

## GIRO conference and exhibition 2010 Jonathan Broughton and Tom Jowett



### Measuring the Value Added by Technical Pricing Techniques in Commercial Lines of Business

12-15 October 2010

---

# Overview

---

- How do you measure the value added by technical pricing approaches?
- This can be very important to justify another study
- Or to support a request for an additional member of staff
- Or to support a study by consultants

---

# What do we mean by "adding value"

---

- Increasing profit
- Increasing accuracy of loss cost estimate
- Satisfying requirements of regulators, reinsurers and rating agencies
- Assumes that have organisational buy-in to technical pricing work and that inefficiencies exist in current (market) pricing

---

# Where GLMs being used in Commercial Lines

---

- Marine P&I
- Marine Hull
- Yacht
- Professional Indemnity
- Employers Liability
- Libel & Slander
- Extended Warranty
- Medical Expenses
- Motor XOL Reinsurance
- Employment Practices Liability
- Sports Personal Accident
- Livestock
- Credit
- ...any class with more than 1,000 claims
- Technical pricing doesn't need to be GLM based

# Challenges

---

- Changes in:
  - Underwriting team
  - Broker
  - Underwriter philosophy
- Policy churn rates
- Technical pricing benefits from hindsight
  - when compared to premiums charged at point of underwriting

---

# Commercial lines specific issues

---

- Catastrophes
- Uneven spread of large losses from year to year
- Subscription market
  - Limited ability to set price and conditions
  - Limited ability to control line size
- Stripping out market cycle
- Room for improvement on data

# Problems with expected profit calculation

- At point of underwriting

$$\text{value added} = \sum_{\text{portfolio}} \text{profit}_{\text{new method}} - \sum_{\text{policy}} \text{profit}_{\text{old method}}$$

- Don't have the same data before and after
- Volumes may be too small to allow sampling errors to be minimised
- Look at both 100% and own share
- May not get the price/share you'd like due to subscription market constraints

---

# Definitions

---

- Old tool – rates used historically
  - In first instance, benchmark rates
  - But could be refinement of technical rates
- New tool – new rates based on technical pricing work
- Bound premium – contractually agreed premium
- Technical premium – estimated loss cost loaded for capital, expenses and profit
- Actual loss cost – observed losses from the policies



---

# Example portfolio

---

- A simple benchmark pricing tool was put in place a few years ago based on underwriter judgement (old tool)
- You now have 1500 claims linked to policies with reasonable exposure and claim data
- Now fitted a predictive model which converges (new tool)

This is typical of many CL portfolios and is the type of portfolio where we want to measure value added

---

# Method 1 – Dual ratebook solution

---

- Either:
  - Run two ratebooks (old and new) live and concurrently,
    - random switching; or
    - Run different teams on different ratebooks (old and new)
- Simple benchmark against new predictive model
  - Objectively measure performance difference between two over time
  - Picks up new business take-up rates and renewals / lapses
  - Insufficient volumes to do so in commercial lines
  - Inability of systems to handle this in commercial lines
  - Business may be very different by team
    - Especially if teams are in different locations
    - Exclude portions of portfolio by location to standardise risk mix?
- Dual solution unlikely to be practical for commercial lines

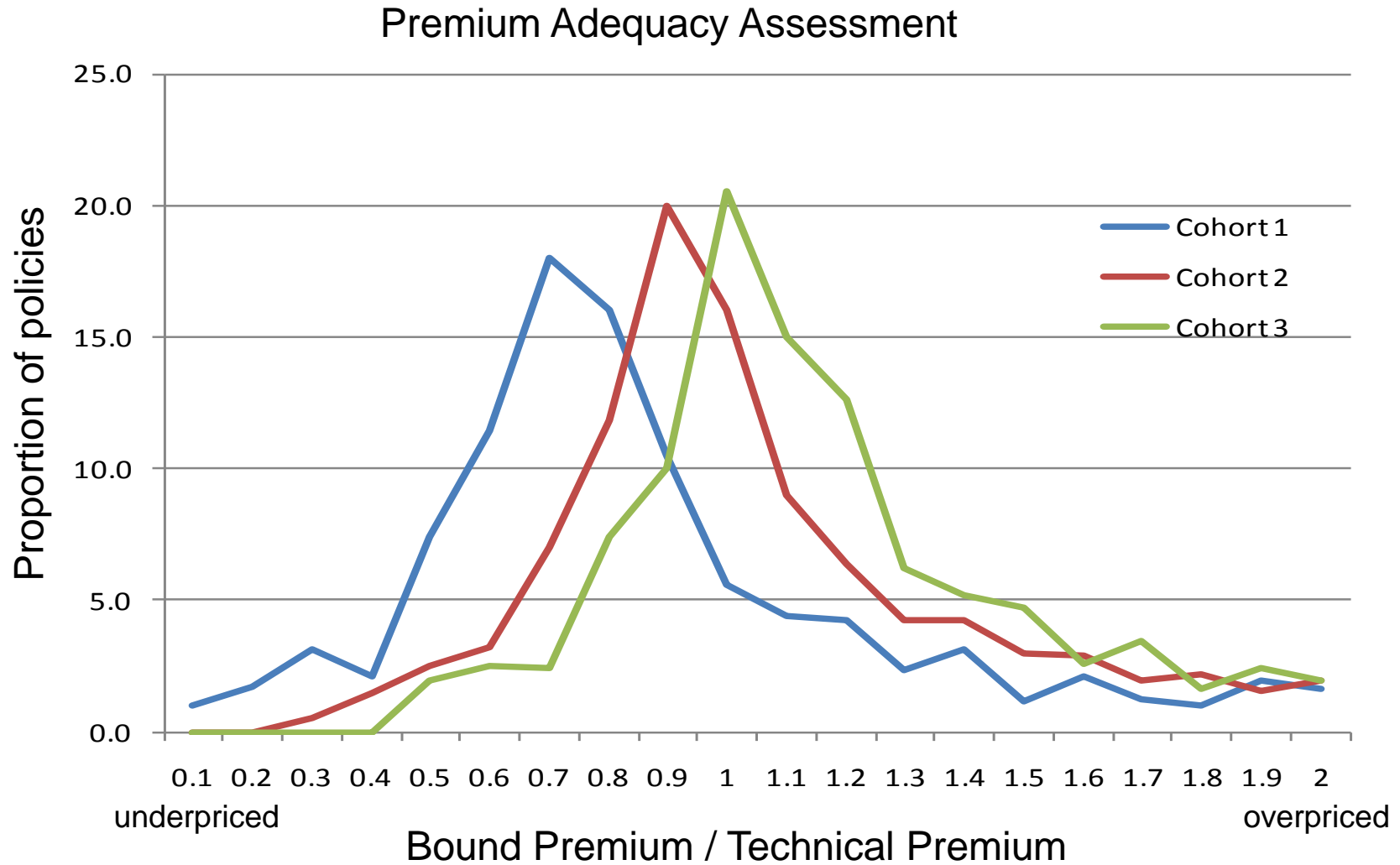
---

## Method 2 – Cohort split

---

- Split portfolio into cohorts
  - Choose number of cohorts to maximise trends while avoiding lack of data issues
    - Compare different rating cohorts, pre and post technical pricing work
    - or after changing parameter estimates
- Show distribution of technical vs bound premium for each cohort
  - Show that the pricing adequacy of the portfolio is improving over time
  - As the portfolio matures show that the profitability improves
    - make allowances for unexpectedly good experience, cats & large losses

# Chart for method 2



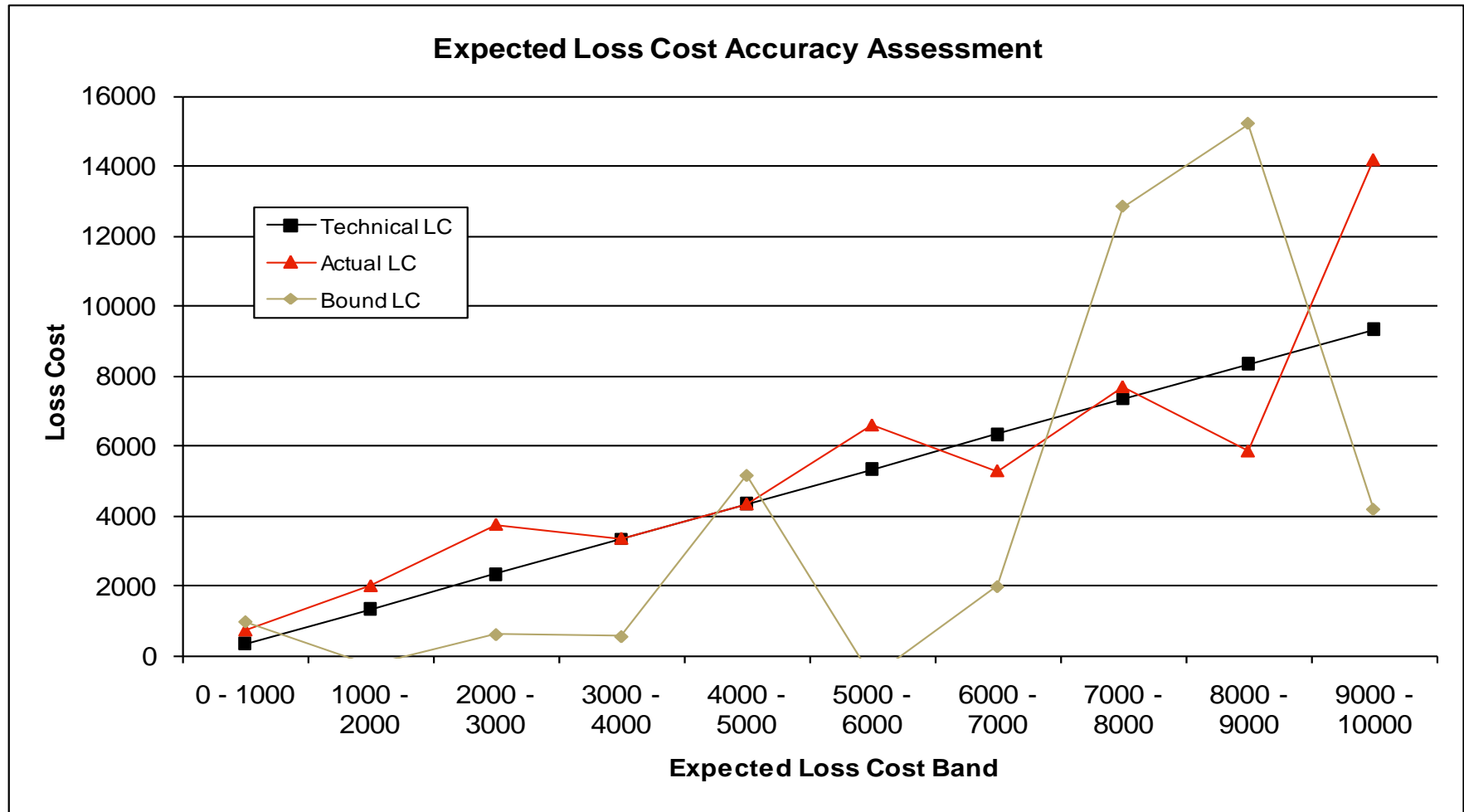
---

## Method 3 – Implied bound loss cost

---

- Back derive an expected loss cost from the bound premium
- Use technical premium calculation algorithm for capital, expenses and profit to
  - Compare actual claims against the bound loss cost estimate
  - Do same against technical loss cost estimate
  - Aim to show that closer fit exists for technical loss cost estimate
  - Possibly also show negative bound loss cost estimates exist
    - I.e. fixed expenses not covered adequately in some cases

# Chart for method 3



---

## Method 4 – What-if portfolio

---

- Build retention model to predict portfolio
- Based on:
  - Technical premium estimate
  - Bound premium values
  - Estimates of retention ratios
    - Can be based on change in premium or on underwriter view
  - Future loss inflation
- Can directly predict portfolio size and profitability from rating assumptions
- Reference – estimating value added before writing anything.

---

# Method 4 calculation

---

- Data for each policy:
  - Last year's bound premium
  - Last year's expected and reported claims
  - Historical retention ratio for policy (or type of policy)
  - Underwriter view of rate increases for this year
- Modelled for each policy:
  - This year's estimated loss cost
  - This year's technical premium
  - Retention ratio (based on rate change between last year's bound and this year's technical premium)
  - Price elasticity is a key assumption
- Apply historical retention ratio to this year's bound premium and expected claims to get standard renewal book
- Apply adjusted retention ratio to this year's technical premium and expected claims to get enhanced renewal book



## Method 4 example

### Impact of technical pricing

- In this example we have a softening market and expect less profit in the coming year
- Estimate renewing portfolio based on past experience & old model
- Estimate renewing portfolio using new technical pricing
- Compare the differences and monitor the outcome

<b>Policy year</b>	<b>Total premiums</b>	<b>Total claims</b>	<b>ULR</b>	<b>Total profit</b>
Current portfolio	£ 1,282,550	£ 772,500	60%	£ 510,050
Standard renewal book	£ 1,010,008	£ 674,044	67%	£ 335,964
Enhanced renewal book	£ 823,915	£ 406,895	49%	£ 417,020
Benefit of enhancement				£ 81,056

- Only method which provides a prospective financial measure

---

# Portfolio monitoring during transition towards technical rates

---

- **Step 1 – analyse historic portfolio**
  - Understand where claims are coming from
  - Are rating actions being taken supporting this
    - Growth of account, rate changes, etc
    - Are we growing into poor areas?
- **Step 2 – monitor emerging portfolio**
  - Compare actual vs expected
    - Mix and premium changes come through first
      - Testing new business and renewal assumptions
    - Then claim frequency as notifications are made
    - And finally severity and burning cost as claims settle
  - Refining view of the value added from method 4

# Comparing actual to modelled losses

Modelled types	Size	Risk Group					Total Over All Groups
		1	2	3	4	5	
Type 1	Small	-	130%	-	482%	52%	116%
	Medium	69%	95%	115%	214%	2813%	134%
	Large	99%	356%	71%	547%	145%	110%
Type 2	Small	118%	2090%	113%	70%	122%	100%
	Medium	113%	77%	85%	134%	94%	98%
	Large	87%	94%	299%	71%	-	101%
Type 3	Small	74%	91%	191%	80%	118%	101%
	Medium	128%	96%	105%	75%	424%	100%
	Large	149%	90%	127%	79%	93%	98%
Type 4	Small	137%	52%	118%	89%	1369%	93%
	Medium	80%	162%	65%	1951%	74%	101%
	Large	123%	310%	100%	25%	-	117%
Type 5	Small	85%	146%	64%	85%	210%	104%
	Medium	106%	93%	70%	-	211%	123%
	Large	127%	104%	24%	128%	68%	100%
Type 7	Small	174%	453%	63%	-	102%	120%
	Medium	119%	254%	70%	42%	112%	93%
	Large	92%	40%	66%	-	-	76%
Type 8	Small	106%	99%	82%	136%	1726%	134%
	Medium	74%	59%	126%	248%	606%	105%
	Large	144%	78%	57%	110%	-	98%
Total Over Type & Size Groups		107%	90%	93%	108%	155%	Grand Total 105%

<80%	Under Estimation
80% to 120%	Appropriate rates
>120%	Over Estimation

---

# An aside – underwriter risk selection

---

- Look at signed share of risks
  - Does underwriter take bigger share on average of better risks, or of poorer risks?
  - How would account look if wrote 100% line on all risks?
    - Better or worse?
- Assess underwriter risk selection
  - Be aware of subscription market constraints
    - better priced risks can be oversubscribed

---

# Technical pricing work and reserving

---

- Technical expected loss cost can be initial reserving estimate for immature years
  - For Bornhuetter-Ferguson method
  - For IELR method
- Instant estimate at point of underwriting
- Meet regulatory requirements
  - For Lloyd's now and SII later?

---

# Discussion starter

---

- Which methods might work for the example portfolio?
- What methods have you tried?

---

## In summary

---

- You should be able to do something
- Although significant assumptions may need to be made
- Longer tailed lines will be more difficult
- Diminishing returns mean the value added will reduce over time

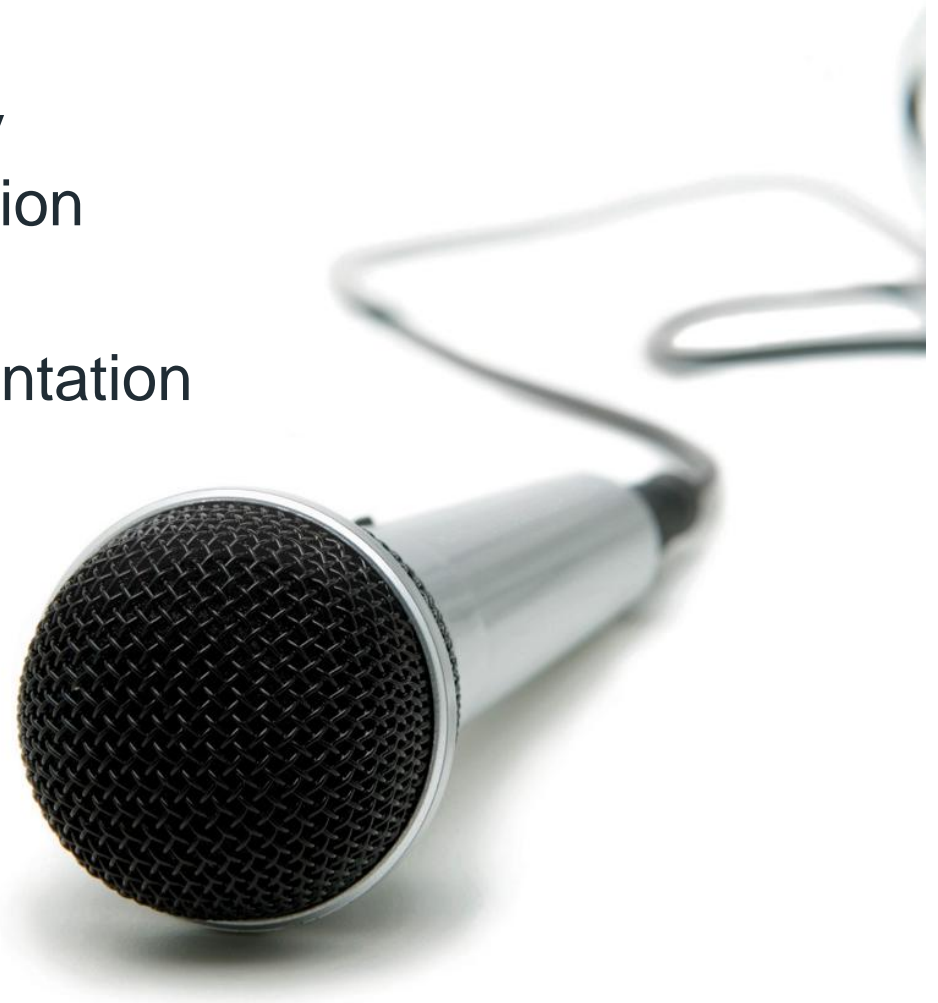
---

# 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 presenter.





---

# Contact details

---

- Jonathan Broughton, EMB  
[Jonathan.broughton@emb.com](mailto:Jonathan.broughton@emb.com)
- Tom Jowett, Swiss Re  
[Tom\\_jowett@swissre.com](mailto:Tom_jowett@swissre.com)