Reinsurance Pricing Basics

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Outline

• Overview
• Rating Techniques
  – Experience
  – Exposure
• Loads and Discounting
• Current Issues
• Role of Actuary
Overview

- Aimed at those with no experience of reinsurance pricing
- Focus on Individual Loss Excess of Loss protections
- Techniques can be applied to both Property and Casualty
Rating techniques

Experience Rating
• Uses contract-specific losses and exposure to derive expected losses to contract, covers range of methods including:
  – Basic burning cost
  – Stochastic Frequency – Severity approach

Exposure Rating
• Uses the reinsurance exposures together with industry data (e.g. loss ratio and severity patterns) to derive expected losses to contract
Example Experience Approach
Severity

- Triangulate individual losses by appropriate cohort
- Trend for inflation to mid point of exposure period
- Other adjustments? (As-if ing)
- Project losses (open losses only?)
- Fit a severity distribution
Example Experience Approach

Frequency

1. Triangulate number of claims xs a common threshold
2. Project number of claims (e.g. using chain ladder / BF etc.)
3. Exposure adjust against appropriate exposure base
4. Select expected frequency per unit of exposure
5. Fit a distribution e.g. Poisson / Negative Binomial
Experience Rating
Modelling Losses to Contract

• Check how contract responds to losses
• Common contract features:
  – Reinstatement conditions, e.g. number and rate
  – Indexation
  – How are Loss Adjustment Expenses allocated, e.g. “Pro-Rata in addition” or “Costs Inclusive”
• A simple burning cost is normally a good check, especially for working layers
Experience Rating Considerations

• Is there sufficient experience?
  – Size of book
  – Scarcity of large losses

No losses to the contract does not imply rate = 0!

• Is the history an appropriate base? How has the book changed, can this be adjusted for?
Expected Loss = Premium * Loss Ratio

Reinsurance Layer

Original Ground Up Premium

Ground up expected losses

How to allocate these to layer?
Severity Curve Allocation Example

- **Policy Details**
  - Policy Limit: 10,000,000
  - Expected Losses: 100,000
  - Ground up Policy
A Couple of Rating Terms

• Given a severity curve $F$, with density function $f$ …

• Limited Expected Value at $L = \int_0^L xf(x)dx + L \times (1 - F(L))$

• Increased Limits Factor at $L = \frac{LEV(L)}{LEV(Base\ Limit)}$
  
  Note that these differ from ILFs used to compute premium, which usually include a compensatory margin for the increased volatility at higher limits

• $E[Loss\ in\ Layer] = [LEV(L + A) - LEV(A)] \times E[No.\ of\ Claims]$
  
  $= E[Losses] \times \frac{ILF(L + A) - ILF(A)}{ILF(Pol.\ Limit + Excess) - ILF(Pol.\ Excess)}$
Severity Curve Allocation Example

- **Policy Details**
  - Policy Limit: 10,000,000
  - Expected Losses: 100,000
  - Ground up Policy
Excess Points Matter!

- Charge per marginal unit of exposure gets more uniform in the tail of the distribution
  - Mathematically, $Pr(X>x+y/X>x) \approx 1$ as $y$ becomes small relative to $x$
  - This translates to greater excess of loss rates for excess portfolios
Exposure Rating Curves

Types of Curves
- Theoretical – e.g. LogNormal, Pareto, Exponential
- Mixed curves – e.g. ISO mixed exponential

Sources of Curves
- US Casualty – ISO, NCCI (WC)
- Property – MBBEFD (Bernegger paper), ISO, Various older sources
Exposure Rating Considerations

• Take appropriate account of limits, attachments and lines

• Ventilated policies – data must enable identification of layered policies issued to the same insured covering the same risks

• Do your parameters approximate behaviour well for the class and region?
  – Loss ratio
  – Severity Distribution

• Checks against experience
  – Implied frequency = \[ \sum (\text{Expected Losses} / \text{Policy LEV}) \]
  – Distribution of losses
  – Is the experience credible?
  – Is the exposure model a bad fit?
Clash Type Covers

Natural Catastrophes

- Simplistic modelling on history
- Exposure modelling, e.g.
  - Vendor models
  - In house

Other types of clash

- Casualty
Proportional Covers

- Commission Terms
- Developing view of prospective Loss Ratio is key
- Rate changes important consideration
- Coverage features?
Loadings and Discounting

Discounting

• Price on undiscounted or discounted basis?
• Rate
• Payment Pattern

Reasons for loadings:

• Expenses
• Brokerage
• Volatility
• Profit margin
Loadings and Discounting

Ways to load:

• % of:
  – Expected Loss, SD

• Percentile

• Allocate capital to contract and required return

Expressing Final Rate

• Adjustable: % of subject premium

• Rate on Line: % of reinsurance limit
Current Issues

• Impact of TAS on transactional pricing
• Changing environment:
  – PPOs
  – Economy
  – Solvency II
Role of Actuary in Pricing

Organisations:

- Reinsurers
- Insurers
- Brokers
- + More?
Recap

• Rating Techniques
  – Experience
  – Exposure
• Loads and Discounting
• Current Issues
• Role of Actuary
Questions or comments?

Expressions of individual views by members of The Actuarial Profession and its staff are encouraged.

The views expressed in this presentation are those of the presenters.