2.4 Summary   🕐 **10m**

This section explains methods for selecting and applying data trends in ratemaking. It covers how to adjust data for anomalies, rate, and benefit changes before trending, and considerations for selecting data intervals (monthly, quarterly, yearly) and types (e.g., premium, losses). It describes methods to estimate trends, including linear and exponential approaches, and discusses seasonal adjustments, trend limits, and periods. Both one-step and two-step trending methods are detailed, addressing adjustments for current and projected trends. Finally, it clarifies that trending and development are separate steps that do not overlap in their effects.

Selecting Data for Trending

There are several considerations to make when selecting data to use for trending:

- Trending should be done after adjusting for anomalies and rate and benefit changes.

- Monthly, quarterly, or yearly data can be used, along with different levels of granularity.

- Exposures that are impacted by time-related influences, like inflation, may need trended separately.

- For premiums, trending should be done on average premium per exposure. Either written or earned premium can be used, as written premium is a leading indicator of changes in earned premium.

- Loss trends can be estimated by analyzing pure premium directly or by analyzing frequency and severity separately. Frequency and severity are often analyzed separately because they can change for different reasons and in different directions.

- Exposures, premiums, and losses should be trended consistently when determining the rate level indication.

Estimating a Trend

Approaches for determining a trend include:

1. Simple average of percent changes (typically used for average premiums)

2. Linear or exponential trend fitting (typically used for losses)

With exponential growth, the pure premium trend can be found as:

$$(1 + \text{Pure Premium Trend}) = (1 + \text{Frequency Trend}) \times (1 + \text{Severity Trend})$$

SEASONALITY

12-month rolling data can be used to estimate trends when there is seasonality in the data.

LIMITS

When trending loss data that is subject to limits, the effect of the severity trend on basic limits losses and excess losses should be considered. For a positive severity trend,

$$\text{Basic Limits Trend} \leq \text{Total Limits Trend} \leq \text{Excess Loss Trend}$$

The relationship above is reversed for a negative severity trend.

Determining Trend Periods

The experience period is the time period in which the historical data occurs, while the forecast period is the future time period to which historical data is projected.

The trend period is the length of time from the midpoint of the experience period to the midpoint of the forecast period.

The experience and forecast periods depend on

- the type of data (e.g., earned or written premium or losses)
- the length of the policy term (e.g., 6 or 12 months)
- the type of data aggregation (e.g., calendar/accident year or policy year)
- the length of time rates are expected to be in effect

ONE-STEP TRENDING

The one-step trending approach involves applying a single trend to historical data to adjust it to the forecast period.

- Written premium is trended from the average written date in each historical period to the average written date at the new rate level.

- If the trend is estimated from earned premium data, earned premium is trended from the average earned date in each historical period to the average earned date at the new rate level.

- If the trend is estimated from written premium data, earned premium is trended from the average written date for a time period of earned premium to the average written date at the new rate level.

- Losses are trended from the average accident date in each historical period to the average accident date at the new rate level.

TWO-STEP TRENDING

The two-step trending approach is used when the future trend rate is expected to differ from the historical trend rate.

Step 1 is the current trend step, which adjusts each year's historical data to the average level of the most recent time period in the trend data. This step can be performed in two ways:

1. Trend historical data to the latest time period

2. Adjust historical data to match the current trend level

Step 2 is the projected trend step, which is to adjust the data from the average date of the latest time period to the average date of the future policy period.

$$\text{Total Trend Factor} = \text{Current Trend Factor} \times \text{Projected Trend Factor}$$

OVERLAP FALLACY

The overlap fallacy states that developing and trending data will double-count the effect of inflation and other possible changes. This is not true, as development brings immature values to their expected ultimate values, while trending adjusts the ultimate values from the historical experience period to the period the rates will be in effect.