Summary **10m**

Accurate ratemaking relies on quality data. For existing products, insurers should collect policy and claim data at detailed levels (e.g., individual policy or segment) to allow flexible aggregation by calendar, accident, policy, or report year as needed. External data sources—such as statistical plans, competitor filings, and third-party sources—are valuable for pricing new lines or supplementing internal data.

Exposure types include written, in-force, earned, and unearned, which may be aggregated by calendar or policy year based on analysis requirements. For monthly or quarterly summaries, exposures are often estimated at the midpoint (e.g., “15th of the month”).

Estimating future premiums is essential in loss ratio analyses and may involve various premium types (in-force, written, earned, or unearned) aggregated by calendar or policy year.

Losses, the largest insurance cost, require precise estimation. Pricing actuaries use adjusted historical data to project expected losses for future policy periods.

Compiling Data

Internal data includes:

1. Risk information
2. Accounting information

External data includes:

1. Data call/statistical plans
2. Other aggregated insurance industry data
3. Competitor rate filings/manuals
4. Third-party data unrelated to insurance

Data considerations:

1. Limited data

2. Multiple currencies
3. Large claims
4. Terminology differences

Areas of focus of a data review:

1. Consistency with financial statement data
2. Consistency with prior data
3. Reasonableness of the data
4. Clarity and accuracy of data definitions

Aggregating Data

General goals of data aggregation:

1. Accurately match losses and premium
2. Use the most recent data available
3. Minimize the cost associated with gathering and retrieving data

Calendar year aggregation groups data according to calendar year.

- Advantages:
    - Data is readily available
    - No future development
    - Data is easily accessible
- Disadvantages:
    - Mismatch between premium and losses
    - Inability to capture major developments

Accident year aggregation groups losses according to the accident data.

- Advantages:
    - Easy to achieve and understand
    - Better match of premium and losses than calendar year aggregation

        - Useful for identifying the impact of major claim events or changes due to economic or regulatory forces
    - Disadvantages:
        - Requires estimation of future development
        - Less accurate matching of premium and losses compared to policy/underwriting year aggregation

Policy/Underwriting year aggregation groups data according to the year in which the policies were written.

- Advantages:
    - Best match between losses and premium
    - Useful for identifying the impact of underwriting or pricing changes
- Disadvantages:
    - Longer development time
    - Difficult to understand and isolate the impact of a significant event

Report year aggregation groups data according to the report date.

- Advantage:
    - Provides more stable data than accident year aggregation
- Disadvantage:
    - Development on incurred but not reported claims is excluded

Measuring Exposures and Premium

The calendar/calendar-accident year and policy year methods can be used to aggregate the following types of exposures and premium:

1. Written exposures/premium
2. Earned exposures/premium
3. Unearned exposures/premium

Relationship between written, earned, and unearned exposures/premium:

$$\text{EOY Unearned Exposure} = \text{Written Exposure} - \text{Earned Exposure} + \text{BOY Unear}$$
$$\text{EOY Unearned Premium} = \text{Written Premium} - \text{Earned Premium} + \text{BOY Unear}$$

In-force exposures and premium are measured as of a specific point in time. The in-force premium is always based on the full-term premium amount.

Factors affecting the measurement of exposures and premiums:

1. Mid-term cancellations
2. Mid-term recalculations of premium
3. Policy terms
4. Earning patterns

When summarizing data of a group of policies, it is assumed that all policies were written at the mid-point of the period.

Measuring Losses

Aggregation of losses is based on the following factors:

1. Choice of relevant statistics
    - Paid losses
    - Reported losses
2. Data aggregation method
    - Calendar year
    - Accident year
    - Policy year
    - Report year
3. Period of time
    - Accounting period
    - Valuation date