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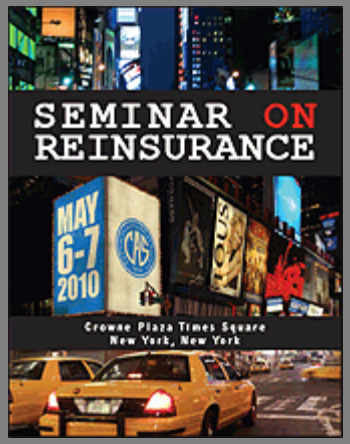

May 6 - 7, 2010

Truth About Exposure Curves

CAS Seminar on Reinsurance, 2010

New York City

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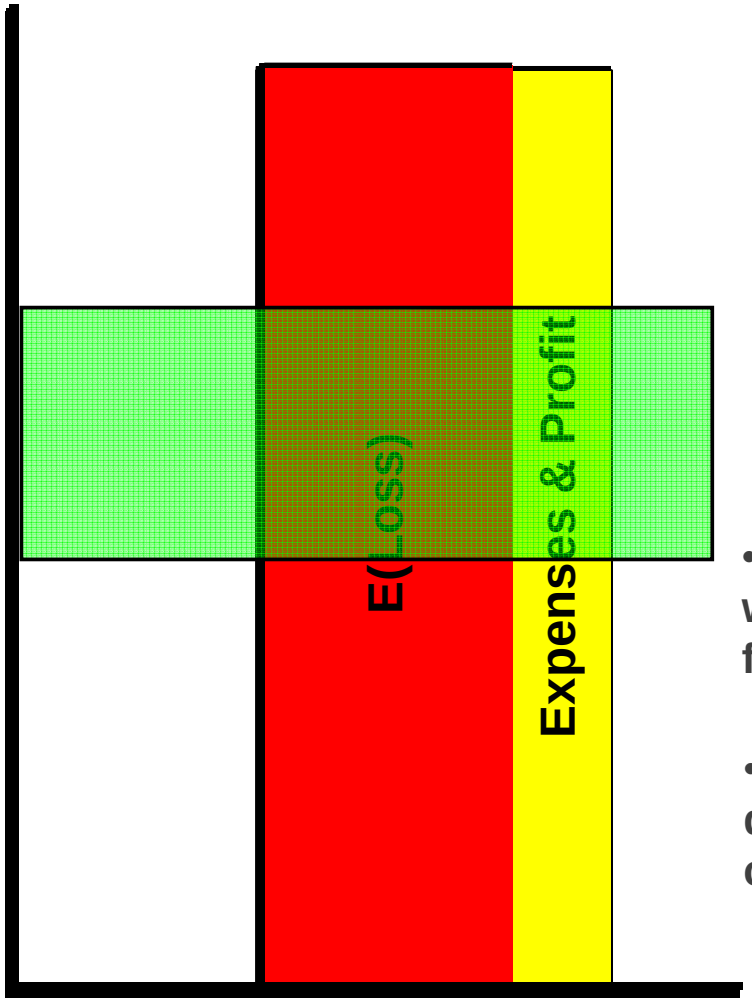
Truth About Exposure Curves

AGENDA

- Exposure Rating Overview
- Where Do Curves Come From?
- Benefits and Limitations of Exposure Curves
- Curve Selection

Exposure Rating Overview

Exposure Rating Overview



- We always start with the subject premium
- The loss ratio determines the expected ground–up loss
- Exposure Rating simply tells us how much of the expected loss will fall into a given layer
- Once we have expected loss to the layer, we can break it up into its component frequency and severity
- The mechanics of how we do this is different depending on the form of the curve(s) used

Where Do Curves Come From?

Where do Curves come from?

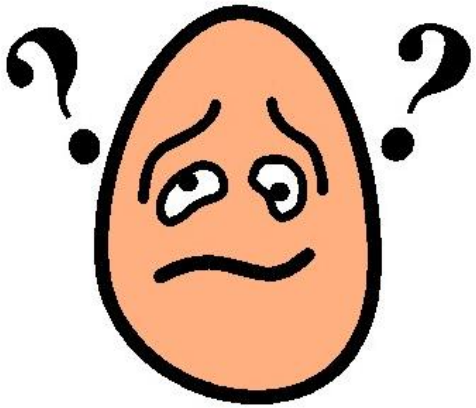
- Workers Comp - NCCI

- Liability – ISO Increased Limits Factor Studies

- Property
  - ISO PSOLD (Property Size-of-Loss Distributions)
  - First-Loss Scales
    Ruth Salzman: 1960 INA Homeowners data
    Stephen Ludwig (Hartford data 1984-1988)
    "small commercial property book of business"

Where do Curves come from?

- Other First-Loss Scales



Benefits and Limitations of Exposure Curves

Benefits and Limitations of Exposure Rating in General

- For many (especially larger) accounts:
  - Lower layers based on credible experience
    - (many years of few or no claims should be granted credibility)
  - Upper layers may be based on return on capital or minimum ROL
  - Layers in between are priced as a walk-up from one to the other

- BUT!
  - The benefit of exposure rating is that we don't always have experience.

- NCCI, ISO Liability ILF's, PSOLD: the main benefit is that we have them at all!
  - What if we didn't? What would we do? Are we doing those things anyway?
    - Should we?
  - Current
  - Relevant
    (As opposed to using Homeowners to rate Commercial property)
  - Large data sample
  - More granular than they were several years ago.

Benefits and Limitations of Exposure Curves

- BIGGEST LIMITATION: We don't have enough of them!
- Other than WC, GL/CA and Property, what is there?

- NCCI Worker's Comp Curves: I'll let Mike discuss these.
- ISO ILF Liability Curves:
  - Commonly applied to layers far beyond their intended use.
  - ALAE is assumed constant (ILF's vs LAS M.E. equations).
  - We treat them as severity curves.

Limitations: What do we do about that?

- ISO ILF Liability Curves:
  - ➢ Commonly applied to layers far beyond their intended use.
  - ❖ **What do we do about that?**
    - ➢ Keep things in perspective.
      - Pricing of high layers may be more a function of return than E(Loss)
    - ➢ Defer to expert judgment
      - These are tools, meant to *inform*, *augment* and *assist* expertise and judgment. They were never intended to *replace* it.

Limitations: What do we do about that?

- ISO ILF Liability Curves:
  - ➢ ALAE is assumed constant.
  - ❖ **What do we do about that?**
    - ➢ ISO Variable ALAE model
    - ➢ Can we try to model ALAE as an independent variable?
    - ➢ Study in-house data. Are there factors that can be applied to the ISO average ALAE value?
    - ➢ Judgment? In-house expert?

Limitations: What do we do about that?

- ISO ILF Liability Curves:
  - We treat them as severity curves.
    - What does that mean?

LIMIT	Class 1 E(Loss)	Class 2 E(Loss)	ILF
$ 1M	10K	100K	1
$ 2M	12K	120K	1.2
$ 5M	15K	150K	1.5

  - Class 1 and Class 2 go into the same ILF Table

❖ **What do we do about that?**

- When thinking about the appropriateness of a severity curve, we may often ask "are the average severities of these risks in line with those in the curves?" However, we really need to ask if the average severities ***relative*** to each other across limit sizes are in line.
- Be thoughtful when disaggregating into frequency vs severity.
  - May be appropriate to apply a simple scalar to the means of the distribution.

Limitations: What do we do about that?

- ISO PSOLD Curves:
  - Only available data sets are Building+Contents or Building+Contents+BI
    - No curves for Contents or Contents+BI

- **What do we do about that?**
  - Voice opinions at ISO Reinsurance Panel meetings
  - Contact ISO directly

Limitations: What do we do about that?

- ISO PSOLD Curves:
  - U.S. Data only – not necessarily applicable to non-US exposures

  - **What do we do about that?**
    - Use International Construction Cost Index
    - Use proprietary information to adjust the PSOLD curves

Limitations: What do we do about that?

- http://www.fgould.com/media/resources/files/ICI-US-Qtr2-2009.pdf
- Published by Faithful+Gould, Atlanta, GA
- Last update was dated 2Q 2009
- Feb 2010: published limited analysis covering
  US, Canada, Mexico, UK, China, Singapore, US

INTERNATIONAL CONSTRUCTION
INTELLIGENCE
Volume 21, Issue 2 - 2nd Quarter 2009 - U.S. Edition

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Building Information Modelling – Coming of Age?

International Construction Cost Index

Infrastructure at the Forefront

Building Information Modeling - Coming of Age?

The benefits BIM (Building Information Modeling) offers would appear to be compelling, yet the construction industry has with notable but isolated exceptions rejected BIM in favour of traditional practices.

In BIM design information is stored electronically as inter-connected objects (door, window, slab etc) rather than the abstract lines we have become familiar with in CAD (Computer Aided Design). The approach allows sophisticated analysis such as clash-detection which can quickly reveal problems between the routing of M&E services and the building structure. BIM can also allow the performance of a building, for example energy performance, to be simulated before construction commences.

After a decade, it appears that the industry is beginning to embrace BIM. In 2007 the General Service Administration (GSA) in the U.S. made the use of BIM a requirement on all major projects receiving significant public funding.

Government has played a similar lead role in northern European countries such as Finland, where Senate Properties, a government owned organization which manages, develops and lets public buildings such as universities, offices, and government buildings implemented BIM Requirements in October 2007.

In Singapore, the CORENET e-PLAN Check system (COnstruction Real Estate NETwork, launched by Singapore's Ministry of National Development) provides automated compliance checking against building codes for schemes designed using BIM.

A second wave?

In the U.K. there is no government policy specifically targeted at the adoption of BIM, this may be a key reason why adoption has been slower in the U.K. than elsewhere. BIM was used at Heathrow T5 where it has been reported that it helped shave 8% off project costs (£210million), but such examples of U.K. BIM projects are rare. This may now be changing.

Faithful+Gould are receiving enquiries from clients, architects and contractors about our BIM capability. In an age of globalization, firms who have invested in BIM to comply with requirements in a local market appear to now be exporting the approach to both sectors and locations where the use of BIM is not a specific requirement.

What does BIM mean for Estimating and Managing Costs?

BIM provides cost professionals including Quantity Surveyors (QS) with a greater degree of automation in the process of Quantity Take-Off (QTO). This means that the impact of design changes can be modeled more swiftly than in a CAD environment and that a range of design scenarios can be costed. As with CAD, the experience of the cost professional is called upon to correctly analyze these design quantities and relate them to the client's project objectives.

Using BIM, Faithful+Gould are able to more closely integrate our cost management service into the wider project team, providing advice on the impact of design changes which would previously not have been manageable. The cost professional, armed with BIM tools is able to contribute to overall efficiency savings for the project.

Collaboration within the supply chain is essential for the benefits of better co-ordination which BIM offers to be realised. This means a shift in culture and working practices. Process and cultural aspects of BIM implementation are more significant to success than technology (although the technology must work effectively). Faithful+Gould recognise this and have been working as part of the BuildingSmart Alliance to define information standards to allow the effective exchange of cost information in a BIM environment. The adoption of these standards can drive efficiency into the BIM/QTO process by helping to ensure that information is shared in the right format and in a form which is recognised and can be easily worked with by all parties.

"BIM is a great example of how Faithful+Gould are delivering innovative solutions with collaboration at the heart" commented Adrian Malone, Faithful+Gould's Head of Commercial Research.

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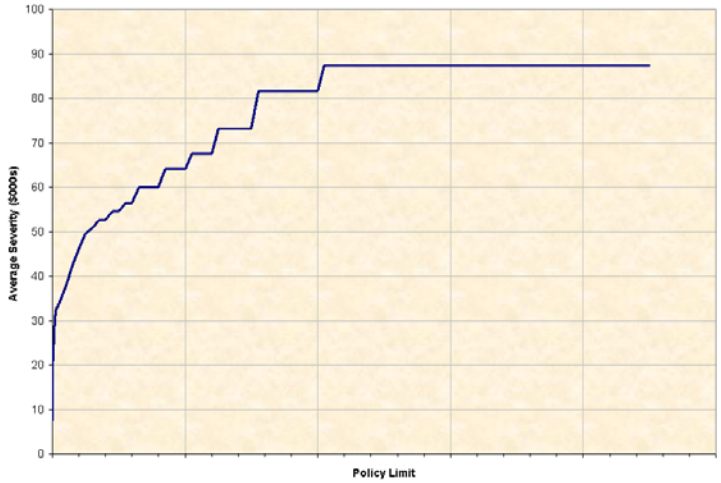
Limitations: What do we do about that?

- ISO PSOLD Curves:
  - When you move into the realm of large limits, the curves go flat
    - Free cover dilemma



  - **What do we do about that?**
    - Keep perspective
    - Translate PSOLD curve into a First-Loss Scale
    - Use an alternative First-Loss Scale

Which First-Loss Scale Do You Choose?

- Lloyds
- Reinsurer Curves (Swiss Re, Munich Re, etc)
- Salzmann (1960 INA Homeowners data)
- Ludwig (1984-1988 Homeowners and Small Commercial data)

The Big Question – How Do I Know Which Curve to Use?

- **Compare Experience vs Exposure Frequency and Severity by band – Narrow Bands force Severity match**
- **One would expect to see similarity in frequency relativities at the low end where experience is credible**
- **Expect to see divergence at the top end when experience is less credible**
- **If there are several curves that match on the lower end, judgment may be required in determining which tail is more appropriate**

		Experience Rating			Exposure Rating								
Per Risk Layer		Projected (Undev.)		Loss	Projected		Loss	Exper/Expos Relativities			Exper Freq	Expos Freq	Difference
Limit	Attach	Freq	Sev	Cost	Freq	Sev	Cost	Freq	Sev	Loss Cost	Relativities	Relativities	
($000s)	($000s)		($000s)	($000s)		($000s)	($000s)	(%)	(%)	(%)			
								(3)/(6)	(4)/(7)	(5)/(8)			
		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)			
150	200	25.4	112	2,839	29	117	3,341	89%	96%	85%	100.00%	100.00%	0.00%
250	250	20.7	164	3,387	24	180	4,282	87%	91%	79%	81.45%	82.97%	1.51%
500	500	9.7	340	3,305	13	347	4,414	76%	98%	75%	38.31%	44.49%	6.18%
1,000	1,000	4.2	565	2,370	6	665	4,165	67%	85%	57%	16.53%	21.90%	5.37%
1,000	2,000	1.1	774	871	3	774	2,204	40%	100%	40%	4.44%	9.96%	5.52%
1,000	3,000	0.6	680	417	2	824	1,411	36%	83%	30%	2.42%	5.99%	3.57%
1,000	4,000	0.2	1,000	205	1	857	1,000	18%	117%	20%	0.81%	4.08%	3.28%
5,000	5,000	0.2	2,579	528	1	2,895	2,483	24%	89%	21%	0.81%	3.00%	2.19%
15,000	10,000	n.a.	n.a.	n.a.	0.3	5,973	1,668	n.a.	n.a.	n.a.			
15,000	25,000	n.a.	n.a.	n.a.	0.04	8,501	346	n.a.	n.a.	n.a.			
10,000	40,000	n.a.	n.a.	n.a.	0.013	7,809	100	n.a.	n.a.	n.a.			
Unl.	50,000	n.a.	n.a.	n.a.	0.008	36,741	292	n.a.	n.a.	n.a.			

Final Thoughts

- Actuaries need to understand what is behind the curves so that they can make informed decisions about their usage.
- Actuaries cannot assume that, as the complement of credibility to experience, exposure curves are in fact credible for a particular deal.
- Actuaries need to understand the drivers of loss for an insured so that they can apply informed judgment in modifying results. For example, if there is a statute that eliminates all losses excess of 500k, are the exposure curves appropriate for a 500k xs 500k layer?
- Perhaps actuaries can look at historical experience and ask, “If my exposure curves are credible, what is the probability that I would have this experience?”

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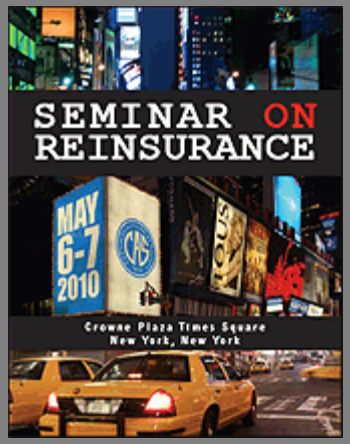

Thank You

Kevin Hilferty