



# SIGMA CIRCLE SOLUTIONS

Volume 2, Issue 1

## The Insurance Professional's Loss Development Primer

A recent discussion in the Risknet internet newsgroup focused on the question of loss triangles. The original post to the newsgroup asked for some general information on the topic. Both actuaries and non-actuaries responded with ideas ranging from technical reasons for having loss triangles to who should create the triangles. The purpose of this article is to give a general discussion to the insurance professional on the theory and uses of loss triangles.

### What Is A Loss Triangle?

A loss triangle is created from multiple evaluations of the aggregate losses from a series of loss periods. The standard format is:

Loss Period	Months of Development		
	12	24	36
1993	12/31/93	12/31/94	12/31/95
1994	12/31/94	12/31/95	
1995	12/31/95		

When completed, this table will contain estimates of incurred losses at various points in time. This cell would show the reported incurred losses for the 1993 loss period as evaluated on 12/31/95

The purpose of arranging data in this way is to estimate development from one evaluation to the next. Development accounts for losses that occurred during the loss period but are not reported until a later date, commonly referred to as incurred but not reported losses, or IBNRs. Development



## The SIGMA Circle – Your Key To Success!

In early 1996, SIGMA Actuarial Consulting Group, Inc. founded the SIGMA Circle. In only a few months, the SIGMA Circle has reached new members across the country. As a Circle member, you receive informative articles on actuarial related topics, access to SIGMA's staff of actuaries, and discounted actuarial services and software.

We now have our e-mail service, "Ask an Actuary" available for Circle members. Feel free to e-mail any actuarial questions to: [alrhodes@aol.com](mailto:alrhodes@aol.com).

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## Loss Development

also includes adjustments to case reserves and adjustments to claims that have closed and reopened. Once development between evaluations has been estimated, the total anticipated development from any evaluation date can be calculated.

### What Data Is Needed?

Data is usually gathered on both a paid and reported loss basis. There are pros and cons as to which is more valuable. A reported loss triangle assumes that the claim reporting pattern and reserving philosophy are consistent for each loss period. Since reported losses are higher than paid losses, there should also be less volatility in reported loss development patterns. A paid loss triangle assumes that the claim payment pattern and claim settlement philosophy are consistent for each loss period. In addition, since case reserves are excluded, development patterns are not skewed by changes in reserving philosophies.

The data should be segregated between lines of coverage. The data can be limited to a certain per occurrence loss limit - but, only if all claims for all

periods are limited to the same limitation. The number of loss periods you will need varies. However, five to ten years worth of data is a good starting point. You will also need industry development factors as a standard to measure against. These are published by certain organizations. They are also available from brokers, actuaries and insurance companies.

### Some Points On The Effective Use Of A Loss Triangle

The reason for creating a loss triangle, as opposed to using industry information, is that unique development factors allow for a more accurate reflection of the entity's specific loss development patterns. Theoretically, the use of unique factors as opposed to industry averages produces a more accurate projection of ultimate incurred losses.

The following is an example of how a completed triangle will look.

Loss Period	Months of Development				
	12	24	36	48	60
1991	\$300,000	\$600,000	\$750,000	\$825,000	\$866,250
1992	400,000	800,000	960,000	1,056,000	
1993	450,000	810,000	1,053,000		
1994	500,000	1,100,000			
1995	550,000				

In most cases, losses increase from one evaluation to the next. The next step is to measure the increase.

Loss Period	Months of Development				
	12 to 24	24 to 36	36 to 48	48 to 60	60 to Ult.
1991	2.000	1.250	1.100	1.050	
1992	2.000	1.200	1.100		
1993	1.800	1.300			
1994	2.200				

The 1.300 is calculated by dividing the 36 month evaluation of the 1993 losses by the 24 month evaluation of the 1993 losses: (1,053,000 / 810,000)

## Loss Development Primer

The previous exhibit indicates the development between each evaluation. For example, the losses for the 1993 loss period increased by a factor of 1.300 (\$810,000 to \$1,053,000) between 24 and 36 months. Because of the consistency of development from period to period in this example, an average of each column will give a good estimate of the development between evaluations.

In most cases, the risk specific loss development factors are supplemented with industry development data due to two important points. First, because the older periods probably have some open claims, there is still the potential for additional development. The amount of this additional development will be driven by a number of factors such as maturity of the loss period and the line of coverage. Second, even with a large volume of losses, random fluctuations can distort the true pattern of development. The following is an exhibit showing the selection of estimated development factors between evaluations and the calculation of cumulative loss development factors.

	Months of Development				
	12 to 24	24 to 36	36 to 48	48 to 60	60 to Ult.
Average	2.000	1.250	1.000	1.050	
Industry	1.800	1.300	1.150	1.050	1.100
Selected	2.000	1.250	1.100	1.050	1.100
Cumulative	3.178	1.589	1.271	1.155	1.100

The 1.271 represents the development factor that applies to losses that are evaluated at 36 months. This is the "36 to ultimate" development factor. It is computed by multiplying the following factors together (60 to ult.) (48 to 60) and (36 to 48).

$$1.271 = 1.100 * 1.050 * 1.100$$

The average is the straight average of each column. When the data is more volatile, other averages such as a weighted average, two or three year averages, or an average that excludes the high and low points could be used. Selected factors are usually a combination of the averages and industry. Because of the consistency of this example, the selected equals the average for all periods except 60 months to ultimate. Since unique data is not available beyond 60 months, the industry factor is chosen.

Once the development between periods is estimated, then the total development is calculated. Start with the most mature factor in the "selected" row (60 months to ultimate) and work to the left. For example, the 48 month to ultimate factor of 1.155 is calculated as  $1.100 \times 1.050$ . The 36 month to ultimate factor of 1.271 is calculated as  $1.100 \times 1.050 \times 1.100$ .

### Using The Results

You now have a loss development triangle and loss development factors. The next step is to apply the information. The ultimate losses for each loss period can now be estimated. For example, the 1995 12 month evaluation of \$550,000 (page 2) is multiplied by the 12 month to ultimate loss development factor of 3.178 to yield an ultimate estimated loss amount of \$1,747,900.

### Who Can Create A Loss Triangle?

There are a wide variety of opinions on this issue. Some favor the idea that only an actuary has the needed background to attempt the calculations. Others say that anyone with the data can put a triangle together. The latter is probably more accurate - as long as the individual has a grasp of the basic concepts addressed in the above sections.

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## Loss Development Primer

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### Some Concluding Thoughts

One of the first steps in putting together an actuarial analysis is the creation of loss triangles. If your organization requires this type of analysis, a good way to reduce the hours billed is to produce the triangles for the actuary.

Loss triangles are a valuable tool to determine if your claims administrator has changed their reserving practice. Consistency is the key to successfully estimating development. If the order of magnitude of development factors suddenly changes, then you should immediately review the reserving process. If, in fact, the process has changed, then estimated outstanding liabilities may prove to be erroneous which may affect your balance sheet.

An important benefit of a paid loss triangle is that development factors can also be used as payout percentages. Teamed with an expected discount rate, a present value analysis of expected cash-flows of outstanding liabilities is easily created.

As a wrap-up to the discussion of loss triangles, the development of a loss triangle is the first step in a larger analysis. Whether the purpose is to project losses, estimate liabilities or to benchmark with the competition, the key to a more valuable analysis will be consistent and accurate data.

*"Theoretical ly, the use of unique factors ...produces a more accurate projection"*



### The Problem:

SIGMA was recently contacted by a broker who was concerned his client's unique loss development history was not given enough credibility by a carrier. Their carrier insisted on using loss development factors from a broader database. In the broker's opinion, the industry loss development factors seemed conservative.

### The SIGMA Solution:

Fortunately, there were two points in favor of the client. First, there was sufficient data available to build a unique loss development triangle for the client. Second, the volume of data available from the client made the unique development patterns credible. The analysis SIGMA performed indicated that the client's claim administrator reserved claims closer to an ultimate amount than industry factors would suggest. When this is the case, complete reliance on industry factors will often lead to a conservative (higher than necessary) estimate of premium and required reserves. SIGMA's analysis presented quantifiable facts, in an actuarial format that the carrier could accept, that led to a lower charged premium.

During these negotiations, the broker felt that he was finally negotiating from a position of strength. SIGMA can be your resource for solutions to such challenging negotiations. Contact Al Rhodes, ACAS, MAAA, for more information.