## Summary

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This section explains diagnostic and development techniques used in ratemaking and reserving. Development triangles help identify data patterns or changes, such as variations in paid or reported losses and claim counts. Developing premiums is necessary for incomplete data periods or audited lines, and uses historical patterns to estimate full premiums. Developing losses, often through the chain-ladder method, projects ultimate losses by applying claim development factors to historical claims data.

## **Development Triangles for Diagnostics**

Development triangles can be examined to understand and identify changes in the data used for ratemaking and reserving. Common examples of development triangles used for diagnostics include:

- Paid losses divided by reported losses
- Total closed claim counts divided by reported claim counts
- Claim counts on closed with payment divided by total closed claim counts
- Claim counts on closed without payment divided by total closed claim counts
- Average case reserves
- Average paid on closed claims
- Average reported

## **Developing Premiums**

Premiums typically need to be developed when an incomplete year of data is used or for lines of business that utilize premium audits. This is commonly done by studying historical patterns of premium development.

## **Developing Losses**

One method for developing losses is the **chain-ladder method**, also known as the **development technique**. The steps for this method are

- 1. Compile claims data.
- 2. Calculate age-to-age development factors.
- 3. Calculate averages of the age-to-age factors for each age (e.g., arithmetic average, medial average, geometric average, volume-weighted average).
- 4. Select claim development factors.
- 5. Select tail factor.
- 6. Calculate cumulative claim development factors.
- 7. Project ultimate claims.