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SELF-INSURANCE RESERVES: A CATCH-UP GAME?

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Much is being said about the "turn" or "bottoming" of the underwriting cycle. A number of insurance companies have been declared insolvent. Some leading carriers have abruptly declined business or left certain markets entirely. Indeed, the events that have lead up to this turning point have been tumultuous for the sellers of insurance.

In addition, the consequences are beginning to be felt by insurance buyers. Some hazards are impossible to insure. Retentions or deductibles are going up and many are finding that the cost of "real" insurance—most notably umbrella policies—has at least doubled.

Self-insurers are feeling the consequences, too. The ever-increasing cost of claims which has plagued insurance companies is also making life difficult for self-insurers. But not much is said about the adequacy of the loss reserves of self-insurers. Many self-insurers may have fallen behind, and some catching up through added loss reserves will be necessary.

Why is so little being said about loss reserve adequacy and self-insurance? There are a number of explanations for this:

- Many self-insurers may not know that incurred but not reported reserves can be set up under present accounting rules. Sometimes self-insurers have to wait to be told to set them up by their accountants.
- Some self-insurers believe that being on top of crucial cases is the most important issue. While close supervision of individual cases is important, preoccupation with known cases can lead one to overlook the emergence of late reported claims and development on claims already reported.
- Another possible explanation is that it is usually pretty easy to show some spectacular savings by switching from insurance to self-insurance. As the years go by, however, it becomes increasingly difficult to duplicate this initial success.
- Quite frankly, the people who regulate workers' compensation are of little help. States do not say that IBNR reserves have to be established. Few require reports of case reserves and most states tie assessments for administration and second-injury funds to paid losses. Finally, surety bond amounts can be ridiculously low in relation to outstanding claims.

Another possible explanation: self-insurers haven't had the chance to learn a lot about actuarial loss-reserving practices.

For this reason, it might be worthwhile to recount some of the basics of loss reserving. One objective of loss reserving is to estimate ultimate losses. The components that make up ultimate losses are:

—Amounts paid for claims.

—Amounts paid for claims defense costs.

—Case reserves for claims already reported.

—IBNR and/or IBNE reserves for incurred-but-not-reported or incurred-but-not-enough claims reserves.

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Some definitions

By definition an incurred loss consists of both paid amounts and case reserves. An ultimate loss is made up of incurred losses plus IBNR. If one projects losses to ultimate and finds out a year later that actual losses incurred exceeded the estimated ultimate loss, it can be said that this risk is underreserved. If, on the other hand, actual incurred losses were less than the original estimate, it can be said that loss reserves were redundant.

So much for definitions. It takes a lot of data to do a loss-reserve analysis. Most people get periodic claim reports of paid and open claims for each accident year. The reports prepared by third-party claims services can be quite extensive.

To do an eight-year analysis, at least eight claim reports are needed. Exhibit I is a loss development triangle that shows where the data from the eight claim reports go. The idea is to look back on the eight accident years to see how much our losses amounted to at the 12, 14, 36, and so on, month evaluation dates. The change in value is the loss development.

If there's been a change in claims services, more claim reports will have to be summarized. Too much work? Yes, this takes a lot of work, but once the initial investment of time is made, it is possible to analyze loss development. Next year, all that will be needed is an updating of such loss development triangles as the one in Exhibit I by adding another diagonal onto the triangle.

Exhibit II

In Exhibit II are shown the paid-loss amounts, both incrementally and cumulatively, and the loss-development factors. This is best explained by examples:

- Looking at the upper left hand corner of Exhibit II one can see that $200,000 of claims that occurred in accident year 1975 were paid by the end of 1975.
- Reading across from left to right, one can see that an additional $275,000 of claims were paid during 1976 for accident year 1975.
- Glancing over to the Cumulative Paid Loss Chart in Exhibit II, one can see that $475,000 in paid claims were paid by the end of the 24th month. That's $200,000 + $275,000.

To get the loss development factors divide the cumulative paid losses at 24 months by the cumulative paid losses at 12 months. For example, $475,000 divided by $200,000 yields a factor of 2.375. Another example, $650,000 divided by $475,000 yields a paid development factor of 1.368 for the 24 to 36 months interval.

This process is repeated throughout the triangle. Fortunately, there are computer programs available for this

EXHIBIT I

Accident year	Evaluation Date 12 mos.	24 mos.	36 mos.	48 mos.	60 mos.	72 mos.	84 mos.	96 mos.
1975	12/31/75	12/31/76	12/31/77	12/31/78	12/31/79	12/31/80	12/31/81	12/31/82
1976	12/31/76	12/31/77	12/31/78	12/31/79	12/31/80	12/31/81	12/31/82	
1977	12/31/77	12/31/78	12/31/79	12/31/80	12/31/81	12/31/82		
1978	12/31/78	12/31/79	12/31/80	12/31/81	12/31/82			
1979	12/31/79	12/31/80	12/31/81	12/31/82				
1980	12/31/80	12/31/81	12/31/82					
1981	12/31/81	12/31/82						
1982	12/31/82							

purpose. The hardest part is yet to come. One can see that this particular computer model has generated a wealth of statistics: the average, the weighted average, the three-year average, the linear trend and exponential curve. One has to select the paid loss development factor that best fits the situation.

If there are enough data and they are valid and consistent, then one can rely on all of these statistics. For example, in this instance, the 12 to 24 months loss development factors appear to vary randomly about an average of 2.341. Both the weighted average (the most recent factors are weighted the highest) and the three-year average (last three years' factors) are lower than the mean, suggesting a declining trend in the loss development factors. If the develpment factors are declining, this could mean that claims are being paid out faster, among other things.

On the other hand, the R2's (coefficients of determination) for both the linear (straight line) and exponential (curve) are rather meaningless at .086 and .093 respectively. The higher the R2, the greater the reliability of the projection. So, we would have to conclude that there is no strong evidence to support selecting either of the linear or exponential projections. Later on, when we look at Exhibit IV, we can see that the actuary has selected loss development factors that are somewhat less than the average and weighted factors for 1981 and 1982.

In addition to this objective information, one has to keep in mind any other relevant information. Changes in one's operations, products or manpower can change the exposure to loss. In workers' compensation benefit levels can be changed. Changes in claims handling procedures can change the rate at which claims are reported and paid. Any one or a combination of these internal or external factors can influence the behavior of the loss development factors.

In Exhibit II we illustrated a paid-loss development triangle. To make our analysis more meaningful, one should also look at incurred loss trends. The incurred losses include the case reserves and thus contain useful information for loss forecasting purposes. Ideally, one should do an incurred loss development in parallel with the paid loss development.

Exhibit III shows the inter-relationships between paid and incurred losses. This triangle shows the Ratio of Paid to Incurred Claims, which is a good thing to have as a check for changing claims handling procedures.

With all of this information, one is almost ready to select the loss development factors. Ideally, one should also have countrywide or industry loss development factors available for reference. These are especially useful in helping select the development factors after the 12, 24 and 36 months factors have been selected. The last factor, at the 96 months interval, has no data at 108 months to divide into; therefore, this one must be estimated.

It is possible, within the confines of this article, to say a few things about how a self-insurer can estimate ultimate losses so that IBNR reserves can also be estimated.

EXHIBIT II

Paid Loss As of December 31,1982

Accident year	Months of Development 12	24	36	48	60	72	84	96
1975	200000	275000	175000	100000	85000	40000	25000	20000
1976	200000	300000	200000	100000	50000	30000	25000	
1977	220000	290000	250000	80000	130000	50000		
1978	230000	270000	220000	130000	125000			
1979	260000	410000	180000	150000				
1980	310000	340000	250000					
1981	320000	430000						
1982	340000							

Cumulative Paid Loss As of December 31, 1982

Accident year	Months of Development 12	24	36	48	60	72	84	96
1975	200000	475000	650000	750000	835000	875000	900000	920000
1976	200000	500000	700000	800000	850000	880000	905000	
1977	220000	510000	760000	840000	970000	1020000		
1978	230000	500000	720000	850000	975000			
1979	260000	670000	850000	1000000				
1980	310000	650000	900000					
1981	320000	750000						
1982	340000							

Paid Loss Development As of December 31, 1982

Accident year	Months of Development 12	24	36	48	60	72	84	96
1975	2.375	1.368	1.154	1.113	1.048	1.029	1.022	
1976	2.500	1.400	1.143	1.063	1.035	1.028		
1977	2.318	1.490	1.105	1.155	1.052			
1978	2.174	1.440	1.181	1.147				
1979	2.577	1.269	1.176					
1980	2.097	1.385						
1981	2.344							
1982								
Average	2.341	1.392	1.152	1.119	1.045	1.028	1.022	
Weighted Average	2.318	1.383	1.157	1.129	1.046	1.028	1.022	
3 Year Average	2.339	1.364	1.154	1.121	1.045	1.028	1.022	
Linear Trend								
Slope	−0.023	−0.010	0.008	0.019	0.002	0.000		
Intercept	2.432	1.428	1.127	1.071	1.041	1.029		
R2	0.086	0.068	0.187	0.354	0.046	1.000		
Projected	2.249	1.356	1.177	1.168	1.049	1.028		
Exponential Curve								
Slope %	−1.015	−0.771	0.715	1.743	0.174	−0.016		
Intercept	2.433	1.428	1.127	1.072	1.041	1.029		
R2	0.093	0.071	0.180	0.346	0.045	1.000		
Projected	2.242	1.353	1.176	1.168	1.049	1.028		
Selected	—	—	—	—	—	—	—	—

A starting point

A starting point should be both a paid and incurred loss development. All that you need is the information on Exhibit II plus the same information on incurred losses. Exhibit IV shows how a paid-loss development is done.

In column (1) on Exhibit IV one can see the cumulative paid losses from the

diagonal of the triangle on Exhibit II. In columnn (2) are the development factors we selected at the bottom of Exhibit II.

If 1982's cumulative paid losses of $340,000 are multiplied by the 12 to 24 months factor of 2.300, that would get us to where we ought to be at the 24- months interval. Similarly, if we multiplied this product by the 24 months factor of 1.370, this would take us to where paid losses ought to be for 1982 at the 36 months interval and so forth. In doing this we'd ultimately get to our loss estimate for 1982.

You can get the same outcome if you multiply all the Selected Development Factors in column (2) to get the Cumulative Development Factors in column (3). For example, 1982's Cumulative Development Factor is the product of 1.032 x 1.022 x 1.028 x 1.047 x 1.160 x 1.370 x 2.300. Multiplying 4.730 x $340,000 gives us 1982's ultimate loss of $1,608,200.

The above is a basic loss-reserving method used by actuaries and laymen. when they have the data available. In addition to doing paid and incurred loss developments, if the data are available, one should consider at least two other loss development methods:

- Claim reports also generally give statistics about the number of reported and closed claims. Inclusion of these statistics allows work with claims frequencies and average severities. Many large insurance companies use average incurred losses as the basis for estimating ultimate losses and IBNR reserves.
- Other information that can enhance the analysis relates to exposures to loss. Here, self-insurers are at an advantage, because they know what their workers' compensation payroll is. They also have a lot of internal data on production and sales that insurance companies seldom can include in their actuarial forecasts.

Risk managers need to be right about loss reserves because they should give their operating managers an opportunity to build into the price of their products and services the full cost of risk. While self-insurance is hard to beat from a cash flow standpoint, the unexpected emergence of claims can mar the performance of an operating manager's budget.

To avoid being the bearer of bad tidings self-insurers would be well-advised to get ahead in the game by using some of the same actuarial loss-reserving practices insurance companies have been using for years. Given the wealth of statistics self-insurers have accumulated over the years, these actuarial methods can be employed to avoid having to play catch up ball in the late innings. ◆

EXHIBIT III

Ratio of Cumulative Paid Loss to Cumulative Incurred Loss As of December 31, 1982

Accident year	Months of Development 12	24	36	48	60	72	84	96
1975	0.370	0.688	0.774	0.843	0.908	0.921	0.947	0.968
1976	0.364	0.667	0.778	0.842	0.867	0.880	0.905	
1977	0.333	0.646	0.784	0.824	0.924	0.936		
1978	0.343	0.658	0.758	0.817	0.894			
1979	0.356	0.677	0.746	0.806				
1980	0.408	0.619	0.732					
1981	0.356	0.625						
1982	0.370							
Average	0.362	0.654	0.762	0.826	0.898	0.912	0.926	0.968
Weighted Average	0.365	0.645	0.754	0.820	0.899	0.915	0.919	0.968
3 Year Average	0.378	0.640	0.745	0.816	0.895	0.912	0.926	0.968
Linear Trend								
Slope	0.002	-0.009	-0.010	-0.010	0.002	0.007	-0.042	
Intercept	0.352	0.691	0.795	0.856	0.894	0.898	0.990	
R2	0.062	0.576	0.770	0.945	0.009	0.065	1.000	
Projected	0.373	0.618	0.728	0.797	0.903	0.927	0.863	
Exponential Curve								
Slope %	0.615	-1.386	-1.248	-1.171	0.194	0.796	-4.472	
Intercept	0.352	0.691	0.796	0.856	0.894	0.898	0.992	
R2	0.062	0.578	0.772	0.946	0.009	0.062	1.000	
Projected	0.372	0.618	0.729	0.798	0.902	0.927	0.865	
Selected	—	—	—	—	—	—	—	—

EXHIBIT IV

Ultimate Loss Based on Paid Loss Development As of December 31, 1982

Accident Year	Cumulative Paid Loss	Selected Development Factor	Cumulative Development Factor	Ultimate Loss (1)x(3)
	(1)	(2)	(3)	(4)
1975	920000	1.032	1.032	949440
1976	905000	1.022	1.055	954775
1977	1020000	1.028	1.084	1105680
1978	975000	1.047	1.135	1106625
1979	1000000	1.140	1.294	1294000
1980	900000	1.160	1.501	1350900
1981	750000	1.370	2.057	1542750
1982	340000	2.300	4.730	1608200
Total	6810000			9912370