the GLAS that the use of countrywide loss development factors was inappropriate in many states. Since very few states had sufficient volume to allow using statewide loss development factors, each state was assigned to one of three groups of states for loss development purposes, based on the observed magnitude of the historical loss development factors. The general pattern of these groupings was such that the more urban, litigious states had the most significant loss development, while the more rural states showed very modest loss development. Examples of the relative magnitudes of development factors in these three groupings are shown in Exhibit 7.

The third major change was the shift to the policy year incurred severity trend procedure outlined earlier. The combined effect of these three changes has begun to result in more reasonable and stable rate level indications in many low credibility states.

There have been several other refinements made in each of the Professional Liability sublines; these are outlined below:

1. *Physicians, Surgeons, and Dentists:* Major expansions in classification codes were introduced in 1968 (mainly in the surgical area) and in 1976 (largely in the physicians area, where individual specialty codes were established) in order to provide a more precise measurement of insurance exposure. Dentists were incorporated into the overall Physicians and Surgeons review in 1976, in response to the extreme credibility problems that persisted for these classes. Dentists' rates are now related to the Physicians' rates in each state.
2. *Hospitals:* By 1973, the immunity status enjoyed by charitable hospitals, which was mentioned by Lange, had been overturned essentially in every state, either by legislative action or by judicial precedent. As a result, charitable hospitals' rates as well as for-profit hospitals' rates have been determined by state for some time.

   An additional revision to the Hospital Professional ratemaking procedure was introduced in 1975. Premiums generated by additional interests added to Hospital policies—employed doctors, nurses, technicians, maintenance employees, etc.—had become increasingly significant. As the loss potential for this coverage varied widely from hospital to hospital, the premium was (a) rated. Since all additional premiums were reported under one class code, with no exposure, the CCAS decided to

incorporate this experience into the review by increasing premium at present rates for manually rated classes by the percentage of total Hospital Professional premiums represented by additional interest premiums. This procedure is illustrated in Exhibit 8. Losses reported under the additional interest class code are also included in the review.

3. *Druggists:* Rates for Druggists have been established on a countrywide basis since 1975, as experience for the previous two groups of states indicated no significant difference between the two groups. In addition, the basis for determining premiums was changed. In the past premiums were determined based on receipts, if receipts were greater than $100,000 per year, or else on a flat charge basis. The flat charge approach was discontinued in 1975, as very few risks were being written on this basis.

Special Multi-peril Policy Program

The Commercial Risks Statistical Plan was introduced in 1969 to collect ratemaking data on commercial package policies. While time revealed a number of problems with its design, particularly with regard to individual classification data, liability experience collected under CRSP has been used since 1975 to review the package discounts from monoline rate levels.

CRSP data for each of ISO's SMP Programs in each state is reviewed, after premiums are adjusted to current monoline rate levels. After reflection of SMP expense requirements and the effect of using rating plans, an indicated package discount by program is calculated. This indicated discount is compared to the current discount factor and a revised package discount factor selected. An example of these calculations for the SMP Motel/Hotel program is shown in Exhibit 9. This procedure has allowed the ratemaking process to reflect the differences between monoline and package experience.

FUTURE CHALLENGES

It should be clear from the foregoing that Lange's concluding comment that "General Liability ratemaking procedures are in a constant state of flux" (12) has proven to be very true. While the changes discussed in this paper have certainly improved the accuracy of General Liability ratemaking procedures, there are still significant areas needing further research and study.

Probably the largest single challenge ahead is that presented by the future availability of monoline and package General Liability data in compatible detail, as provided by the Commercial Statistical Plan, which became effective January

1, 1979. While discussion has already begun on whether (and how) to use package liability data in monoline ratemaking, it seems reasonably evident at this point that a final decision will not, and probably should not, be made until actual CSP data is available for analysis. Since this decision will likely affect the manner in which Commercial Package Policies are rated, underwritten, and marketed in the 1980's, very careful consideration of all implications of the decision is vital.

A second area of major importance is the ratemaking implications of the proposed consolidation of the various General Liability sublines (excluding Products Liability) into one policy and one rate, with a single, uniform, inflation-sensitive exposure base for each area of operation. Preliminary work on various aspects of this project is still underway; if, however, this approach is implemented, the importance of pricing the consolidation accurately initially and adjusting current ratemaking procedures to review the consolidation cannot be overemphasized. The resultant elimination of sublines will reduce the credibility problems that exist today, since losses will have to be assigned only to a particular operation, rather than to a particular coverage for that operation. This problem has been particularly chronic for the Contractual and Owners' or Contractors' Protective sublines. Shifting to an inflation-sensitive exposure base has the obvious advantage of keeping premiums up-to-date without the necessity of frequent rate filings.

Other areas requiring further work include developing reports to review experience written on both occurrence and claims-made policy forms; this is most critical for the Professional Liability sublines. The outlined changes in the Professional Liability area, namely grouping states for loss development and reviewing the appropriateness of the 30%–70% weighting of the latest two policy years for all states, should also be evaluated for possible use in other sublines.

In the area of trend, possible use of econometric procedures should continue to be explored, in order to develop a more responsive measurement of expected changes in loss levels.

One thing is clear: General Liability ratemaking procedures will continue to change in the years to come.

NOTES AND REFERENCES

(1) J. T. Lange, "General Liability Insurance Ratemaking," *PCAS* LIII (1966), p. 26.

(2) R. S. Miccolis, "On the Theory of Increased Limits and Excess of Loss Pricing," *PCAS* LXIV (1977), p. 27.

(3) For a definition of "D-ratios," see R. Snader, "Fundamentals of Individual, Risk Rating and Related Topics," Casualty Actuarial Society 1981 Study Kit on Advanced Ratemaking.

(4) Based on results of ISO's "Special Call for General Liability Expenses Distributed by Size of Risk," December 30, 1975.

(5) For example, see J. A. Dooley, *Modern Tort Law—Liability and Litigation,* Vol. I–III (1977), especially Chapters 32 and 34; and W. L. Prosser, *Handbook of the Law of Torts* (1971), especially Chapters 14 and 17.

(6) R. J. Finger, "Estimating Pure Premiums by Layer—An Approach," *PCAS* LXIII (1976), p. 34.

(7) This section is adopted from ISO GLAS "White Paper" "General Liability Insurance Average Claim Severity Trending Procedure," contained in the minutes of the September 20, 1977 meeting, distributed on October 11, 1977. The author contributed to the writing of the original "White Paper."

(8) P. Benbrook, "The Advantages of Calendar-Accident Year Experience and Need for Appropriate Trend and Projection Factors in the Determination of Automobile Liability Rates," *PCAS* XLV (1958), p. 20.

(9) For the mathematical derivation of an exponential curve of best fit, see P. G. Hoel, *Introduction to Mathematical Statistics* (Fourth Edition), p. 87 or R. V. Hogg & A. T. Craig, *Introduction to Mathematical Statistics* (Fourth Edition), p. 105.

(10) A similar change was instituted for all lines of insurance under ISO jurisdiction at the same time.

(11) See pages 44–58 of the ISO GLAS agenda for the May 10–11, 1977 meeting, distributed on April 29, 1977.

(12) Lange, op. cit., p. 53.

APPENDIX

*Model Illustrating the Impact of a Rapid Increase in Claim Frequency on Calendar Year Average Paid Claim Cost**

Claim frequency has increased rapidly for Medical Professional Liability insurance since 1972. This analysis considers the impact of claim frequency changes on average paid claim cost.

We make the following assumptions:

1. Policy year average incurred claim cost increases at a constant annual percentage rate d.
2. Claim frequency is constant for most of the period used to compute trend factors. During the latter portion of this period, it increases rapidly. Assume this increase is due to an increase in claims rather than to a decrease in exposures.
3. The increment in claims in recent years has a claim size distribution similar to the one which would have been observed had claim frequency remained constant.

The increase in claim frequency during recent years should not affect policy year average incurred claim cost; if other conditions remain unchanged, policy year average incurred claim cost will continue to increase at the annual rate d.

As long as claim frequency is constant and settlement procedures remain unchanged, calendar year average paid claim cost will increase at rate d. When claim frequency increases, a disproportionately large number of small claims from this increment in claims will be included in the immediate evaluations of calendar year average paid claim cost data. The large claims will take time to settle and will be included in future evaluations of average paid claim cost data because smaller claims are settled more quickly than larger claims.

The fact that an unusually large number of small claims will be included quickly in the calendar year paid claim cost data will lead to smaller values of average paid claim cost than would have been calculated if claim frequency had remained constant. The slope of the average paid claim cost curve will decrease, leading to an indicated average annual change in average paid claim cost which is smaller than d. Since policy year average incurred claim cost is still increasing at a rate of d, use of calendar year paid claim cost data to calculate trend factors would produce an inadequate rate level.

* This model was presented to ISO's Commercial Casualty Actuarial Subcommittee in a mailing dated September 22, 1976 and was originally prepared by Robert Bear of ISO.

As an illustration of the problem cited above, assume that the policy year 1972 average incurred claim cost was $10,000. Assume that only the following two types of claims occur: small claims with incurred claim cost of $1,000 in 1972, and large claims with incurred claim cost of $20,000 in 1972. Incurred claim costs for both small and large claims are increasing at the constant rate of 10% per year. Assume the number of exposures remains constant throughout while the number of claims remains constant until 1974; in 1974, the number of claims increases 30%; the number of claims remains constant thereafter. Consequently, claim frequency is constant before 1974, increases 30% in 1974, and remains constant thereafter. Assume that small claims are settled immediately and that large claims take four years to settle; no loss development occurs. Finally, assume that the proportion of small and large claims remain constant from year to year.

Based on the 1972 average claim cost of $10,000, the proportion of large claims can be obtained by solving the following equation:

$$\$20{,}000\,X + (1 - X)\,1000 = 10{,}000$$
$$X = .474$$

Consequently, 47.4% of all claims occurring in any policy year are large claims and 52.6% are small claims.

Let C denote the total number of claims occurring in any year prior to 1974. The total paid loss in calendar year 1972 is obtained by adding the costs of small claims occurring in 1972 to the incurred costs of large claims occurring in 1968:

$$\begin{aligned}\text{Calendar year 1972 losses} &= \$1{,}000\,(.526C) + \$20{,}000\,(1.1)^{-4}\,(.474C)\\ &= \$526C + \$6474.97C\\ &= \$7000.97C\end{aligned}$$

Thus, the average paid claim cost in 1972 is $7,000.97.

The total paid claim cost for 1973 is obtained by adding the costs of small claims occurring in 1973 to the incurred costs of large claims occurring in 1969 (and settled in 1973):

$$\begin{aligned}\text{Calendar year 1973 losses} &= \$1100\,(.526C) + \$20{,}000\,(1.1)^{-3}\,(.474C)\\ &= \$7701.06C;\end{aligned}$$

the average paid claim cost for 1973 is $7701.06.

In policy year 1974, the total number of claims is $1.3C$. The total paid cost for calendar year 1974 is obtained by adding the costs of the .526 $(1.3C)$ small claims occurring in 1974 to the incurred costs of the $.474C$ large claims which occurred in 1970 and were settled in 1974:

$$\text{Calendar year 1974 losses} = \$1210\,(.526)\,(1.3C) + \$20{,}000\,(1.1)^{-2}\,(.474C)$$
$$= \$8{,}662.11C$$

The average paid claim cost for 1974 is $\$8{,}662.11C/1.1578C = \$7481.53$. While average paid claim cost increases 10% from calendar year 1972 to 1973, it decreases 2.9% from calendar year 1973 to 1974. This drop is due solely to the jump in claim frequency in 1974 which results in a disproportionately large number of small claims being included in the paid claim cost data of 1974.

Values for average paid claim cost for succeeding calendar years are calculated similarly and are given in the table below, along with the annual changes in average paid claim cost.

Calendar Year	Average Paid Claim Cost	Percentage Increase
1975	8,229.68	10.0%
1976	9,052.64	10.0
1977	9,957.91	10.0
1978	12,402.64	24.6
1979	13,642.91	10.0
1980	15,007.20	10.0

Notice that average paid claim cost increases 24.6% from 1977 to 1978 due to the impact of the large number of big claims incurred in 1974 which are settled in 1978. Note also that average paid claim cost increases from 1972 to 1980 by a factor of $(1.1)^8$. Hence, average paid claim cost increases at an average annual rate of 10% from 1972 to 1980. However, the jump in claim frequency in 1974 produces a decrease in average paid claim cost in 1974 and a large increase in average paid claim cost in 1978. If only average paid claim cost data through 1974 or 1975 were used to compute an average annual change in average paid claim cost, the result would be significantly smaller than 10%.

COUNTRYWIDE LOSS DEVELOPMENT

EXHIBIT 1

PHYSICIANS, SURGEONS & DENTISTS—PROFESSIONAL LIABILITY INSURANCE

Basic Limits Incurred Losses and Allocated Loss Adjustment Expense as of:

Policy Year Ending	27 Months	39 Months	51 Months	63 Months	75 Months	87 Months	99 Months	111 Months	123 Months	135 Months
12/31/66									14,515,504	14,725,212
12/31/67								17,834,379	18,304,244	18,379,627
12/31/68							21,070,637	21,682,255	21,981,105	22,236,520
12/31/69						24,409,798	25,079,556	25,271,738	25,067,665	
12/31/70					29,504,055	29,968,671	30,839,537	30,626,180		
12/31/71				37,693,694	37,329,634	38,096,613	37,222,908			
12/31/72			49,654,899	55,410,098	55,758,608	56,378,770				
12/31/73		55,642,854	67,215,009	71,322,486	71,466,950					
12/31/74	43,796,302	76,611,689	95,590,512	92,353,039						
12/31/75	55,543,924	91,469,239	103,138,770							
12/31/76	41,626,398	63,260,930								

Ratios

Policy Year Ending	39:27	51:39	63:51	75:63	87:75	99:87	111:99	123:111	135:123
12/31/66									1.014
12/31/67								1.026	1.004
12/31/68							1.029	1.014	1.012
12/31/69						1.027	1.008	.992	
12/31/70					1.016	1.029	.993		
12/31/71				.990	1.021	.977			
12/31/72			1.116	1.006	1.011				
12/31/73		1.208	1.061	1.002					
12/31/74	1.749	1.248	.966						
12/31/75	1.647	1.128							
12/31/76	1.520								
3 Year Mean	1.639	1.195	1.048	.999	1.016	1.011	1.010	1.011	1.010

Policy Year Ending	27 to 39	39 to 51	51 to 63	63 to 75	75 to 87	87 to 99	99 to 111	111 to 123	123 to 135	Factor
12/31/73					1.016	1.011	1.010	1.011	1.010	1.059
12/31/74				.999	1.016	1.011	1.010	1.011	1.010	1.058
12/31/75			1.048	.999	1.016	1.011	1.010	1.011	1.010	1.109
12/31/76		1.195	1.048	.999	1.016	1.011	1.010	1.011	1.010	1.325
12/31/77	1.639	1.195	1.048	.999	1.016	1.011	1.010	1.011	1.010	2.172

Source: Insurance Services Office; includes all reporting companies.

EXHIBIT 1
continued

COMPARISON OF COUNTRYWIDE LOSS DEVELOPMENT FACTORS

PHYSICIANS, SURGEONS & DENTISTS PROFESSIONAL LIABILITY INSURANCE

Interval	Development Factor	Interval	Development Factor
75 to 87	1.016	87 to 135	1.042
87 to 99	1.011	99 to 135	1.031
99 to 111	1.010	111 to 135	1.021
111 to 123	1.011	123 to 135	1.010

EXHIBIT 2

CALCULATION OF ANNUAL TREND FACTOR BASED ON AVERAGE PAID CLAIM COST DATA

GENERAL LIABILITY INSURANCE
PROFESSIONAL LIABILITY
BASIC LIMITS BODILY INJURY

(1)	(2)	(3)	(4)	(5)
			Average Paid Claim Cost	
Twelve Months Ended	$25,000 Basic Limits Paid Losses*	Number of Paid Claims	Actual (2) ÷ (3)	Exponential Curve of Best Fit
6/30/70	$26,132,901	6,780	$3,854	$4,020.78
12/31/70	29,271,828	7,067	4,142	4,149.37
6/30/71	31,650,272	7,537	4,199	4,282.07
12/31/71	32,746,397	7,354	4,453	4,419.01
6/30/72	34,684,486	7,367	4,708	4,560.33
12/31/72	38,736,177	8,135	4,762	4,706.18
6/30/73	44,783,802	8,958	4,999	4,856.68
12/31/73	50,130,236	9,475	5,291	5,012.00
6/30/74	55,000,735	10,183	5,401	5,172.29
9/30/74	58,759,022	11,139	5,275	5,254.34
12/31/74	63,290,907	12,316	5,139	5,337.70
3/31/75	65,740,318	13,133	5,006	5,422.38

Average Annual Paid Claim Cost Trend Factor
[$4,282.07 ÷ $4,020.78] 1.065

* Excluding all loss adjustment expense.

Source: Insurance Services Office; includes all reporting companies.

EXHIBIT 3
Part 1

COMPARISON OF AVERAGE ANNUAL TREND FACTORS PAID VS. INCURRED

GENERAL LIABILITY INSURANCE

Subline	Paid*	Incurred*	See Exhibit 3 Part
OL&T—Bodily Injury, Basic Limits	1.131	1.102	2
OL&T—Bodily Injury, Total Limits	1.159	1.124	—
OL&T—Property Damage, Basic Limits	—	1.108	3
M&C—Bodily Injury, Basic Limits	1.076	1.118	4
M&C—Bodily Injury, Total Limits	1.102	1.175	—
M&C—Property Damage, Basic Limits	1.109	1.093	5
M&C—Property Damage, Total Limits	1.119	1.103	—
General Liability excluding Products and Professional—Bodily Injury			
Basic Limits	1.147	—	6
Total Limits	1.186	—	—
General Liability—Property Damage			
Basic Limits	1.121	—	7
Total Limits	1.167	—	—

* Paid trend factors are based on an exponential least squares fit of the 12 quarterly year ended average paid claim cost data points through March 31, 1976. Incurred trend factors reflect a similar fit applied to the average ultimate incurred claim costs for policy years 1970–1974, evaluated as of March 31, 1975.

Source: Insurance Services Office

EXHIBIT 3
Part 2

CALCULATION OF ANNUAL TREND FACTOR BASED ON INCURRED CLAIM COST DATA

GENERAL LIABILITY INSURANCE
OWNERS, LANDLORDS & TENANTS
BASIC LIMITS BODILY INJURY

(1)	(2)	(3)	(4)	(5)
			Average Incurred Claim Cost	
Policy Year Ending	Basic Limits Incurred Losses*	Number of Incurred Claims**	Actual (2) ÷ (3)	Exponential Curve of Best Fit
12/31/70	$ 86,168,004	62,234	$1,385	$1,370.09
12/31/71	91,968,722	59,696	1,541	1,509.81
12/31/72	110,828,095	69,533	1,594	1,663.77
12/31/73	109,756,890	61,003	1,799	1,833.42
12/31/74	111,756,464	53,656	2,083	2,020.38

Average Annual Incurred Claim Cost Trend Factor
(2,020.38 ÷ 1,833.42) 1.102

* Including all loss adjustment expense and developed to an ultimate settlement basis.

** As of 39 months.

Source: Insurance Services Office

EXHIBIT 3
Part 3

CALCULATION OF ANNUAL TREND FACTOR BASED ON INCURRED CLAIM COST DATA

GENERAL LIABILITY INSURANCE
OWNERS, LANDLORDS & TENANTS
BASIC LIMITS PROPERTY DAMAGE

(1)	(2)	(3)	(4)	(5)
			Average Incurred Claim Cost	
Policy Year Ending	Basic Limits Incurred Losses*	Number of Incurred Claims**	Actual (2) ÷ (3)	Exponential Curve of Best Fit
12/31/70	$11,154,844	29,972	$372	$376.08
12/31/71	12,692,026	29,144	435	416.79
12/31/72	15,620,690	35,450	441	461.90
12/31/73	18,902,315	36,597	516	511.90
12/31/74	20,691,387	36,236	571	567.31

Average Annual Incurred Claim Cost Trend Factor
(567.31 ÷ 511.90) 1.108

* Including all loss adjustment expense and developed to an ultimate settlement basis.

** As of 39 months.

Source: Insurance Services Office

EXHIBIT 3
Part 4

CALCULATION OF ANNUAL TREND FACTOR BASED ON INCURRED CLAIM COST DATA

GENERAL LIABILITY INSURANCE
MANUFACTURERS AND CONTRACTORS
BASIC LIMITS BODILY INJURY

(1)	(2)	(3)	(4)	(5)
			Average Incurred Claim Cost	
Policy Year Ending	Basic Limits Incurred Losses*	Number of Incurred Claims**	Actual (2) ÷ (3)	Exponential Curve of Best Fit
12/31/70	$ 70,429,232	19,553	$3,602	$3,650.94
12/31/71	73,480,091	18,026	4,076	4,082.16
12/31/72	96,626,729	20,507	4,712	4,564.30
12/31/73	101,668,362	20,026	5,077	5,103.38
12/31/74	111,899,044	19,841	5,640	5,706.14

Average Annual Incurred Claim Cost Trend Factor
(5,706.14 ÷ 5,103.38) 1.118

* Including all loss adjustment expense and developed to an ultimate settlement basis.

** As of 39 months.

Source: Insurance Services Office

EXHIBIT 3
Part 5

CALCULATION OF ANNUAL TREND FACTOR BASED ON INCURRED CLAIM COST DATA

GENERAL LIABILITY INSURANCE
MANUFACTURERS AND CONTRACTORS
BASIC LIMITS PROPERTY DAMAGE

(1)	(2)	(3)	(4)	(5)
			Average Incurred Claim Cost	
Policy Year Ending	Basic Limits Incurred Losses*	Number of Incurred Claims**	Actual (2) ÷ (3)	Exponential Curve of Best Fit
12/31/70	$39,108,952	99,876	$392	$397.94
12/31/71	39,377,197	88,825	443	434.86
12/31/72	49,375,642	102,400	482	475.20
12/31/73	55,979,114	110,408	507	519.29
12/31/74	62,467,019	109,376	571	567.46

Average Annual Incurred Claim Cost Trend Factor
(567.46 ÷ 519.29) 1.093

* Including all loss adjustment expense and developed to an ultimate settlement basis.

** As of 39 months.

Source: Insurance Services Office

EXHIBIT 3
Part 6

CALCULATION OF ANNUAL TREND FACTOR BASED ON AVERAGE PAID CLAIM COST DATA

GENERAL LIABILITY INSURANCE
ALL SUBLINES COMBINED EXCLUDING PROFESSIONAL & PRODUCTS LIABILITY
BASIC LIMITS BODILY INJURY

(1)	(2)	(3)	(4)	(5)
			Average Paid Claim Cost	
Calendar Year Ending	$25,000 Basic Limits Paid Losses*	Number of Paid Claims	Actual (2) ÷ (3)	Exponential Curve of Best Fit
6/30/72	$218,785,402	170,590	$1,283	1,245.80
12/31/72	228,390,998	172,958	1,320	1,334.44
6/30/73	246,497,863	171,315	1,439	1,429.38
12/31/73	262,432,437	172,434	1,522	1,531.08
6/30/74	258,890,150	163,442	1,584	1,640.01
9/30/74	266,634,243	161,270	1,653	1,697.35
12/31/74	264,654,012	153,195	1,728	1,756.70
3/31/75	280,023,470	152,924	1,831	1,818.12
6/30/75	279,295,068	144,922	1,927	1,881.68
9/30/75	278,496,210	139,359	1,998	1,947.47
12/31/75	284,878,602	139,439	2,043	2,015.56
3/31/76	273,230,393	132,522	2,062	2,086.03

Average Annual Paid Claim Cost Trend Factor
(1429.38 ÷ 1245.80) 1.147

* Excluding all loss adjustment expense.

Source: Insurnace Services Office; includes all reporting companies.

EXHIBIT 3
Part 7

CALCULATION OF ANNUAL TREND FACTOR BASED ON AVERAGE PAID CLAIM COST DATA

GENERAL LIABILITY INSURANCE
ALL GENERAL LIABILITY SUBLINES
BASIC LIMITS PROPERTY DAMAGE

(1)	(2)	(3)	(4)	(5)
			Average Paid Claim Cost	
Calendar Year Ending	$25,000 Basic Limits Paid Losses*	Number of Paid Claims	Actual (2) ÷ (3)	Exponential Curve of Best Fit
6/30/72	$58,363,769	172,951	$337	330.51
12/31/72	62,715,239	178,270	352	349.90
6/30/73	65,786,611	180,767	364	370.42
12/31/73	75,846,823	197,276	384	392.15
6/30/74	81,688,134	198,132	412	415.16
9/30/74	83,660,568	196,596	426	427.16
12/31/74	84,083,615	190,021	442	439.51
3/31/75	86,187,381	189,820	454	452.22
6/30/75	84,569,339	180,688	468	465.30
9/30/75	80,774,492	167,576	482	478.75
12/31/75	77,123,228	155,584	496	492.59
3/31/76	74,060,660	146,952	504	506.83

Average Annual Paid Claim Cost Trend Factor
(370.42 ÷ 330.51) 1.121

* Excluding all loss adjustment expense.

Source: Insurnace Services Office; includes all reporting companies.

EXHIBIT 4

DEVELOPMENT OF STATEWIDE RATE LEVEL CHANGE

OWNERS, LANDLORDS AND TENANTS BODILY INJURY LIABILITY INSURANCE

PREMISES AND OPERATIONS (SUBLINE CODES 314 & 326)
CLASS GROUPS 1–13
MAINE (18)

(1) Policy Year Ending	(2) $25,000 Basic Limits Earned Premium at Present Rates	(3) $25,000 Basic Limits Incurred Losses*	(4) Number of Claims	(5) Loss and Loss Adjustment Ratio (3) ÷ (2)
12/31/76	$1,807,819	$1,586,273	302	.877
12/31/77	1,890,592	1,345,680	337	.712

(6) Weighted Loss and Loss Adjustment Ratio at Present Rates (30% of Policy Year Ended 12/31/76 and 70% of Policy Year Ended 12/31/77)	.762
(7) Expected Loss and Loss Adjustment Ratio	.570
(8) Credibility Based on Latest Two Years' Number of Claims	.90
(9) Indicated Rate Level Change {[(6) × (8)] + [(1.000 − (8)) × (7) × trend factor **]} ÷ (7)	1.314
(10) Selected Statewide Rate Level Change	+31.4%

* Including all loss adjustment expense and developed to an ultimate basis. In addition, policy year losses have been trended from the average date of coverage to one year beyond an anticipated effective date of August 1, 1979. Actual loss severity trend as measured in Exhibit 3, was applied exponentially to bring losses to an October 1, 1978 level. In anticipation of positive effects that might be brought about by the voluntary Anti-Inflation Program, a reduced trend factor was selected to exponentially project losses beyond this date.

** Trends the expected loss ratio from one year after the last review or filing effective date to one year beyond an anticipated effective date of August 1, 1979, again reducing the trend from October 1, 1978 in anticipation of effects of the Anti-Inflation Program.

Source: Insurance Services Office; includes all reporting companies.

EXHIBIT 5
Part 1

CALCULATION OF AVERAGE ANNUAL CHANGE IN WAGE LEVELS

MANUFACTURERS & CONTRACTORS LIABILITY INSURANCE

(1) Quarter Ending	(2) Manufacturing Production Actual*	(3) (2) × .181**	(4) Contract Construction Actual*	(5) (4) × .819**	(6) (3) + (5)	(7) Exponential Curve of Best Fit
6/30/76	205.75	37.24	279.97	229.30	266.54	266.64
9/30/76	211.33	38.25	289.50	237.10	275.35	270.70
12/31/76	217.45	39.36	294.83	241.47	280.83	274.82
3/31/77	218.53	39.55	283.55	232.23	271.78	279.00
6/30/77	226.57	41.01	294.08	240.85	281.86	283.25
9/30/77	231.04	41.82	300.89	246.43	288.25	287.56
12/31/77	239.23	43.30	301.95	247.30	290.60	291.94
3/31/78	237.74	43.03	289.34	236.97	280.00	296.38
6/30/78	246.04	44.53	315.84	258.67	303.20	300.89
9/30/78	251.04	45.44	330.93	271.03	316.47	305.47
12/31/78	261.80	47.39	330.41	270.61	318.00	310.12
3/31/79	262.76	47.56	320.16	262.21	309.77	314.84

Average yearly change 1.062

* Source: *Monthly Labor Review* & Bureau of Labor Statistics

** Weights obtained from total collected premium.

Source: Insurance Services Office

EXHIBIT 5
Part 2

CALCULATION OF ANNUAL WAGE OFFSET FACTOR

MANUFACTURERS & CONTRACTORS LIABILITY

(1) Average wage level

Policy Year Ending	Average Wage Level*
12/31/73	216.24
12/31/74	229.73
12/31/75	244.29
12/31/76	261.36
12/31/77	276.92

(2) Average value as of 2/15/79** = 309.77 { 1/79 = 301.01; 2/79 = 308.66; 3/79 = 319.65 }

(3) Indexing of policy year 1972-1976 to current (2/15/79) level

Policy Year Ending	Index (2) ÷ (1)
12/31/73	1.433
12/31/74	1.348
12/31/75	1.268
12/31/76	1.185
12/31/77	1.119

(4) Premium Trend: Trend from policy year to one year beyond anticipated effective date of 2/1/80.

Policy Year Ending	Premium Trend
12/31/73	$1.433 \times (1.062)^{1.958} = 1.612$
12/31/74	$1.348 \times (1.062)^{1.958} = 1.516$
12/31/75	$1.268 \times (1.062)^{1.958} = 1.426$
12/31/76	$1.185 \times (1.062)^{1.958} = 1.333$
12/31/77	$1.119 \times (1.062)^{1.958} = 1.259$

* Source: Bureau of Labor Statistics

** Source: *Monthly Labor Review*

EXHIBIT 6

DETERMINATION OF UNLIMITED PAYROLL OFFSET FACTORS SPECIAL STUDY FOR POLICY YEAR 1-1-70 TO 12-31-70 LOUISIANA*

Code No.	(1) Exec. Officer Payroll	(2) No. of Officers	(3) Other Payroll	(4) Total Payroll Above Limitation	(5) Payroll Subject to Limitation	(6) Offset (5) ÷ [(4) + (5)]
0005	11,707	1	40,077	51,784	2,158,006	.977
0006	71,729	117	380,997	452,726	12,039,809	.964
0008	0	0	0	0	76,730	1.000
0030	18,194	3	208,895	227,089	8,785,275	.975
0034	8,675	3	76,152	84,827	1,376,063	.942
0035	23,280	3	23,989	47,269	264,066	.848
0042	13,517	2	159,696	173,213	1,822,110	.913
0050	0	0	10,731	10,731	210,837	.952
0059	0	0	5,793	5,793	294,374	.981
0106	12,600	1	41,887	54,487	1,024,188	.949
0251	14,800	2	57,935	72,735	677,048	.903
0400	0	0	66,947	66,947	347,700	.839
0401	0	0	26,946	26,946	758,874	.966
1164	0	0	168,706	168,706	646,817	.793
1320	34,410	5	5,036,097	5,070,507	12,191,513	.706
1322	114,703	9	1,878,835	1,993,538	3,535,564	.639
1430	0	0	2,140	2,140	24,974	.921
1452	0	0	17,645	17,645	114,098	.866
1463	0	0	301,778	301,778	1,043,563	.776
1473	0	0	16,962	16,962	175,190	.912
1624	0	0	3,177	3,177	177,716	.982
1642	0	0	39,259	39,259	81,391	.675
1701	0	0	33,187	33,187	34,774	.512
1703	0	0	0	0	29,783	1.000
1803	4,880	1	34,204	39,084	208,725	.842
1852	0	0	0	0	2,099,743	1.000
2001	0	0	25,826	25,826	229,667	.899
2002	0	0	54,126	54,126	436,812	.890
2003	147,265	19	5,692,519	5,839,784	11,047,536	.654
2014	58,500	4	352,842	411,342	2,870,271	.875
2021	0	0	1,421,772	1,421,772	3,159,213	.690
2022	86,994	9	1,333,643	1,420,637	6,521,614	.821
2039	50,700	5	504,647	555,347	1,610,256	.744
2041	16,800	3	68,856	85,656	1,338,650	.940
2065	0	0	3,425	3,425	37,999	.917
2070	42,027	4	1,848,092	1,890,119	5,977,108	.760
2081	0	0	270,936	270,936	1,011,983	.789
2089	51,773	3	88,641	140,414	1,497,740	.914
2095	24,500	2	642,933	667,433	1,978,314	.748
2105	0	0	0	0	21,635	1.000

* Excerpted from the National Council on Compensation Insurance's 12/31/75 filing of Item B-1094, Amendment of Payroll Limitation Rules in Louisiana.

EXHIBIT 7
Part 1

PROFESSIONAL LIABILITY INSURANCE LOSS DEVELOPMENT

PHYSICIANS, SURGEONS & DENTISTS
(STATES WITH LOW DEVELOPMENT)*

Basic Limits Incurred Losses and Allocated Loss Adjustment Expense as of:

Policy Year Ending	27 Months	39 Months	51 Months	63 Months	75 Months	87 Months	99 Months	111 Months	123 Months	135 Months
12/31/66						2,592,268	2,544,709	2,652,294	2,172,096	2,802,493
12/31/67					3,333,501	3,224,645	3,050,345	3,135,806	3,115,082	3,104,573
12/31/68				3,866,465	3,471,905	3,489,057	3,551,015	3,701,025	3,571,544	3,715,976
12/31/69			5,320,458	4,943,169	5,340,481	4,702,429	4,694,296	4,496,450	4,464,224	
12/31/70		6,106,561	6,774,965	6,784,410	6,179,470	5,931,344	5,696,357	5,929,706		
12/31/71	4,063,318	6,237,693	6,615,069	6,914,608	6,242,609	5,961,564	5,767,401			
12/31/72	6,082,197	10,075,310	10,752,535	10,520,629	9,854,569	10,206,054				
12/31/73	8,271,300	13,383,111	13,190,027	12,603,632	12,043,135					
12/31/74	11,841,959	18,209,291	19,013,225	17,106,396						
12/31/75	13,394,160	19,126,309	20,261,954							
12/31/76	7,456,558	11,306,954								

Ratios

Policy Year Ending	39:27	51:39	63:51	75:63	87:75	99:87	111:99	123:111	135:123
12/31/66						.982	1.042	1.023	1.033
12/31/67					.967	.946	1.028	.993	.997
12/31/68				.898	1.005	1.018	1.042	.965	1.040
12/31/69			.929	1.080	.881	.998	.958	.993	
12/31/70		1.109	1.001	.911	.960	.960	1.041		
12/31/71	1.535	1.060	1.045	.903	.955	.967			
12/31/72	1.657	1.067	.978	.937	1.036				
12/31/73	1.618	.986	.956	.956					
12/31/74	1.538	1.044	.900						
12/31/75	1.428	1.059							
12/31/76	1.516								
3 Year Mean	1.494	1.030	.945	.932	.984	.975	1.014	.984	1.023

Policy Year Ending	27 to 39	39 to 51	51 to 63	63 to 75	75 to 87	87 to 99	99 to 111	111 to 123	123 to 135	Factor
12/31/73					.984	.975	1.014	.984	1.023	.979
12/31/74				.932	.984	.975	1.014	.984	1.023	.913
12/31/75			.945	.932	.984	.975	1.014	.984	1.023	.862
12/31/76		1.030	.945	.932	.984	.975	1.014	.984	1.023	.888
12/31/77	1.494	1.030	.945	.932	.984	.975	1.014	.984	1.023	1.327

* Ala., Ark., Ga., Ky., La., Minn., N.C., Ohio, Tenn., Va.

Source: Insurance Services Office; includes all reporting companies.

PROFESSIONAL LIABILITY INSURANCE LOSS DEVELOPMENT

PHYSICIANS, SURGEONS & DENTISTS
(STATES WITH MEDIUM DEVELOPMENT)*

Basic Limits Incurred Losses and Allocated Loss Adjustment Expense as of:

Policy Year Ending	27 Months	39 Months	51 Months	63 Months	75 Months	87 Months	99 Months	111 Months	123 Months	135 Months
12/31/66								4,965,395	4,914,066	4,970,428
12/31/67							6,042,997	6,269,797	6,436,210	6,333,321
12/31/68						7,546,617	7,773,144	7,845,349	7,916,681	7,970,198
12/31/69					8,533,546	9,021,410	9,234,803	9,087,059	9,125,212	
12/31/70				11,876,021	11,926,614	12,091,332	12,112,319	11,849,339		
12/31/71			15,023,441	15,960,740	15,742,204	15,563,035	15,525,421			
12/31/72		16,689,188	19,323,468	20,958,091	20,162,830	20,225,194				
12/31/73	12,675,832	20,811,842	26,018,108	25,577,158	26,216,658					
12/31/74	17,004,356	28,203,997	32,570,027	30,943,126						
12/31/75	21,946,572	32,632,978	35,844,172							
12/31/76	16,002,535	22,036,198								

Ratios

Policy Year Ending	39:27	51:39	63:51	75:63	87:75	99:87	111:99	123:111	135:123
12/31/66								.990	1.011
12/31/67							1.038	1.027	.984
12/31/68						1.030	1.009	1.009	1.007
12/31/69					1.057	1.024	.984	1.004	
12/31/70				1.004	1.014	1.002	.978		
12/31/71			1.062	.986	.989	.998			
12/31/72		1.158	1.085	.962	1.003				
12/31/73	1.642	1.250	.983	1.025					
12/31/74	1.659	1.155	.950						
12/31/75	1.487	1.098							
12/31/76	1.377								
3 Year Mean	1.508	1.168	1.006	.991	1.002	1.008	.990	1.013	1.001

Policy Year Ending	27 to 39	39 to 51	51 to 63	63 to 75	75 to 87	87 to 99	99 to 111	111 to 123	123 to 135	Factor
12/31/73					1.002	1.008	.990	1.013	1.001	1.014
12/31/74				.991	1.002	1.008	.990	1.013	1.001	1.005
12/31/75			1.006	.991	1.002	1.008	.990	1.013	1.001	1.011
12/31/76		1.168	1.006	.991	1.002	1.008	.990	1.013	1.001	1.181
12/31/77	1.508	1.168	1.006	.991	1.002	1.008	.990	1.013	1.001	1.780

* Colo., Dela., D.C., Fla., Ida., Ind., Iowa, Kans., Md., Miss., Mo., Mont., Neb., Nev., N.M., N.D., Okla., Ore., S.C., S.D., Tex., Utah, W.V., Wisc., Wyo., Haw., Alas., P.R.

Source: Insurance Services Office; includes all reporting companies.

EXHIBIT 7
Part 3

PROFESSIONAL LIABILITY INSURANCE LOSS DEVELOPMENT

PHYSICIANS, SURGEONS & DENTISTS
(STATES WITH HIGH DEVELOPMENT)*

Basic Limits Incurred Losses and Allocated Loss Adjustment Expense as of:

Policy Year Ending	27 Months	39 Months	51 Months	63 Months	75 Months	87 Months	99 Months	111 Months	123 Months	135 Months
12/31/66						6,267,160	6,648,473	6,703,874	6,889,342	6,952,291
12/31/67					7,596,832	7,984,313	8,271,555	8,428,776	8,752,952	8,941,733
12/31/68				8,416,766	8,808,923	9,440,258	9,746,478	10,135,881	10,492,880	10,550,346
12/31/69			8,746,086	10,169,826	10,899,551	10,685,959	11,150,457	11,688,229	11,478,229	
12/31/70		6,949,289	9,987,193	11,469,442	11,397,971	11,945,995	13,030,861	12,847,135		
12/31/71	4,608,189	8,963,200	13,304,111	14,818,346	15,344,821	16,572,014	15,930,086			
12/31/72	5,791,857	12,855,942	19,578,896	23,931,378	25,741,209	25,947,522				
12/31/73	10,021,758	21,447,901	28,006,874	33,141,696	33,207,157					
12/31/74	14,949,987	30,198,401	44,007,260	44,303,517						
12/31/75	20,203,192	39,709,952	47,032,644							
12/31/76	18,167,305	29,917,778								

Ratios

Policy Year Ending	39:27	51:39	63:51	75:63	87:75	99:87	111:99	123:111	135:123
12/31/66						1.061	1.008	1.028	1.009
12/31/67					1.051	1.036	1.019	1.038	1.022
12/31/68				1.047	1.072	1.032	1.040	1.035	1.005
12/31/69			1.163	1.072	.980	1.043	1.048	.982	
12/31/70		1.437	1.148	.994	1.048	1.091	.986		
12/31/71	1.945	1.484	1.114	1.036	1.080	.961			
12/31/72	2.220	1.523	1.222	1.076	1.008				
12/31/73	2.140	1.306	1.183	1.002					
12/31/74	2.020	1.457	1.007						
12/31/75	1.966	1.184							
12/31/76	1.647								
3 Year Mean	1.878	1.316	1.137	1.038	1.045	1.032	1.025	1.018	1.012

Policy Year Ending	27 to 39	39 to 51	51 to 63	63 to 75	75 to 87	87 to 99	99 to 111	111 to 123	123 to 135	Factor
12/31/73					1.045	1.032	1.025	1.018	1.012	1.139
12/31/74				1.038	1.045	1.032	1.025	1.018	1.012	1.182
12/31/75			1.137	1.038	1.045	1.032	1.025	1.018	1.012	1.344
12/31/76		1.316	1.137	1.038	1.045	1.032	1.025	1.018	1.012	1.769
12/31/77	1.878	1.316	1.137	1.038	1.045	1.032	1.025	1.018	1.012	3.322

* Ariz., Calif., Conn., Ill., Me., Mass., Mich., N.H., N.J., N.Y., Pa., R.I., Vt., Wash.

Source: Insurance Services Office; includes all reporting companies.

EXHIBIT 8

DEVELOPMENT OF PREMIUM AT PRESENT RATES
(INCLUDING ADDITIONAL INTERESTS)

HOSPITAL PROFESSIONAL LIABILITY INSURANCE
NEW JERSEY

(1) Policy Year	(2) Additional Interests Collected Premium	(3) Collected Premiums For Rated Classes	(4) Ratio (2) ÷ (3)
1974	$ 339,130	$ 1,619,212	.209
1975	466,527	2,161,940	.216
1976	950,267	6,662,552	.143
Total	$1,755,924	$10,443,704	.168

(1) Policy Year	(5) $25/75 Premium at Present Rates—Rated Classes	(6) Additional Interest Factor	(7) $25/75 Premium at Present Rates—All Classes (5) × (6)
1974	$5,783,630	1.143	$6,610,689
1975	7,797,548	1.143	8,912,597
1976	3,670,085*	1.143	4,194,907

* Mostly claims-made experience.

Source: Insurance Services Office

EXHIBIT 9

CALCULATION OF REVISED SMP PACKAGE PROGRAM DISCOUNTS

SMP POLICY PROGRAM
MOTEL/HOTEL PROGRAM
INDIANA

Line of Business	(1) Adjusted SMP Loss and Loss Adjustment Ratio	(2) 1977 Adjusted Earned Premium Weight*
Fire	0.186	.461
Extended Coverage	0.593	.055
Casualty Other Than Automobile	1.091	.484
(3) Weighted Total SMP Program Loss and Loss Adjustment Ratio: Total ((1) × (2))		0.646
(4) Current Program Discount Complement		0.80
(5) Expected Loss and Loss Adjustment Ratio		0.570
(6) Revised SMP Package Program Discount 1.00 − ((3) × (4)/(5))		9.3%
(7) Factor to Adjust For Use of Rating Plans		0.92
(8) Revised Discount Including Rating Plan Effects 1.00 − [(7) × (1.00 − (6))]		16.6%
(9) Selected SMP Package Program Discount		15.0%

* Statewide

Source: Insurance Services Office