REINSURANCE STRUCTURING & OPTIMIZATION

4th Capacity Building Seminar in General Insurance – Institute of Actuaries of India

Presented By: Hiten Kothari

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Contents

- Indian Reinsurance Market
- Reinsurance Structure Considerations
- Reinsurance Structuring
- Reinsurance Optimization
- Conclusion
Indian Reinsurance Market

- Approx. INR 150bn – INR 180bn Premium expected to be ceded during 2013-14
- Treaty Reinsurance forms 25% - 30% of the total RI spend with the rest being Facultative
- Treaty RI business is split into Proportional and Non-Proportional in the ratio 3:1
- In terms of RI premiums, GIC Re is the leading reinsurer followed by Berkshire Hathway, SCOR and Swiss Re
- Fire and Engineering class mainly reinsured via Surplus, Risk XL and CAT XL treaties
- Motor and Marine class are mainly gross Risk and CAT XL.
- Broker involvement to liaise with Foreign Reinsurers
Public Insurance companies have ceded about 30%-35% of the total gross direct premiums (excl Obligatory) for Fire, Engineering and Marine Cargo classes.

For the Motor class less than 10% of the premiums are ceded.

Aviation and Hull business is reinsured mainly within the London market.
Private Insurance companies comparatively retain a very small share of the total gross direct premiums (excl Obligatory) as compared to the Public Sector Insurance Companies.

For the Motor class less than 10% of the premiums are ceded.
REINSURANCE STRUCTURE CONSIDERATIONS
Reinsurance Structure Considerations

• What are the Company’s Goals?
  — Preserve/Create Surplus i.e. Risk Policy and Tolerance
  — Reduce Exposure and Manage Volatility
  — Maintain/Support Capital
  — Business Objective

• Peer Comparison

• Reinsurance Pricing
REINSURANCE STRUCTURING
Proportional Treaty

- **Quota Share**
  - Reinsurer loss experience mirrors that of the cedant. So historical experience of the gross book is important
  - Reinsurer might prescribe underwriting and claims management philosophy for the cedant

- **Surplus**
  - Risk Retention i.e. How much to retain per risk?

- Commission terms i.e. Ceding commission (Flat Commission or Sliding Scale) and Profit commission

- Loss Corridors features
The graph above shows the Risk Retention for Fire and Engineering class of business as a percentage of company’s net worth for the top 10 Indian non-life insurance companies.
Factors Affecting Risk Retention

- Financial Strength
- Insurer’s willingness to take on risks
- Reinsurance Market
- Solvency Regulations
- Underwriting Capacity
- Tradition and Market Practice
- Mix of Business i.e. diversification
Non-Proportional Treaty

- Deductible and Limits for the treaty
  - Too low deductible might result in just dollar swap
  - Too high deductible might mean it's not effective
  - Impact of increasing/reducing deductible/limit
- No. Of Reinstatements
  - What is the chance that the treaty is completely exhausted?
- Alternative Layering suitable i.e. Price advantage
- Should I drop my Surplus/QS and go pure XL?
- Peer/Market Benchmarking
Risk Adjusted Pricing

- Graph plots the Rate on Line charged against the Risk-adjusted layer mid-point for various XL layers
- Can be used to determine changes in Reinsurance rates year-on-year
- Can also be used to benchmark Risk XL pricing across the different companies in a given year
REINSURANCE OPTIMIZATION
Proportional Reinsurance Optimization – Classic Method

Stage 1: Gross Loss Modeling
- Determine the gross underwriting result distribution for the class of business or Portfolio
- Risk Profile based modeling can allow for change in Risk Retention appropriately

Stage 2: Model existing RI Structure
- Model the existing RI structure and determine the appropriate risk metrics e.g. Expected Net Profit, Economic Capital or Return on risk adjusted capital
- Determine pricing factors

Stage 3: Model alternate Risk Retentions
- Model the alternative RI structure with increase/reduce Risk retention
- Determine the risk metrics
- In case of XL structures, adjust technical rates to determine market rates

Stage 4: Compare Results
- Compare the risk metrics across different structures to select the Risk retention that optimizes the Risk metric
Impact on Profitability and Capital at Risk

<table>
<thead>
<tr>
<th>Impact on Profitability and Capital at Risk</th>
<th>Expected Profit and Loss Account</th>
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</thead>
<tbody>
<tr>
<td>Expected Profit and Loss Account</td>
<td></td>
</tr>
<tr>
<td><strong>Gross 2012</strong></td>
<td><strong>Alt 1</strong></td>
</tr>
<tr>
<td>Gross Premium</td>
<td>10,014,000,000</td>
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<tr>
<td>Reinsurance Premium</td>
<td></td>
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<tr>
<td>- Base Premium</td>
<td>0</td>
</tr>
<tr>
<td>- Reinstatement Premium</td>
<td>0</td>
</tr>
<tr>
<td>Net Premium</td>
<td>10,014,000,000</td>
</tr>
<tr>
<td>Expenses</td>
<td>2,793,906,000</td>
</tr>
<tr>
<td>Underwriting Result (A)</td>
<td>588,303,214</td>
</tr>
<tr>
<td>Capital at Risk</td>
<td></td>
</tr>
<tr>
<td>VaR (1 in 200 years)</td>
<td>2,551,318,548</td>
</tr>
<tr>
<td>Cost of Capital (B)</td>
<td>255,131,855</td>
</tr>
</tbody>
</table>

- Normal for gross underwriting result to be better than net – this is an average result so takes into account good years as well as bad
- If net is better than gross – could mean reinsurance programme is very cheap – normally reinsurers price for a profit!
- However, when cost of capital is taken into account, net after reinsurance should be much better
- The greater the cost of capital applied the bigger the difference from gross
- The optimal structure will have the highest economic result

Value at Risk = 1 in 200 “bad” underwriting result, i.e. the capital a client would need to hold to be sure of meeting its liabilities in a bad year

Cost of Capital = charge applied to represent costs associated with maintaining or raising that amount of capital

Economic result = Underwriting Result less Cost of Capital
Impact on Profitability – Return on Capital

Variation of previous report
Adds line showing Return on Capital = Underwriting Result / Value at Risk

<table>
<thead>
<tr>
<th></th>
<th>Gross Premium</th>
<th>2012</th>
<th>Alt 1</th>
<th>Alt 2</th>
<th>Alt 3</th>
<th>Alt 4</th>
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<tbody>
<tr>
<td>Gross Premium</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Base Premium</td>
<td>0</td>
<td>194,805,000</td>
<td>187,200,000</td>
<td>180,350,000</td>
<td>191,850,000</td>
<td>175,700,000</td>
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<tr>
<td>- Reinstatement Premium</td>
<td>0</td>
<td>24,114,595</td>
<td>26,237,981</td>
<td>26,244,456</td>
<td>26,469,860</td>
<td>26,012,577</td>
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<tr>
<td>Net Premium</td>
<td>10,014,000,000</td>
<td>9,795,080,405</td>
<td>9,800,562,019</td>
<td>9,807,405,544</td>
<td>9,795,680,140</td>
<td>9,812,287,423</td>
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<tr>
<td>Net Retained Losses</td>
<td>6,631,790,786</td>
<td>6,495,658,785</td>
<td>6,491,741,878</td>
<td>6,491,282,227</td>
<td>6,489,186,641</td>
<td>6,493,837,464</td>
</tr>
<tr>
<td>Expenses</td>
<td>2,793,906,000</td>
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</tr>
<tr>
<td>Underwriting Result (A)</td>
<td>588,303,214</td>
<td>505,515,620</td>
<td>514,914,142</td>
<td>522,217,316</td>
<td>512,587,499</td>
<td>524,543,999</td>
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<tr>
<td>Capital at Risk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VaR (1 in 200 years)</td>
<td>2,551,318,548</td>
<td>1,690,152,729</td>
<td>1,662,540,556</td>
<td>1,678,434,836</td>
<td>1,666,767,176</td>
<td>1,673,784,836</td>
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<tr>
<td>Cost of Capital (B)</td>
<td>255,131,855</td>
<td>169,015,273</td>
<td>166,254,056</td>
<td>167,843,484</td>
<td>166,676,718</td>
<td>167,378,484</td>
</tr>
<tr>
<td>Economic Return on Capital</td>
<td>23.059%</td>
<td>29.909%</td>
<td>30.972%</td>
<td>31.113%</td>
<td>30.753%</td>
<td>31.339%</td>
</tr>
</tbody>
</table>
Illustrates how reinsurance reduces volatility in underwriting result and which structure is most effective in doing this.
• Plot the Risk-Reward for gross and each of the alternative structures on the graph

• Best retention option should have best return for least amount of capital at risk and appear in the top left corner

Select the alternative that minimizes risk and maximizes reward
**Risk XL - Comparison of Technical Rates v/s Market Rates**

<table>
<thead>
<tr>
<th>Component</th>
<th>Technical ROL</th>
<th>Estimated Market ROL</th>
<th>Technical ROL Standard Deviation</th>
<th>Loading Rate</th>
<th>Risk Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Layer 1</td>
<td>17.300%</td>
<td>25.194%</td>
<td>36.003%</td>
<td>1.456</td>
<td>21.926%</td>
</tr>
<tr>
<td>Layer 2</td>
<td>8.548%</td>
<td>13.376%</td>
<td>25.421%</td>
<td>1.565</td>
<td>18.990%</td>
</tr>
<tr>
<td>Layer 3</td>
<td>2.628%</td>
<td>1.635%</td>
<td>14.536%</td>
<td>0.622</td>
<td>(6.827)%</td>
</tr>
<tr>
<td>Layer 4</td>
<td>0.804%</td>
<td>0.994%</td>
<td>7.759%</td>
<td>1.237</td>
<td>2.452%</td>
</tr>
</tbody>
</table>

- Tech ROL Standard Deviation is the volatility around the Technical ROL and is an indicator of risk – higher for lower more loss affected layers.
- But Co-efficient of variation (standard dev / tech ROL) will be higher for upper layers since these are more volatile even if lower risk overall.
- Loading Rate = Market ROL/Tech ROL – doesn’t take into account volatility of result and just loads the “mean” (tech ROL).
- Risk Factor is the % of the Tech ROL Standard Dev. applied to the Tech ROL to get to the Market ROL. This is a volatility neutral load and so is directly comparable between layers. Can also be described as the Standard Deviation Load.
Classic Method Limitations

- Limited number of options to choose from
- Inability to consider multiple goals or constraints at the same time
- Subjectively limited to initially selected choice of structures
• Risk Retention can be optimized using any one of the following criterias:
  — de Finetti criterion i.e. minimize the variance of the retained loss under the constraint that the expected gain is fixed
  — RORAC criterion i.e. maximize the return on risk adjusted capital of the retained risk
• RORAC is the ratio of Net Profit to the Required Solvency level less retained premium
Final Words

- Reinsurance should be based on the underwriting strategy and not vice-versa
- Reinsurance structuring requires technical knowledge and Appointed Actuary should be involved in the decision making process
- Tap the resources of Reinsurance Brokers
THANK YOU!!

Hiten Kothari
+91 (0) 9867 007 740
hiten.kothari@almondz.com