TITLE: ADJUSTING INCURRED LOSSES FOR SIMULTANEOUS SHIFTS IN PAYMENT PATTERNS AND CASE RESERVE ADEQUACY LEVELS

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ABSTRACT: This paper presents how 1) changes in payment patterns affect both the incurred development projection and the paid development projection, 2) how changes in payment patterns can mask or falsely imply changes in case reserve adequacy levels, and 3) how to test, analyze and correct for these changes.

Introduction and Background

The actuarial literature often describes the traditional loss reserving methodologies of paid and reported incurred development techniques. In doing so, the assumptions underlying each of these methods are discussed. The paid development technique is based on the assumption of consistency in settlement patterns, while the reported incurred development technique is based on consistency in claim count reporting, and case reserve adequacy levels.

A paper by Messrs. Berquist and Sherman* describes how to perform adjustments on each of these actuarial techniques, to the extent that the assumptions of the methods are not met. Their paper describes how to adjust the paid development technique for a change in the claim settlement pattern and how to adjust the incurred development technique for changes in the case reserve adequacy levels.

OBJECTIVES

Our objectives of this paper are as follows:

1) To clearly make the point that a change in claim settlement pattern does affect the incurred development technique in addition to the paid development technique.

2) To propose a method to adjust incurred losses for changes in settlement patterns so that the incurred development technique will not be affected.

*Berquist, J.R. and Sherman, R.E., "Loss Reserve Adequacy Testing: A Comprehensive, Systematic Approach", PCAS, Vol. CXIV, 1977, P. 123-184.

3) To describe how a change in settlement patterns can mask or falsely imply changes in case reserve adequacy levels.

4) To show how our proposed adjustment of incurred losses will allow a proper check for changes in case reserve adequacy levels.

ASSUMPTIONS AND DATA

For purposes of this paper and all of its data adjustments we assume that the claim count reporting pattern is consistent from year to year.

We simulated data for this paper. The details are contained in the Appendix. The data items that we used are as follows:

- accident year triangulation of reported incurred losses (Exhibit 1, Sheet 1),
- accident year triangulation of paid losses on closed claims (Exhibit 1, Sheet 2),
- accident year triangulation of reported claim counts (Exhibit 1, Sheet 3),
- accident year triangulation of closed claim counts (Exhibit 1, Sheet 4).

Exhibit 1, Sheet 5 shows the claim reporting ratios for this data. Looking down the columns we see that the claim reporting pattern is not changing over time.

TRADITIONAL RESERVE STUDY

Without going into much detail on the traditional projection methods, we estimated ultimate losses separately on an incurred development basis and a paid development basis. These estimates are shown on Exhibit 2 and are based on developing data from Exhibit 1, Sheets 1 and 2. These methods produce estimates of $134.2 million and $188.7 million. It is our intention to try to examine this difference, and subsequently reduce it.

SUMMARY OF BERQUIST AND SHERMAN'S METHODS

Exhibit 3 shows the claim closing ratios for this data. In examining this data, we observe that the claim closing ratios are changing over time, in particular they are speeding up.

Berquist and Sherman recommend the following steps to adjust the paid data to reduce the effect of changing claim closing ratios on paid development projections:

1) Identify a mathematical curve which closely approximates the relationship between the cumulative number of closed claims and the cumulative paid losses.

2) Select a claims closing ratio pattern which represents the pattern along the current diagonal.

3) Use the claim closing ratios and the projected ultimate number of claims to obtain the number of cumulative closed claims which would be equivalent to the indicated claims

closing ratio for that year of development and accident year.

4) Use the mathematical curve in item (1) and the indicated claims in item (3) to interpolate in the cumulative paid losses triangle to obtain the adjusted cumulative paid losses.

These adjusted estimates of cumulative paid losses may then be analyzed by various loss development methods.

Exhibit 4 shows the average outstanding values implied by the original data prior to any adjustments. Looking down the columns we see that the average outstanding values are increasing. There appears to be a larger than usual jump in the average outstanding between the last two diagonals which might imply a strenghtening in claim reserves. If this were the case, then an adjustment in average outstanding would be called for.

Berquist and Sherman recommended adjusting the incurred losses for unusual changes in outstanding as follows:

1) Start with the average outstandings on the latest diagonal.

2) Select a trend rate based on separate information.

3) "Detrend" the average outstandings up each column.

4) Multiply these "detrended" average outstandings times the number of outstanding claims to reconstruct outstanding dollars.

5) Add the reconstructed outstanding dollars to the paid dollars to get incurred dollars.

The incurred dollar adjustment method described above does not address the question of whether the outstanding dollars should also be adjusted for changes in claim closing patterns prior to reviewing changes in average case reserves.

PROPOSED METHODS

We have noticed that the underlying factors which affect claim settlement rates will sometimes also produce changes in the average case reserve adequacy levels. It seems reasonable to us that the claim reserve associated with a claim is a function of the time remaining to settlement. Specifically, as the claims get closer to settlement, the reserve carried on the claim should be closer to the ultimate settlement value which in most cases is higher than the prior case reserve. Because of this relationship, if the payment pattern is changing over time the incurred losses at a particular maturity period should also change, because at time of settlement you will recognize this development.

When a claim is outstanding, the incurred value equals the outstanding value. When a claim settles, the incurred values equal the paid value which, more often than not, is different than the outstanding value (incurred development). Thus, a speed up in settlement causes a speed up in incurred development.

Suppose we use the proposed method by Berquist and Sherman to adjust paid losses. One possible adjustment to incurred losses to reflect changes in payment patterns is to take the outstanding losses that existed at the maturity point in time from which the adjusted paid losses were taken. As an example, suppose we were taking losses from the second evaluation point in the paid loss adjustment. We could take the outstanding losses that existed at the second evaluation point and shift them to the same "new" point that the paid losses are being shifted to. This process of shifting both paid and outstanding losses is equivalent to shifting incurred losses according to the change in the payment pattern.

In short, what this says is that while a claim is outstanding the incurred value equals the outstanding value. At the time of settlement the incurred value equals the paid value. Since more often that not, the paid value will be different than the earlier outstanding value, the effect of settlement is to cause incurred development. Thus the effect of changes in settlement is to cause change in the incurred development pattern.

One reason why this first suggestion would not work is that it violates our assumption that the reporting pattern of claims is constant. By shifting incurred losses in time, we are implicitly changing the reporting pattern of claims. If we are shifting back in time, not all outstanding losses can be shifted. In particular, if we are shifting back one year, only those claims that were reported at the prior year can be moved back. If we are shifting forward in time, all outstanding losses can be shifted plus more, since new claims will be reported.

What must be done is to shift a portion of the outstanding losses. This is the method we propose.

In order to calculate the appropriate percentage of outstanding losses to shift, we use the adjusted outstanding claims that are implied from the paid loss adjustment. Since we assume that the reporting pattern of claims is unchanged, the adjusted outstanding claims are equal to the original unchanged reported claims minus the adjustment paid claims. We use these adjusted outstanding claims divided by actual outstanding claims at the point in time that we are adjusting from, to calculate an appropriate percentage of outstanding losses that may then be shifted.

As an example, suppose that we have used the Berquist and Sherman paid adjustment method to shift paid claims and paid losses from the fourth evaluation point of an accident year to the third evaluation point of an accident year. In order to calculate adjusted incurred losses, we would like to shift a portion of the outstanding losses from the fourth evaluation point to the third evaluation point. Specifically, suppose we have the following data for a particular accident year:

		Third Evaluation	Fourth Evaluation
1.	Reported Claims	15	20
2.	Original Paid Claims	10	12
3.	Original Outstanding Claims (1)-(2)	5	8
4.	Adjusted Paid Claims	12	16
5.	Outstanding Claims Implied by Adjustment (1)-(4)	3	4

In this example, we are shifting data from the fourth evaluation point to the third evaluation point. After the adjustment to the paid data, we have 3 outstanding claims at the third evaluation point but we cannot shift all the outstanding losses because:

1) not all 8 claims were reported at the third evaluation point

2) by shifting all the outstanding losses we would violate the assumption that the reporting pattern of claims is constant.

We propose shifting 37.5% (3/8) of the outstanding losses.

Exhibit 5, Sheet 1 shows the adjusted claim closing triangle. This triangle was adjusted using the methods of Berquist and Sherman. The claim closing pattern on the last diagonal in Exhibit 3, was assumed to be the pattern that will continue into the future. Using this pattern the projected ultimate claims were spread back to the different evaluation points for each accident year.

Exhibit 5, Sheet 2 showns the adjusted paid losses. These paid losses were adjusted using the method of Berquist and Sherman. An exponential curve was assumed to represent the relationship between the paid losses and the paid claims for all evaluation points except 12 months where we used a linear relationship.

On Exhibit 5, Sheet 3 are shown the adjusted incurred losses. These losses were adjusted by using our proposed method. This is the critical part of the analysis.

In our proposed method we take a percentage of the outstanding losses that exist at the same point in time as the paid losses that we are shifting.

In order to determine the outstanding losses we calculated the incurred losses that existed at the same point in time as the shifted paid losses and then subtracted the two. In order to determine the proper amount of incurred losses, we developed a relationship between paid claims and incurred losses. For this example we used an exponential curve for all evaluation points except 12 months where we used a linear relationship. In certain cases the following curve provided a better fit than an exponential relationship:

$$\text{Incurred losses at time t} = \frac{a}{(\text{ultimate claims} - \underset{\text{at time t}}{\text{paid claims}})^{b}}$$
$$+1$$

We also need a relationship between incurred claims and paid claims so that we can determine the number of original outstanding claims that exist at the point in time that we are shifting the paid dollars from. For this example, we used a linear relationship.

Exhibit 5, Sheet 4 shows the average outstanding losses after the adjustment. By comparing this exhibit to Exhibit 4, we see that although the average outstandings are still increasing, the jump in average outstandings between the last two diagonals has been reduced. As stated in the appendix, this data does not have a change in reserving methods. However, the data was created so that large claims close later than smaller claims. Exhibit 4 gives the impression that case reserves have been strengthened not because of a change in reserving methods but because of the change in the payment pattern. If more claims are closing at a particular evaluation point than had been closing in the past, the average outstanding claim at that evaluation point will be higher than it use to be. This gives the false impression of claim reserve strengthening. Conversely, a slow down in claim payments would give the impression of claim reserve weakening.

We think that the adjusted average outstandings on Exhibit 5, Sheet 4 give a better insight into whether average case reserves have been strengthened or not. We also think that a decision to adjust outstanding losses to take into account changes in claim reserve adequacy can be better based on this information.

On Exhibit 6, we see a comparison of the projections using the different data and the different methods. Also on Exhibit 6 are the ultimate values produced from the simulation. Both the traditional paid projection and the traditional incurred projection are distorted by the change in payment pattern. The adjusted paid projection is reduced as we would expect based on the work of Berquist and Sherman. The adjusted incurred projection is also reduced in this example and gives a better estimate of what the actual ultimates will be than the traditional incurred projection. In addition, the adjusted incurred projection yields better information on whether claim reserve adequacy is changing.

CLOSING WORDS

Although the adjusted incurred projection gives a better insight into the operations of a company and its claim reserving practices, it is not a substitute for meeting with the company personnel responsible for establishing case reserves and discussing with them any changes in reserving practices. We also feel that is is important to meet with the management of the company and discuss any changes in the operations of the company that may have an affect on the claim reserving practice.

As for the method, we feel that it is a first step. Given the particular situation, additional adjustments may be made to reflect such things as higher cost of IBNR claims relative to known claims, impact of retention changes, and different relationships between losses and claims. In addition, we plan to consider the issue of using different rates per column to detrend the average case outstandings. We look forward to further work in refining these techniques.

Appendix

Discussion of Simulating the Unadjusted Data

The unadjusted data shown in Exhibit 1, Sheets 1-4 in this paper was simulated in order to (1) make the changes in closing patterns large and (2) to insure that reserving practices were not changing.

For each year, 400 claims were used. The following was done for each claim:

1) A report date was chosen. The probabilities of reporting in a particular year are shown below.

Report Year	1	2	3
Probability	60%	20%	20%

2) A closing date was chosen. The probabilities of closing in a particular year after the report year are shown below

Years following Report	0	1	2	3
Probability	40%	20%	20%	20%

3) A claim severity was chosen. The claim severity was generated using a lognormal model with coefficient of variation of 1. The average claim severity used for 1980 was $25,000 plus an additional $10,000 times closing year minus accident year. These values were increased 5.0% for each year beyond 1980. No policy limit was used.

In its report year, the claim is established at 75% of its ultimate value. No additional reserve changes are made.

Once all the claim values were established, the claims scheduled to close in calendar year 1986 were shifted into 1985 to create a speed up in closings.

EXHIBIT 1
SHEET 1

SIMULATED DATA COMPANY

CUMULATIVE INCURRED LOSSES UNADJUSTED DATA

ACCIDENT PERIOD ENDING	12	24	36	48	60	72
	MONTHS OF DEVELOPMENT					
12/80	7908560	10298237	15550043	16743522	17244840	17517279
12/81	7639975	11986067	17106918	18482593	19372157	
12/82	7165222	10744170	16386562	18334939		
12/83	7074279	11590898	19828855			
12/84	10177806	15181616				
12/85	9902402					

DEVELOPMENT FACTORS:

12/80	1.3022	1.5100	1.0768	1.0299	1.0158	
12/81	1.5689	1.4272	1.0804	1.0481		
12/82	1.4995	1.5252	1.1189			
12/83	1.6385	1.7107				
12/84	1.4916					
1	1.5483	1.5528	1.0935	1.0395	1.0158	
2	1.5483	1.5528	1.0935	1.0395	1.0158	1.0000
3	2.7761	1.7930	1.1547	1.0559	1.0158	1.0000
4	80	81	82	83	84	85
	17517279	19678203	19360533	22896171	27221269	27490368

1. = 4 - RATIO OF COLUMN SUMS
2. = SELECTED FACTORS AND SELECTED TAIL
3. = CUMULATIVE FACTORS
4. = PROJECTED ULTIMATES

SIMULATED DATA COMPANY

CUMULATIVE PAID LOSSES UNADJUSTED DATA

ACCIDENT PERIOD ENDING	12	24	36	48	60	72
			MONTHS OF DEVELOPMENT			
12/80	2255214	4536050	9648334	14422250	16427525	17517279
12/81	2191591	5316953	10311200	15813903	19372157	
12/82	2442865	5713388	9752580	17546087		
12/83	2842779	5840578	15724222			
12/84	3384853	10138937				
12/85	4793334					

DEVELOPMENT FACTORS:

12/80	2.0114	2.1270	1.4948	1.1390	1.0663	
12/81	2.4261	1.9393	1.5337	1.2250		
12/82	2.3388	1.7070	1.7991			
12/83	2.0545	2.6922				
12/84	2.9954					

1	2.4738	2.1372	1.6200	1.1843	1.0663	
2	2.4738	2.1372	1.6200	1.1843	1.0663	1.0000
3	10.8165	4.3724	2.0458	1.2628	1.0663	1.0000
4	80	81	82	83	84	85
	17517279	20657249	22158050	32168846	44331389	51847331

1. = 4 - RATIO OF COLUMN SUMS
2. = SELECTED FACTORS AND SELECTED TAIL
3. = CUMULATIVE FACTORS
4. = PROJECTED ULTIMATES

SIMULATED DATA COMPANY

CUMULATIVE REPORTED CLAIMS UNADJUSTED DATA

ACCIDENT PERIOD ENDING	MONTHS OF DEVELOPMENT 12	24	36	48	60	72
12/80	253	312	400	400	400	400
12/81	231	315	400	400	400	
12/82	231	312	400	400		
12/83	217	305	400			
12/84	242	325				
12/85	233					

DEVELOPMENT FACTORS:

12/80	1.2332	1.2821	1.0000	1.0000	1.0000	
12/81	1.3636	1.2698	1.0000	1.0000		
12/82	1.3506	1.2821	1.0000			
12/83	1.4055	1.3115				
12/84	1.3430					
1	1.3655	1.2877	1.0000	1.0000	1.0000	
2	1.3655	1.2877	1.0000	1.0000	1.0000	1.0000
3	1.7584	1.2877	1.0000	1.0000	1.0000	1.0000
4	80	81	82	83	84	85
	400	400	400	400	419	410

1. = 4 - RATIO OF COLUMN SUMS
2. = SELECTED FACTORS AND SELECTED TAIL
3. = CUMULATIVE FACTORS
4. = PROJECTED ULTIMATES

SIMULATED DATA COMPANY

CUMULATIVE CLOSED CLAIMS UNADJUSTED DATA

ACCIDENT PERIOD ENDING	MONTHS OF DEVELOPMENT 12	24	36	48	60	72
12/80	95	172	279	354	387	400
12/81	99	173	269	348	400	
12/82	89	167	258	384		
12/83	94	164	349			
12/84	94	235				
12/85	129					

DEVELOPMENT FACTORS:

12/80	1.8105	1.6221	1.2688	1.0932	1.0336	
12/81	1.7475	1.5549	1.2937	1.1494		
12/82	1.8764	1.5449	1.4884			
12/83	1.7447	2.1280				
12/84	2.5000					
1	1.9959	1.7332	1.3581	1.1228	1.0336	
2	1.9959	1.7332	1.3581	1.1228	1.0336	1.0000
3	5.4522	2.7317	1.5761	1.1605	1.0336	1.0000
4	80	81	82	83	84	85
	400	413	446	550	642	703

1. = 4 - RATIO OF COLUMN SUMS
2. = SELECTED FACTORS AND SELECTED TAIL
3. = CUMULATIVE FACTORS
4. = PROJECTED ULTIMATES

EXHIBIT 1
SHEET 5

SIMULATED DATA COMPANY

CUMULATIVE REPORTED CLAIMS ÷ PROJECTED ULTIMATE CLAIMS UNADJUSTED DATA

ACCIDENT PERIOD ENDING	MONTHS OF DEVELOPMENT 12	24	36	48	60	72
12/80	.6325	.7800	1.0000	1.0000	1.0000	1.0000
12/81	.5775	.7875	1.0000	1.0000	1.0000	
12/82	.5775	.7800	1.0000	1.0000		
12/83	.5425	.7625	1.0000			
12/84	.5776	.7757				
12/85	.5683					

Exhibit 2

Summary of Ultimate Losses

Traditional Methods
(000's)

Accident Year	Incurred Development	Paid Development
1980	$ 17,517	$ 17,517
1981	19,678	20,657
1982	19,361	22,158
1983	22,896	32,169
1984	27,221	44,331
1985	27,490	51,847
	$134,163	$188,679

EXHIBIT 3

SIMULATED DATA COMPANY

CUMULATIVE CLOSED CLAIMS ÷ PROJECTED ULTIMATE CLAIMS UNADJUSTED DATA

ACCIDENT PERIOD ENDING	MONTHS OF DEVELOPMENT 12	24	36	48	60	72
12/80	.2375	.4300	.6975	.8850	.9675	1.0000
12/81	.2475	.4325	.6725	.8700	1.0000	
12/82	.2225	.4175	.6450	.9600		
12/83	.2350	.4100	.8725			
12/84	.2243	.5609				
12/85	.3146					

EXHIBIT 4

SIMULATED DATA COMPANY

AVERAGE OUTSTANDING LOSSES UNADJUSTED DATA

ACCIDENT PERIOD ENDING	MONTHS OF DEVELOPMENT 12	24	36	48	60	72
12/80	35781	41158	48774	50462	62870	
12/81	41276	46966	51876	51321		
12/82	33256	34695	46718	49303		
12/83	34402	40782	80483			
12/84	45898	56030				
12/85	49126					

TREND ANALYSIS:

	12	24	36	48	60	72
1	1.0569	1.0487	1.1500	.9885	2.7183	2.7183
2	.4108	.1764	.5168	.3328	1.0000	1.0000
3	1.0640	1.0584	1.1621	.9875	1.0000	1.0000

1\. = RATE OF CHANGE DETERMINED BY EXPONENTIAL CURVE FIT USING LINEAR LEAST SQUARES
2\. = INDEX OF DETERMINATION
3\. = RATE OF CHANGE DETERMINED BY EXPONENTIAL CURVE FIT USING WEIGHTED (1.0,.9,.9E2,...) LINEAR LEAST SQUARES

SIMULATED DATA COMPANY

CUMULATIVE CLOSED CLAIMS ADJUSTED DATA

ACCIDENT PERIOD ENDING	MONTHS OF DEVELOPMENT 12	24	36	48	60	72
12/80	126	224	349	384	400	400
12/81	126	224	349	384	400	
12/82	126	224	349	384		
12/83	126	224	349			
12/84	132	235				
12/85	129					

DEVELOPMENT FACTORS:

12/80	1.7778	1.5580	1.1003	1.0417	1.0000	
12/81	1.7778	1.5580	1.1003	1.0417		
12/82	1.7778	1.5580	1.1003			
12/83	1.7778	1.5580				
12/84	1.7803					
1	1.7785	1.5580	1.1003	1.0417	1.0000	
2	1.7785	1.5580	1.1003	1.0417	1.0000	1.0000
3	3.1759	1.7857	1.1461	1.0417	1.0000	1.0000
4	80	81	82	83	84	85
	400	400	400	400	420	410

1. = 4 - RATIO OF COLUMN SUMS
2. = SELECTED FACTORS AND SELECTED TAIL
3. = CUMULATIVE FACTORS
4. = PROJECTED ULTIMATES

EXHIBIT 5
SHEET 2

SIMULATED DATA COMPANY

CUMULATIVE PAID LOSSES ADJUSTED DATA

ACCIDENT PERIOD ENDING	MONTHS OF DEVELOPMENT 12	24	36	48	60	72
12/80	3173473	6545912	14040881	16234251	17517280	17517279
12/81	3331926	7559185	15875744	18199453	19372157	
12/82	3994266	7986452	14904935	17546087		
12/83	4213201	8052896	15724222			
12/84	5205103	10138937				
12/85	4793334					

DEVELOPMENT FACTORS:

12/80	2.0627	2.1450	1.1562	1.0790	1.0000	
12/81	2.2687	2.1002	1.1464	1.0644		
12/82	1.9995	1.8663	1.1772			
12/83	1.9113	1.9526				
12/84	1.9479					
1	2.0185	2.0056	1.1607	1.0714	1.0000	
2	2.0185	2.0056	1.1607	1.0714	1.0000	1.0000
3	5.0339	2.4939	1.2435	1.0714	1.0000	1.0000
4	80	81	82	83	84	85
	17517279	19372156	18798001	19553117	25285681	24129332

1. = 4 - RATIO OF COLUMN SUMS
2. = SELECTED FACTORS AND SELECTED TAIL
3. = CUMULATIVE FACTORS
4. = PROJECTED ULTIMATES

EXHIBIT 5
SHEET 3

SIMULATED DATA COMPANY

CUMULATIVE INCURRED LOSSES ADJUSTED DATA

ACCIDENT PERIOD ENDING	MONTHS OF DEVELOPMENT 12	24	36	48	60	72
12/80	7972971	10607713	16661182	17198653	17517280	17517279
12/81	7894061	12184347	18499310	19093979	19372157	
12/82	7558613	11681366	17771589	18334939		
12/83	7628993	12213190	19828855			
12/84	10458133	15181616				
12/85	9902402					

DEVELOPMENT FACTORS:

12/80	1.3305	1.5707	1.0323	1.0185	1.0000	
12/81	1.5435	1.5183	1.0321	1.0146		
12/82	1.5454	1.5214	1.0317			
12/83	1.6009	1.6236				
12/84	1.4517					
1	1.5323	1.5608	1.0320	1.0164	1.0000	
2	1.5323	1.5608	1.0320	1.0164	1.0000	1.0000
3	2.5087	1.6373	1.0490	1.0164	1.0000	1.0000
4	80	81	82	83	84	85
	17517279	19372156	18636427	20800163	24856282	24842360

1. = 4 - RATIO OF COLUMN SUMS
2. = SELECTED FACTORS AND SELECTED TAIL
3. = CUMULATIVE FACTORS
4. = PROJECTED ULTIMATES

EXHIBIT 5
SHEET 4

SIMULATED DATA COMPANY

AVERAGE OUTSTANDING LOSSES ADJUSTED DATA

ACCIDENT PERIOD ENDING	MONTHS OF DEVELOPMENT 12	24	36	48	60	72
12/80	37791	46157	51378	60275		
12/81	43449	50826	51442	55908		
12/82	33946	41988	56209	49303		
12/83	37536	51362	80483			
12/84	47755	56030				
12/85	49126					

TREND ANALYSIS:

	12	24	36	48	60	72
1	1.0496	1.0406	1.1543	.9044	2.7183	2.7183
2	.3761	.3239	.7536	.9794	1.0000	1.0000
3	1.0556	1.0448	1.1631	.9036	1.0000	1.0000

1. = RATE OF CHANGE DETERMINED BY EXPONENTIAL CURVE FIT USING LINEAR LEAST SQUARES
2. = INDEX OF DETERMINATION
3. = RATE OF CHANGE DETERMINED BY EXPONENTIAL CURVE FIT USING WEIGHTED (1.0,.9,.9E2,...) LINEAR LEAST SQUARES

Comparison of Projected Ultimates
(000's)

Year	Ultimate Value from Simulation	Traditional Incurred Projection	Traditional Paid Projection	Adjusted Paid Projection	Adjusted Incurred Projection
1980	$17,517	$17,517	$17,517	$17,517	$17,517
1981	19,372	19,678	20,657	19,372	19,372
1982	18,598	19,361	22,158	18,798	18,636
1983	21,197	22,896	32,169	19,553	20,800
1984	22,157	27,221	44,331	25,286	24,856
1985	21,961	27,490	51,847	24,129	24,842
	$120,802	$134,163	$188,679	$124,655	$126,023