The Actuarial Profession
making financial sense of the future

General Insurance Pricing Seminar
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# 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

Expected Losses + Loads = Premium

### 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

Triangulate number of claims xs a common threshold

Project number of claims (e.g. using chain ladder / BF etc.)

Exposure adjust against appropriate exposure base

Select expected frequency per unit of exposure

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

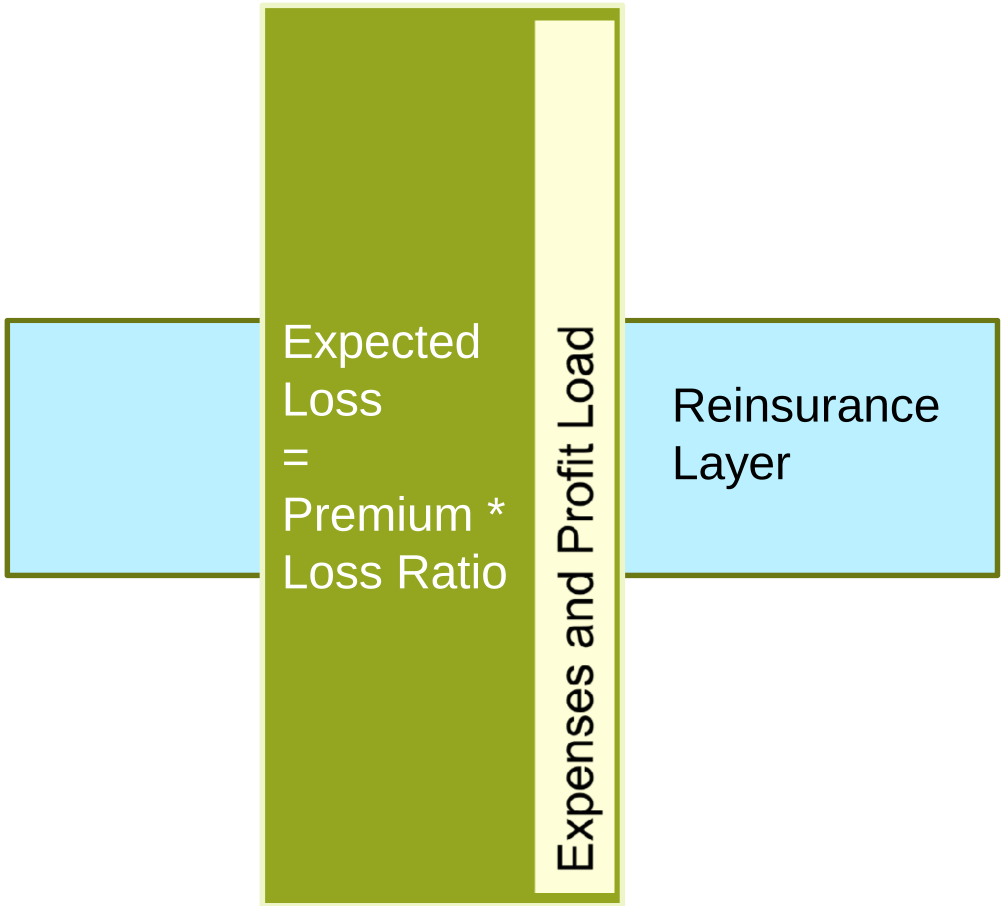
# Experience Rating Considerations

- Is there sufficient experience?
  - Size of book
  - Scarcity of large losses

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

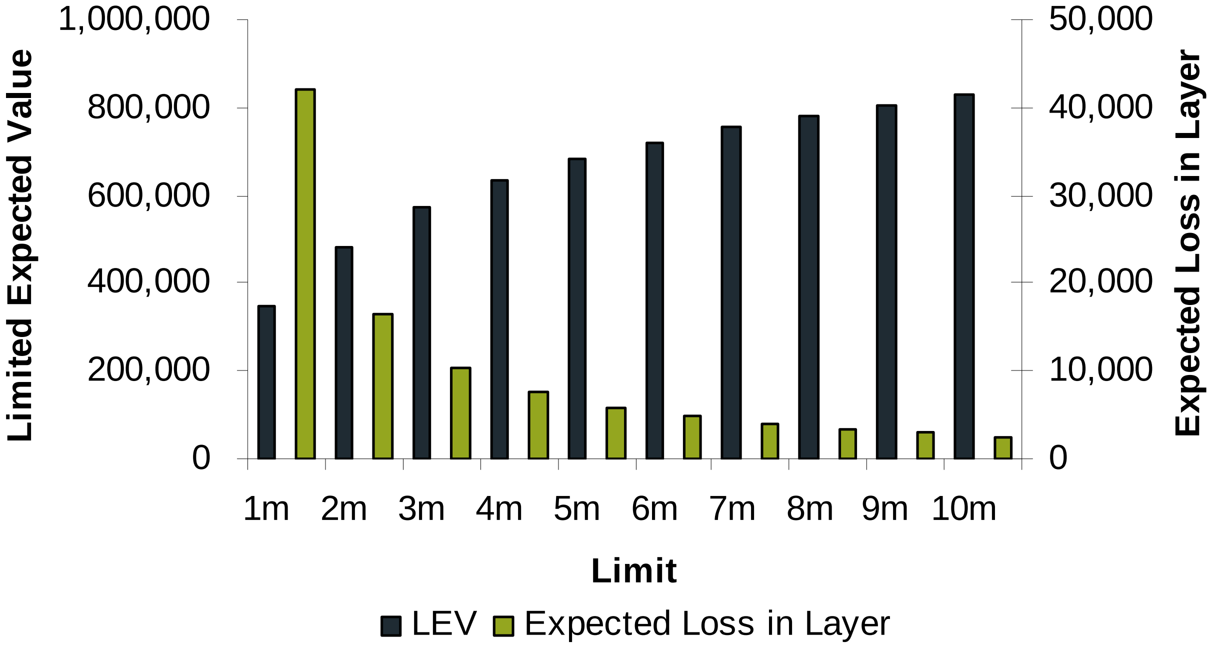
- Is the history an appropriate base? How has the book changed, can this be adjusted for?

# Exposure Rating




# 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 = $\dfrac{LEV(L)}{LEV(Base\ Limit)}$
  - 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] = $[LEV(L+A) - LEV(A)] \times E[No.of\ Claims]$

$$= E[Losses] \times \frac{ILF(L+A) - ILF(A)}{ILF(Pol.Limit + Excess) - ILF(Pol.Excess)}$$

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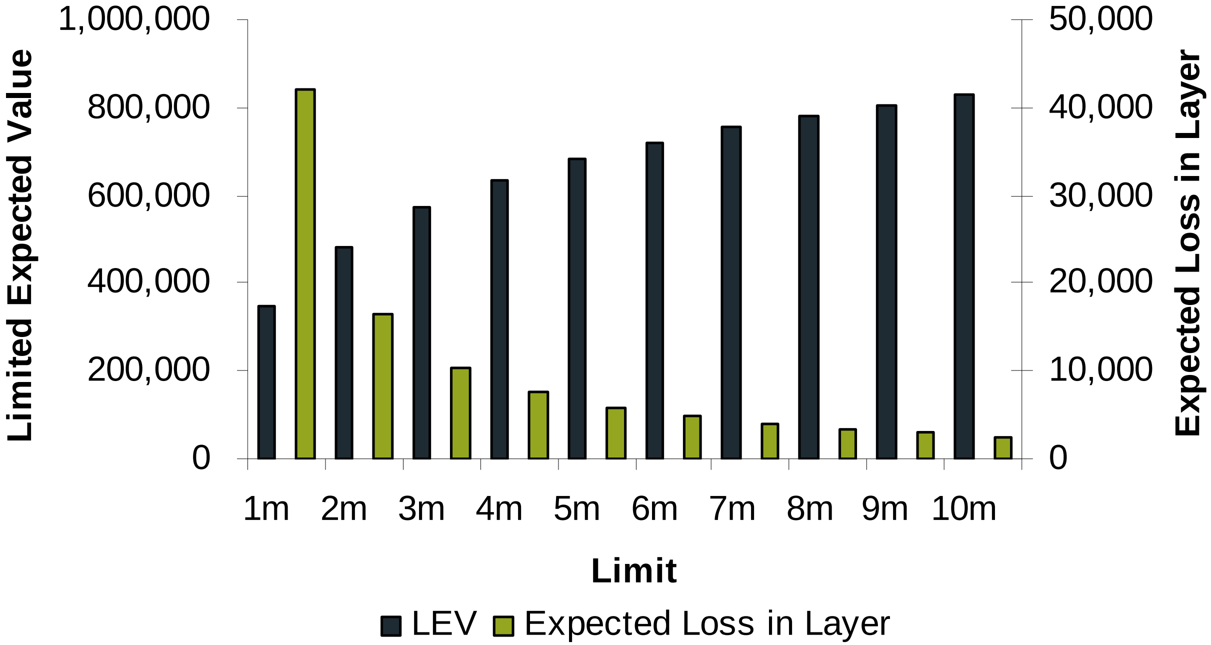
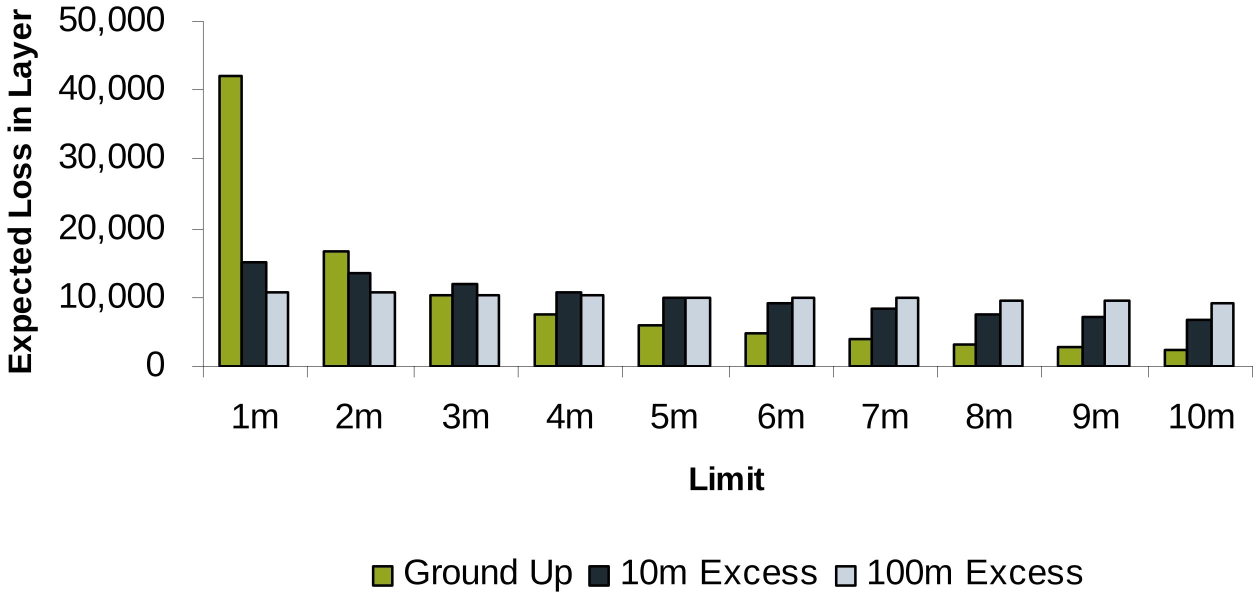


# Excess Points Matter!

- 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 = $\sum (Expected\ Losses / Policy\ LEV)$
  - 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.