RISK 66 TechTalk

Understanding Loss Development Factors

Seeing the Big Picture

Whether you are a broker, CFO, or risk manager, you have probably heard the terms loss development triangle, loss development factor, and IBNR (incurred but not reported losses). These are often included in the first analytical step of an actuarial analysis. Yet a survey of insurance professionals would likely result in a long list of contradictory definitions for these terms. Because of the importance of this topic and the confusion it causes, we have selected it for an in depth SIGMA TechTalk. Loss development is one of the most challenging actuarial topics for non-actuaries. For those familiar with the topic, this article will be a good review and perhaps provide some new insight. For those unfamiliar with loss development or any of the terms mentioned above, don't worry. We will walk through an example, explain every term, and unlock the "black box" of loss development factors, loss triangles, and even IBNR.

WHY THIS TOPIC IS IMPORTANT

Loss development factors are a critical part of any actuarial analysis. The process for determining appropriate loss development factors is often misunderstood or viewed as a mysterious "black box." But the selection of a loss development factor involves definable mathematical and philosophical aspects which we will explain and which will have a significant impact on forecasted losses or estimated loss reserves.

Loss Development: Some Old Claims Never Die, They Just Get Adjusted

It may take several years for all claims in a given policy period to be reported and closed. New information pertaining to existing claims can impact the total losses long after the end of a policy period. Unfortunately, even new claims are sometimes reported after the close of the policy period. Therefore, a snapshot, or summarized evaluation of the losses, is generally made at least once a year. The development in the losses is the quantitative change in this evaluation from year to year.

A loss development triangle is a unique way of arranging the annual loss evaluations for several past policy periods. By arranging the loss evaluations for past years in a table, we can analyze the change in losses from one evaluation to the next. The standard format is shown on page 2. Note how the evaluations are aligned in columns according to the length of time since the inception of the policy period.

HELPFUL INFORMATION

When completed, this table will contain estimates of total incurred losses at various points in time. The highlighted cell will show the total incurred losses for the 2015 loss period as evaluated on 12/31/2019.

The purpose of arranging data this way is to estimate the development, or change in estimated losses, from one evaluation to the next. The table should include as many years of historical data as is available.

FIGURE 1 INCURRED LOSS DEVELOPMENT TRIANGLE

Months of Development					
Period	12	24	36	48	60
2015	12/31/15	12/31/16	12/31/17	12/31/18	12/31/19
2016	12/31/16	12/31/17	12/31/18	12/31/19	
2017	12/31/17	12/31/18	12/31/19		
2018	12/31/18	12/31/19			
2019	12/13/19				

There are two primary reasons that development occurs:

- Sometimes losses that occur during a certain period are not reported until a later date. These additional loss dollars are referred to as incurred but not reported losses. A common abbreviation for this term is IBNR.
- Case reserves, amounts set aside for future payments on a claim, must sometimes be adjusted as more information about a loss becomes available. Adjustments are also made to claims that have been closed and reopened. For example, a back injury that occurred a few years ago may have been established with a $50,000 reserve, but later data shows that the actual costs have reached $80,000 and are anticipated to grow to $100,000 due to ongoing treatments related to the original injury. This “growth” in the claim results in loss development.

When you look at several years of data and snapshots of the reported losses, you begin to see a trend. Once development between evaluations has been estimated, the total anticipated development can be computed for any evaluation date. An example is provided later in this article.

IT IS IMPORTANT TO REMEMBER

Insurance professionals often include development on known claims within the definition of IBNR.

IT IS IMPORTANT TO REMEMBER

- A claim incurred in 2017 is always assigned to 2017 even if payment or reserve changes occur in 2020.
- The terms “reported losses” and “incurred losses” are often used interchangeably.

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One of the most dangerous mistakes to make when preparing financial statements is to use an estimate of loss liabilities that does not include IBNR. This is an easy mistake to make because insurance companies or internal reports often highlight the total outstanding reserves for all open claims. However, without an actuarial analysis, the total future liability may be significantly understated because case reserves do not include IBNR.

The Required Data

Data is usually gathered on both paid and reported losses. Paid losses are the total losses actually paid during a policy period. Reported losses (also referred to as incurred losses) include paid losses plus any loss reserves for open claims. Reported losses are always greater than or equal to paid losses. There are pros and cons as to which type of data is more useful when generating a loss triangle:

- A reported loss triangle is most useful when the claim reporting pattern and reserving philosophy are consistent for each loss period. Development patterns based on reported losses tend to be less volatile than patterns based on paid losses.This is because the initial reported amount of a claim, as compared to the initial paid amount, is usually closer in value to the ultimate amount. Therefore, the reported loss amount varies less than the paid amount over time.
- A paid loss triangle is most useful when 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.

If both paid and reported loss information is available, it is common to create a loss triangle using both methods and then decide which method produces the most reliable results. This decision is based primarily on the volatility of the development patterns.

The data should be segregated between lines of coverage such as auto, general liability, workers compensation and others. 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 value. For example, you may want to use limited losses if you are projecting losses within a certain range, like under $500,000. This might occur if an insurance program is being considered with a $500,000 deductible. There may be other reasons why you might want to forecast losses under a specific loss limit.

The number of loss periods you will need to create a credible analysis varies based on a number of factors. Five to ten years of data is often sufficient. You will also need industry development factors as a standard to measure against. These are available through various data gathering organizations such as the National Council on Compensation Insurance (NCCI) and the Insurance Services Office (ISO), publications such as Best’s Aggregates & Averages, and brokers, actuaries and insurance companies.

Completing the Loss Triangle and Selecting Factors

In most cases, losses increase from one evaluation to the next. Once we have our data gathered and the loss information entered into the loss triangle, the next step is to measure the increase.

After we complete the table shown in Figure 2, we are ready to compute the development between each evaluation.

In the footer of Figure 3, averages of the factors are computed. 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. These average values are carried forward to Figure 4 along with industry factors.

HELPFUL INFORMATION

Figure 2 shows the loss triangle with incurred losses as of each evaluation date. The highlighted value is the 12/31/19 evaluation of the 2018 losses.

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The loss development factor is calculate as the ratio of the losses for one evaluation to the losses for the prior evaluation. For example, the highlighted value of 1.17 is computed by dividing $2,133,656 (the 36 month evaluation of the 2016 losses) by $1,823,638 (the 24 evaluation of the 2016 losses).

FIGURE 2 LOSS TRIANGLE WITH INCURRED LOSSES

	Months of Development				
Period	12	24	36	48	60
2015	$1,175,025	$2,232,548	$2,679,057	$2,813,010	$2,869,270
2016	$985,750	$1,823,638	$2,133,656	$2,283,012	
2017	$1,250,750	$2,751,650	$3,494,596		
2018	$1,325,750	$2,850,363			
2019	$1,225,750				

FIGURE 3 COMPUTATION OF DEVELOPMENT

	Months of Development				
Period	12 to 24	24 to 36	36 to 48	48 to 60	60 to Ult.
2015	1.90	1.20	1.05	1.02	
2016	1.85	1.17	1.07		
2017	2.20	1.27			
2018	2.15				
Average	**2.03**	**1.21**	**1.06**	**1.02**	**N/A**

Selected factors are usually a combination of the unique averages and industry factors. Additional information concerning the losses, changes in reserve practices, implementation of loss control or prevention programs, or other considerations may also influence the determination of the selected factors. Careful consideration of such subjective data is where actuarial judgment, beyond simply following a formula, enters the process of selecting factors.

FIGURE 4 COMPUTATION OF SELECTED FACTORS

	Months of Development				
	12 to 24	24 to 36	36 to 48	48 to 60	60 to Ult.
Average	2.03	1.21	1.06	1.02	
Industry	1.80	1.30	1.15	1.05	1.10
Selected	2.00	1.25	1.10	1.03	1.10

	12 to Ultimate	24 to Ultimate	36 to Ultimate	48 to Ultimate	60 to Ultimate
Cumulative	**3.12**	**1.56**	**1.25**	**1.13**	**1.10**

Using the Results

We now have a completed loss development triangle and selected loss development factors. The next step is to apply the information. The ultimate incurred losses for each loss period can now be estimated. For example, the 2019 12-month evaluation of $1,225,750 (as shown in Figure 2) is multiplied by the 12-month-to-ultimate loss development factor of 3.12 (as shown in Figure 4) to yield an estimated ultimate loss amount of $3,824,340.

HELPFUL INFORMATION

The average factors were derived in Figure 3. The industry factors come from various industry or actuarial sources. The selected factors are determined by the person creating the table based on average factors, industry factors, and judgement.

The cumulative factor 1.25 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 selected factors together (60 to Ult), (48 to 60) and (36 to 48). The calculation is:

36 to Ultimate = 1.25
= 1.10 * 1.03 * 1.10

FIGURE 5 ESTIMATED ULTIMATE INCURRED LOSSES

Period	Incurred Losses	Months of Development	Loss Development Factor	Estimated Ultimate Incurred Losses
2015	$2,869,270	60	1.10	$3,156,197
2016	$2,283,012	48	1.13	$2,579,804
2017	$3,494,596	30	1.25	$4,368,245
2018	$2,850,363	24	1.56	$4,446,566
2019	$1,225,750	12	3.12	$3,824,340

IT IS IMPORTANT TO REMEMBER

Remember, the analytical work an actuary completes does not come out of a black box. If you are working with an actuary who does not provide a straightforward explanation for each step of the analysis — find another actuary!

The development factors applied to incurred losses are selected based on the time that has passed between the beginning of a loss period and the evaluation date of the loss. In most cases, the closer the evaluation date is to the period effective date, the larger the loss development factor will be. This reflects the significant amount of unknown factors which may affect relatively new claims. Conversely, as the period matures, the loss development factors approach 1.00.

Loss development factors are a key component of an actuarial analysis. Developing unique factors based on historical data provides for more accurate estimates. Understanding loss development factors lays the foundation for a more in-depth explanation of IBNR, which is explored in another SIGMA TechTalk issue.

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