EXHIBIT
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BASIC RATEMAKING

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(e.g., reported, paid, or closed claims). Also, a decision should be made whether to include claims that closed without payment.

Severity is a measure of the average loss per claim. If the 7,500 claims above produced $18,750,000 of reported losses as of 18 months, the reported severity as of 18 months is $2,500 (= $18,750,000 / 7,500). The two components of this ratio, losses and claims, can be described and aggregated in various ways—e.g., paid or reported losses; reported, paid, or closed claims with or without claims that closed without payment. In addition, actuaries pricing certain lines of business may use losses developed to ultimate in their severity measures (loss development adjustments will be covered later in this chapter). The ratemaking actuary should give careful thought to how to define severity and be clear in communications to avoid confusion.

Pure premium (also known as loss cost or burning cost) is a measure of the average loss per exposure. It is calculated as the total losses divided by total exposures; this is equivalent to the product of frequency and severity. As with frequency and severity, this calculation involves a choice of relevant statistics. The choice should be consistent with those in the underlying frequency and severity ratios (e.g., if paid claims were used as the numerator of frequency, they should also be used as the denominator of severity). In the example above, the pure premium as of 18 months is $18,750,000 / 150,000 = $125 = 0.05 x $2,500.

Loss ratio is the ratio of losses (or losses and LAE) to premium, which measures the portion of each premium dollar needed to pay losses (or to pay losses and LAE). This metric varies depending on the types of premium and loss used, and the method of aggregation; furthermore, the numerator may or may not include loss adjustment expenses or be developed to ultimate loss levels. As mentioned previously, it is very important to clearly communicate how a particular metric is defined. The most common loss ratio metric is reported loss ratio, or reported losses divided by earned premium. Continuing the example outlined above, if premium earned during the calendar year is $32,000,000, the calendar-accident year reported loss ratio as of 18 months is 58.6% (= $18,750,000 / $32,000,000).

ADJUSTMENTS TO LOSSES

Losses need to be projected to the cost level expected when the rates will be in effect. This is typically done using historical losses with a series of adjustments. Preliminary adjustments may involve removing extraordinary events (e.g., individual shock losses and catastrophe losses) from historical losses and replacing them with a provision more in line with long-term expectations. Immature losses also need to be developed to reflect their ultimate settlement value. Further adjustments may be applied to restate losses to the benefit and cost levels expected during the future policy period.

This text will not prescribe a specific order for the various adjustments to historical losses. The actuary needs to consider how each adjustment is derived in order to assess the order of application. For example, if a catastrophe model outputs ultimate catastrophe losses expected in the future policy period, this provision should be added to non-catastrophe losses that have already been trended and developed to ultimate. If the catastrophe provision is added to non-catastrophe losses, and the sum is then trended and developed, the expected catastrophe losses will be over-adjusted.

development pattern for that accident year.[21] If, on the other hand, the extraordinary loss is reported six months after the end of the accident year, then there will be a large jump in aggregate reported losses from 15 to 27 months, and the 15-to-27 month link ratio will be artificially high for that accident year.

Benefit or coverage changes may also distort loss development patterns. Benefit changes typically affect policies prospectively; in such cases, the effect of the change will first appear in a new accident year row. If the change impacts all claims occurring on or after a certain date, then it is possible that there will be a dramatic change in the absolute amount of losses even though the development pattern is unaffected. In the rare case that the change affects all claims not yet settled regardless of the date the loss occurred, then it may result in a shift of the aggregate loss amounts on a diagonal, which will distort the link ratios. If it is not possible to restate the losses, then any such distortions should be considered during the age-to-age development factor selection process.

The chain ladder method is only one method for calculating loss development. As mentioned earlier, the basic assumption of the chain ladder method is that the historical emergence and payment patterns are indicative of patterns expected in the future. In practice, these assumptions may not hold true. Changes in claims handling methodology or philosophy or even dramatic changes in claims staffing may result in claims being settled faster or slower than historical precedents, and this would violate the basic assumption of the chain ladder method.

In practice, actuaries use a variety of methods to develop losses to ultimate. Some methods, such as Bornhuetter-Ferguson, incorporate a priori assumptions of the expected loss ratio in order to calculate ultimate losses and consequently the outstanding reserve at a point in time. The Bornhuetter-Ferguson method is used in Appendix C. Other methods are used under particular circumstances. For example, the Berquist-Sherman method is often used when a company has experienced significant changes in claim settlement patterns or adequacy of case reserves that would distort development patterns. The method produces adjusted development patterns that are estimated to be consistent with the reserve levels and settlement rates present as of the last diagonal by restating historical development data. Stochastic methods, such as the Mack method, study the variability around loss development so actuaries can better understand the risk of adverse development. These methods are covered in more detail in literature regarding loss reserving methodologies.

In many insurance companies, different professionals may be responsible for estimating ultimate losses for the purposes of ratemaking verses establishing adequate reserve levels. Though the applications are different, the goal of estimating ultimate losses is the same. It is important that these professionals share knowledge of data, methods, and results in order to ensure consistent management of the company.

Loss Trend

In addition to projecting historical losses to an ultimate level, it is necessary to adjust the losses for underlying trends expected to occur between the historical experience period and the period for which the rates will be in effect. Claim frequencies and claim costs are both impacted by underlying factors that may change expected levels over time. These changes in frequency and severity are referred to as loss

[21] This assumes the estimate of the extraordinary loss is reasonably accurate and will change less drastically (as a percentage) than the non-excess losses. If the extraordinary loss increases by more than the normal losses, then the 15-27 month factor will actually be increased.

trends. The actuary should use the available data to estimate the loss trends in an effort to project the historical losses into the future.

Loss Trend Selections

Monetary inflation, increasing medical costs, and advancements in safety technology are examples of factors that can drive loss trends. Social influences also impact loss costs. Actuarial Standard of Practice No. 13, Trending Procedures in Property/Casualty Insurance Ratemaking (Actuarial Standards Board of the American Academy of Actuaries 2009) defines social influences as "the impact on insurance costs of societal changes such as changes in claim consciousness, court practices, and legal precedents, as well as in other non-economic factors." Distributional changes in a book of business also affect frequencies and severities. If the proportion of risky policies is growing, loss costs will be expected to increase.

Actuaries generally measure loss trend by fitting curves to historical data. In addition to analyzing pure premium data, frequency and severity are typically analyzed separately to better understand the underlying drivers of the trend. For example, if an insurance company heavily markets a higher deductible, the resulting shift in distribution will lower frequencies but is likely to increase severities. It may be difficult to detect these changes in a pure premium analysis.

The years chosen to be included in the historical data is based on the actuary's judgment, in consideration of both responsiveness and stability. Though the aim of the analysis is to detect the true underlying trend, influences such as the cyclical nature of insurance and random noise may be difficult to eliminate from the trend analysis. The actuary should, however, adjust the trend data for more easily quantifiable effects such as seasonality and the effect of benefit level changes, which will be addressed later.

Actuaries working in different lines of business may look at different or multiple views of the losses for analyzing trend. In more stable, short-tailed lines of business (e.g., automobile physical damage), the actuary typically analyzes calendar year paid losses for the 12 months ending each quarter. Calendar year data is readily available, the paid loss definition eliminates any distortion from changes in case reserving practices, and the use of 12-month rolling data attempts to smooth out the effect of seasonality. An actuary working on a more volatile and often long-tailed line of business (e.g., workers compensation medical) typically analyzes the trend in accident year reported losses that have already been developed to ultimate and adjusted for benefit changes.

Similar to loss development, it is prudent to undertake the trend analysis on a body of homogeneous claims; this may imply a line of business or something more granular (e.g., separating indemnity and medical losses within workers compensation insurance). Liability claims and property claims are typically analyzed separately. Experience by geography (e.g., state) may also be analyzed separately.

Regardless of loss definition used, frequency, severity, and pure premium are calculated for each time period and the change from period to period is analyzed. Linear and exponential regression models are the most common methods used to measure the trend in the data. The linear model results in a projection that increases by a constant amount for each unit change in the ratio measured (e.g., claim severities). The exponential model produces a constant rate of change in the ratio being measured. Both types of models may be appropriate when measuring increasing trends, though the linear model will eventually project negative values when measuring decreasing trends. Since there is no such thing as a negative frequency or severity in insurance, this is a shortcoming of linear trend models.