2022 Liberty Mutual Case Competition

Team 14:
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Agenda

1. Reserving Objective
2. Reserving Methods
3. Ultimate Loss Selections
4. Standardization
5. CAT Reserving
Reserving Objective
Why is reserving necessary?

Legitimacy

Business Decisions

Laws
Reserving Methods
Reserving Methods

- Chain Ladder
- Bornhuetter-Ferguson
- Expected
- Frequency-Severity
Chain Ladder Method

Total Ultimate Loss

Reported: 200,740,175
Paid: 329,257,430

Total Incurred Loss: 346,224,812

Homeowners

*Numbers are in US dollar
Total Ultimate Loss

Reported: 66,011,648

Paid: 60,912,199

Total Incurred Loss: 97,615,551
Chain Ladder Method

Total Ultimate Loss

Reported: 26,367,701

Paid: 22,855,274

Total Incurred Loss: 32,471,048
Chain Ladder Method

**Pros**
- Straightforward
- Uses historical Loss development patterns

**Cons**
- Random fluctuations in data
- Prone to errors
Expected Loss Ratio Method

Expected Loss Ratio: 1.07

Total Ultimate Loss: 490,937,605

Total Incurred Loss: 346,224,812

Emerging Liability: 144,712,793
Expected Loss Ratio Method

Expected Loss Ratio: 0.99

Total Ultimate Loss: 452,193,528

Total Incurred Loss: 346,224,812

Emerging Liability: 105,968,716
Expected Loss Ratio Method

Expected Loss Ratio: 0.85
Total Ultimate Loss: 76,827,129
Total Incurred Loss: 97,615,552
Emerging Liability: (20,788,422)
**Expected Loss Ratio Method**

**Expected Loss Ratio:**
1.09

**Total Ultimate Loss:**
98,970,936

**Total Incurred Loss:**
97,615,552

**Emerging Liability:**
1,355,384
Expected Loss Ratio Method

Expected Loss Ratio: 0.85

Total Ultimate Loss: 68,179,057

Total Incurred Loss: 32,471,048

Emerging Liability: 35,708,008
Expected Loss Ratio Method

**Pros**

- Works with
  - Lack of past claims and small sample size

**Cons**

- Lack of sensivity in data
- Less accuracy
Bornhuetter-Ferguson Method

Homeowners Property

Personal Auto Physical Damage

Personal Auto Liability

- Total Ultimate Loss
- Total Incurred Loss
- Emerging Liability
Bornhuetter-Ferguson Method

Pros

More responsiveness to data
Better stability

Cons

Requires accurate development pattern
Ineffective balance with inaccuracy in patterns
Frequency-Severity Method

Homeowners Property

- Ultimate Loss
- Premium

Total Ultimate Loss: 300,175,793
Total Incurred Loss: 346,224,812
Emerging Liability: (46,049,019)
Frequency-Severity Method

Total Ultimate Loss: 58,322,797
Total Incurred Loss: 97,615,551
Emerging Liability: (39,292,755)
Frequency-Severity Method

Personal Auto Liability

Total Ultimate Loss: 28,591,573
Total Incurred Loss: 32,471,048
Emerging Liability: (3,879,475)
Frequency-Severity Method

Homeowners Property

- Total Ultimate Loss
- Total Incurred Loss
- Emerging Liability

Personal Auto Physical Damage

- Total Ultimate Loss
- Total Incurred Loss
- Emerging Liability

Personal Auto Liability

- Total Ultimate Loss
- Total Incurred Loss
- Emerging Liability
Frequency-Severity Method

Pros

Past to determine future
Better consistency

Cons

Lack of efficient data
Underestimation
Ultimate Loss Selections
Ultimate Loss Selections

Homeowners Property
2012-2020
Bornhuetter-Ferguson Method

Auto Liability
2011-2017
Bornhuetter-Ferguson Method

Homeowners Property
2011
Chain Ladder Method

Auto Physdam
2011-2020
Bornhuetter-Ferguson Method

Auto Liability
2018-2020
Expected Loss Ratio Method
Standardization

To reduce the amount of time needed to complete the reserve analysis
Recommendation:
Standardize the Personal Auto Physical Damage Line of Business

Development factor stabilizes first

Short payment cycle

Easier to model
10-Year Ultimate Loss Range (Paid Chain Ladder)

- PHYSDAM: $1,466,424
- LIABILITY: $6,050,908
- HOMEOWNERS: $19,212,413
Method of Choice: Bornhuetter-Ferguson

Total Incurred Loss vs. Total Ultimate Loss Predictions

Total Ultimate Loss Predictions

<table>
<thead>
<tr>
<th>Method</th>
<th>Physdam</th>
<th>Liability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chain Ladder (Reported)</td>
<td>66,011,648</td>
<td>26,367,701</td>
</tr>
<tr>
<td>Chain Ladder (Paid)</td>
<td>60,912,199</td>
<td>22,855,274</td>
</tr>
<tr>
<td>Expected</td>
<td>76,827,129</td>
<td>68,179,057</td>
</tr>
<tr>
<td>Bornhuetter-Ferguson</td>
<td>99,990,075</td>
<td>35,293,731</td>
</tr>
<tr>
<td>Frequency-Severity</td>
<td>58,322,797</td>
<td>28,591,573</td>
</tr>
</tbody>
</table>

Total Incurred Loss

97,615,552 32,471,048
Benefits of a Hybrid Method:
- Responsiveness
- Stability

Method of Choice: Bornhuetter-Ferguson
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CAT Reserving
CAT Reserving

Accumulation

Pre-Tax Basis
Challenges with CAT Reserving

Limited Data
- Limited amount of historical catastrophe data
  - Estimating losses is challenging

Time Difference
- Significant gap between accident date and when the loss is settled
  - Insurance agency can face a greater loss if the exchange rate changes

Increase in Claims
- Increase in the number of claims when a catastrophe happens
  - Insurer has to pay more than what is in the xCAT model and cash flow
Thank you!

Team 14