

General Insurance Pricing Seminar



Institute of Actuaries of Australia

Pricing Alternative forms of Commercial insurance cover

Andrew Harford



Pricing alternative covers

- Types of policies
- Overview of Pricing Approaches
- Total claim cost distribution
- Discounting Cash flows
- Adjusting quote for differences in cover
- Conclusion



Types of Policy

- Conventional
- Policies where insurer only pays some claims
 - Aggregate
 - XOL
- Policies involving premium adjustments
 - Burner
 - CED



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Role of underwriter

- Quote for conventional
 - Exposure
 - Claim experience
 - Changes over time
- Breakdown of premium
 - Expected claim number and size
 - Expenses
 - Cost of reinsurance
 - Profit



Pricing approaches

- Aggregates and XOLs - insurer does not pay all claims and receives fixed premium
- CEDs and Burners - insurer pays all claims but there are premium adjustments
- Different approach required for the two groups:
 - Adjusting for differences in cover
 - Discounting expected cash flow



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Distribution of total claim cost

- Need a distribution of total claim costs:

$$T = X_1 + X_2 + \dots + X_N$$

- For aggregate need it to assess cost of claims over aggregate limit
- For Burners and CEDs also need this distribution
- Derive using assumptions about distribution of claim numbers and claim sizes

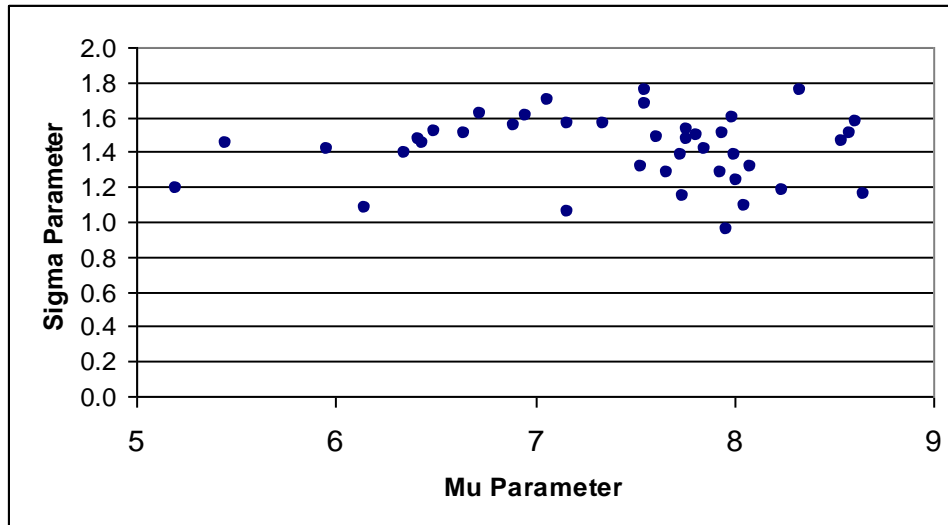


Claim number distributions

- Choose the **form** of the distribution: Poisson, Negative binomial, ...
- Choose **parameters** of the distribution
- Set expected value equal to underwriters assessment
- Model different claim types separately

Claim size distributions

- Choose the **form** - Lognormal, Gamma, ...
- Test validity of selection
- Use underwriter's assessment to set mean
- How to set variance?





Simulation

- Quick with modern computing power
- Simple to implement
- Easy to understand
- Flexible - Calculate other items of interest

Other considerations

- Development delays
- Model and parameter uncertainty
- Accumulations





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Discounting expected cash flows

- Burners and CEDs insurer pays all claims
- Premium adjustments depending on claims
- Simulate potential claims for a year and the premium adjustments they generate
- Calculate the expected value of future premium adjustments
- Discount expected premium adjustments and make equal to Conventional quote



Discounting expected cash flows

- Considerations :
 - credit rating of insured
 - development of claims
 - Uncertainty in constructing claim distributions



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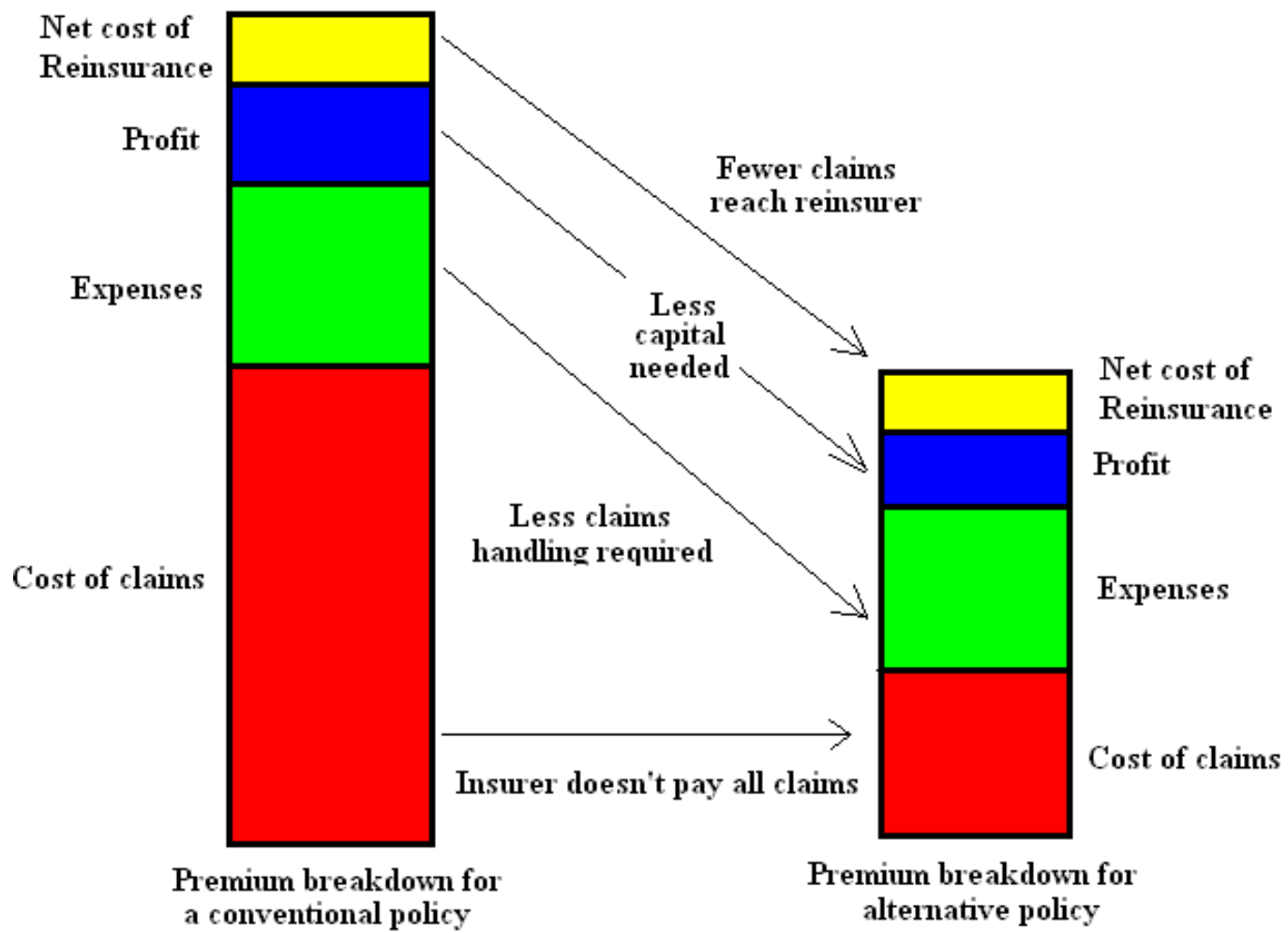


Adjusting for differences in cover

- Underwriter produces quote for conventional policy
- Start of with underwriters assessment and adjust for differences in cover



Adjusting for differences in cover



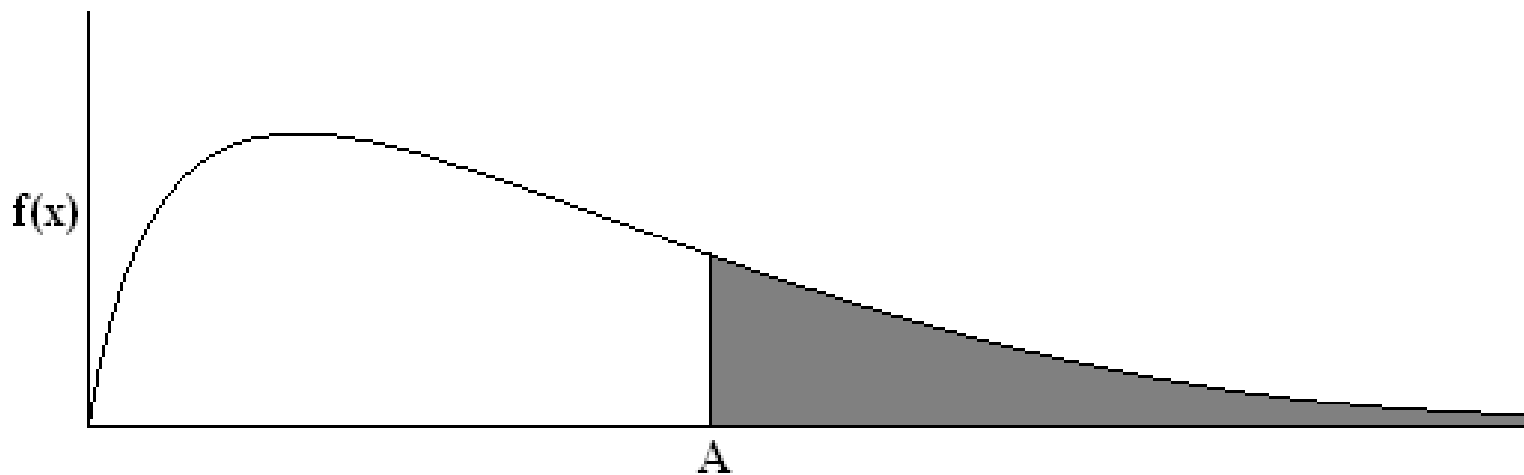


Adjusting for differences in cover

- Suitable for Aggregates and XOLs
- Ensures consistency with underwriter's quote
- Relies on skill of underwriter

Expected cost of claims

- Compute $\text{Max}(T-A, 0)$ in each simulation and get average





Expenses

- Claims handling
 - Claims handled by client or insurer?
- Underwriting
 - Time involved preparing quote
- Overheads



Reinsurance

- Reinsurance recoveries calculated for each simulation for the conventional and the alternative risk
- Derive ratio for average recovery from conventional and from alternative
- Apply this ratio to reinsurance margin in conventional quote



Investment income

- Delays in paying claims:
 - Typically involves larger claims
- Not usually material on short tail lines



Profit

- Consider level of capital needed for conventional policy versus capital for alternative policy
- No consensus



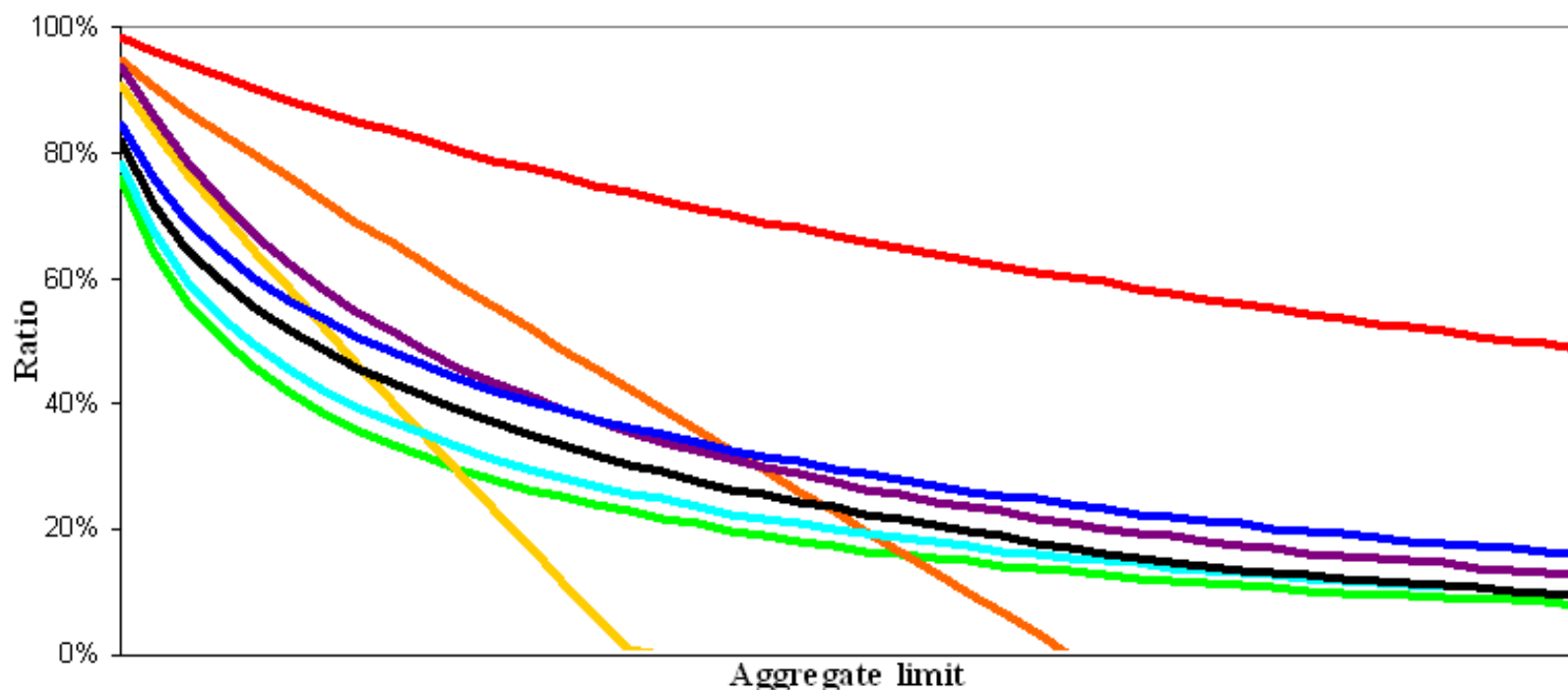
Profit – some approaches

- Standard deviation
- Value at risk
- Probability of meeting claims to some level
- Proportional hazards
- Capital consumption
- Game Theory



Profit – comparison of methods

How the ratio for each method varies with the Aggregate limit



Aggregate cost as a percentage of conventional cost

Method 2 - 99% probability

Method 3 - VAR

Method 4 - PH transform, r=0.95

Method 1 - based on standard deviation

Method 2 - 98% probability

Method 4 - PH transform, r=0.8

Method 5 - Game theoretic



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Conclusion

- Modifying the underwriter's quote
 - Consistency
 - Tractability
 - Simplifies some of the calculations
 - Use knowledge & skill of underwriter