General Insurance
Ratemaking Principles

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Acknowledgements

1. Casualty Actuarial Society
2. Mr. Ron Kozlowski FCAS, MAAA

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Issues

- Ratemaking introduction and considerations
- How is data organized?
- What exposure basis should be used?
- What adjustments need to be made to premium?
- What adjustments need to be made to losses?
- How do we incorporate expenses?
- Some examples of rate indications
- What are catastrophe models and how can I use them?
- How do I analyze increased limit factors?
- What is multivariate classification ratemaking?
What is Ratemaking

• The process of establishing rates used in insurance or other risk transfer mechanisms. This process involves a number of considerations including marketing goals, competition and legal restrictions to the extent that they affect the estimation of future costs associated with the transfer of risk (i.e., claims, claim settlement expenses, operational and administration expenses, and the cost of capital)
Ratemaking Principle (CAS)

1. A rate is an estimate of the expected value of future costs.

2. A rate provides for all costs associated with the transfer of risk.

3. A rate provides for the costs associated with an individual risk transfer.

4. A rate is reasonable and not excessive, inadequate, or unfairly discriminatory if it is an actuarially sound estimate of the expected value of all future costs associated with an individual risk transfer
Considerations

- **Exposure units** – determine an appropriate exposure unit/basis; should vary with hazard and be practical and verifiable.
- **Data** – historical experience (premiums, losses, expenses) is usually the starting point of ratemaking; external data may supplement historical experience; is historical experience predictive of future?
- **Organization of data** – calendar year, accident year, report year, policy year; choice depends on data availability, clarity, simplicity, and nature of insurance coverage.
- **Homogeneity** – ratemaking improved by subdividing experience into groups exhibiting similar characteristics; if heterogeneous – consider segregating into homogeneous groupings.
Considerations (contd)

• Credibility – measure of a predictive value that one attaches to a particular body of data; it is increased by making groupings more homogeneous or increasing the size of the group analyzed; a grouping should be large enough to be statistically reliable; balance between homogeneity and volume of data; what should be complement of credibility

• Loss development – claims may not be mature (i.e., closed) so need to develop to ultimate; emergence patterns, settlement patterns, development patterns

• Trends – past and prospective trends in claim costs, claim frequencies, exposures, expenses, and premiums

• Catastrophes – include an allowance of catastrophes in rates
Considerations (Contd)

• Policy provisions – occurrence vs. claims-made, salvage and subrogation, coinsurance, coverage limits, aggregate limits, deductibles, minimum premiums, coordination of benefits, second injury funds, etc
• Mix of business – distributional changes in deductibles, coverage limitations, types of risks that could affect frequency and severity
• Reinsurance – effects of reinsurance arrangements
• Operational changes – changes in underwriting process, claim handling, case reserving, marketing practices
• Other influences – judicial environment, regulatory and legislative changes, social considerations, guaranty funds, economic variables, residual markets, pools & associations
• Classification plans
Considerations (Contd)

• Individual risk rating – if an individual’s risk sufficiently credible, premium could be modified to reflect individual experience; experience mods; consider impact to overall experience

• Risk – rate should include a charge for the risk of random variation from expected costs; reflect in contingency provision

• Investment and other income – consider investment returns, duration, past vs. future

• Actuarial judgment – reasonableness, standards of practice
Basic Ratemaking Approaches

- Loss Ratio Method
- Application -- Rate Adequacy and Rate Change
- Pure Premium Method
- Increased Limit Factors
- Deductibles
Accumulation of Data

- Matching of Exposures and Experience
- Accident Year/Calendar Year
- Policy Year
- Advantages
- Disadvantages
- Report Year for Claims Made Policy
- Other issues
Exposures

• Basic unit that measures a policy’s exposure to loss
• Criteria for exposure bases
  – Proportional to expected losses
    • Motor: “No cars of the same group” is a better exposure of loss than amount insured
    • Worker compensation: a bit trickier; payroll is being used; discuss no of workers as an alternative
  – Practical – objective and relatively easy and inexpensive to obtain and verify
    • Precludes policyholders and producers from manipulating exposure information
      – Motor: use of # of miles affected by moral hazard
        (but telematics might be the future)
      – Products liability: gross sales better than products in use
  – Historical precedence
    • Change in exposure could cause significant changes in premiums
    • May require change to rating manual
    • Since multiple years used in ratemaking may need significant data adjustments for future analyses
      – e.g., workers compensation: hours worked better measure for medical coverage than payroll
        but transition deemed to difficult

• Other Examples? there may be a need for valid proxies
Adjustments to Premiums

- Current rate level adjustments
- Development to ultimate
- Premium trend
- Change in the mix of business
Adjustment to Losses

• Losses need to be projected to the cost levels expected when rates will be in effect
  – Removing extraordinary events
  – Add a load for “expected” extraordinary events
  – Immature losses need to be developed to ultimate settlement value
  – Restate losses to expected benefit or coverage levels
  – Restate losses to expected cost levels (trend)
• Incorporation of loss adjustment expenses
• Important to consider the order in which losses are adjusted
  – (e.g., historical catastrophe losses, modeled catastrophe losses, shock losses)
AD to L (Contd)

• Catastrophes / Large Losses should be eliminated from losses
• Average provision should be used as a loss loading
• Similar adjustment for reinsurance
• Essentially -- Do not double count but make sure that all losses are included
Trending of Losses

• Project to the loss level predicted to exist during pricing period
  – Inflation (e.g., medical costs, replacement parts)
  – Social inflation (e.g., coverage awareness, court decisions, jury awards)
  – Risk management influences (e.g., safety devices, revised patient lifting procedures)
  – Coverage changes (e.g., +/- new coverages, deductibles, sublimits)
  – Seasonality
  – Layers
    • basic limit trend ≤ total limits trend ≤ excess limits trend

• Expense Trends
### Target Loss Ratio

<table>
<thead>
<tr>
<th>Category</th>
<th>Total</th>
<th>Variable</th>
<th>Fixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissions</td>
<td>10.0%</td>
<td>10.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Other Acquisition</td>
<td>4.0</td>
<td>0.0</td>
<td>4.0</td>
</tr>
<tr>
<td>General</td>
<td>5.0</td>
<td>0.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Taxes, Licenses &amp; Fees</td>
<td>3.5</td>
<td>3.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Profit &amp; Contingency</td>
<td>7.0</td>
<td>7.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Other Costs *</td>
<td>0.5</td>
<td>0.5</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>30.0%</td>
<td>21.0%</td>
<td>9.0%</td>
</tr>
</tbody>
</table>

Target Loss ratio = 1 – Variable Cost – Profit Load + Investment Income
Basic Rate Equations

• Loss ratio (LR) method
  – develops indicated rate change
  – indicated rate change = [(experience LR + fixed expense ratio) / target LR] – 1.0

• Pure premium (PP) method
  – PP = loss / exposure units
  – develops indicated rate per unit of exposure (R)
  – R = [PP + FE] / [1-VER-Profit Ratio]