Analysing The Disconnect Between The Reinsurance Submission And Global Underwriters' Needs – Property Per Risk

IFoA-CAS International Reinsurance Pricing Working Party 'Property Per Risk Pricing

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About the speaker

- **Dr Ana J. Mata, ACAS**
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- Non-life actuarial pricing consultant, actuarial trainer and coach serving clients in London, Europe, Bermuda and the USA. Over 20 years of experience as consultant, pricing actuary, trainer, researcher and software developer.

Matβlas
Actuarial Consultancy, Training, Research and Software

- **MatBlas Ltd**
- Founded in 2007, based in London
- Actuarial pricing and underwriting consultancy
- Actuarial training for non-actuaries
- Pricing software development

Working party formation

- Joint effort between IFoA-GIRO and CAS-CARe 2014-2017
- Chair: John W. Buchanan, FCAS
- 17 members of the working party worldwide
- Goals of working party
  - Analyze gaps between data provided in reinsurance submissions and actuarial and underwriting requirements
  - Improve understanding across all parties about rationale for data requirements
  - Create a reference framework for best practice of data collection and submission

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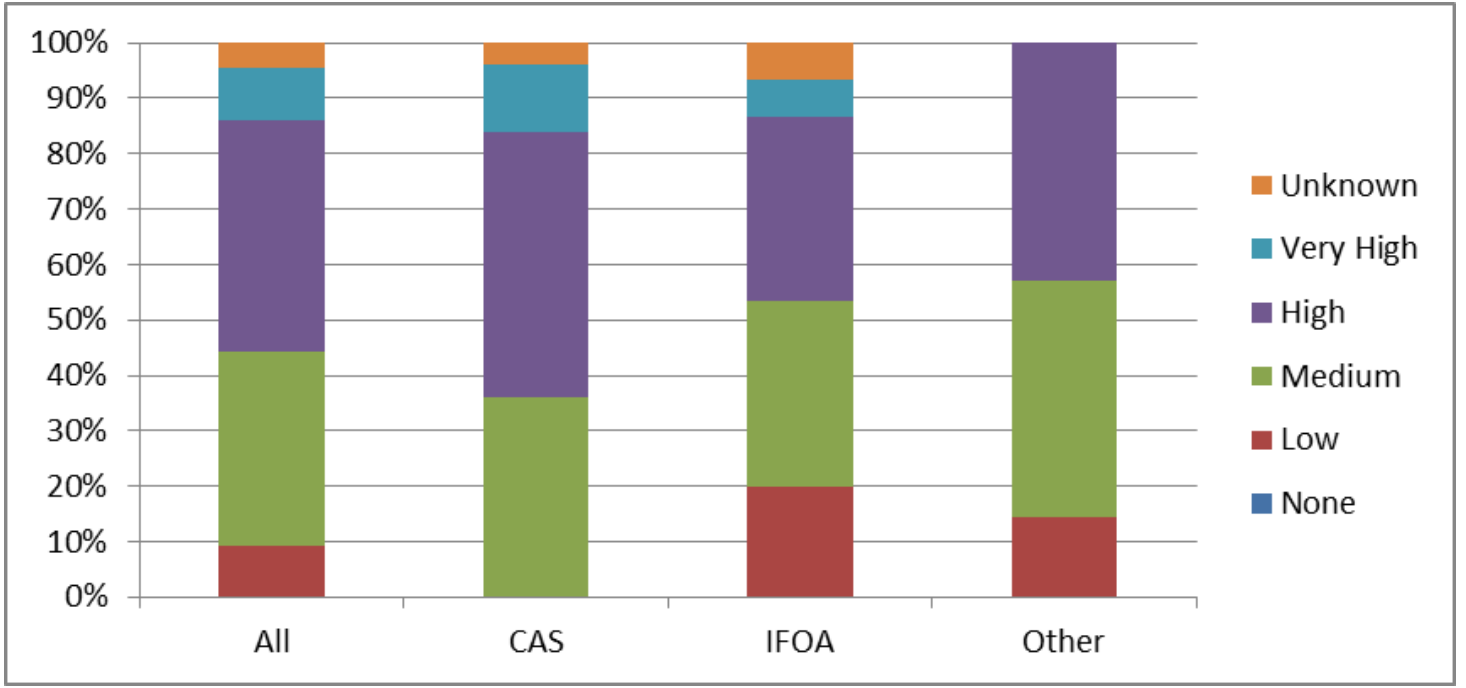
Agenda

1. Motivation of the paper
2. Overview of key points of the paper
3. Conclusions
4. Q&A

About the working party

- Impetus
  - Focus: Property per risk insurance and reinsurance
  - Limitations of information provided by cedant to reinsurers
  - Conservative assumptions in the absence of complete data – higher premiums
  - Better data could benefit all parties
- Steps
  - Survey to actuaries and underwriters worldwide – 44 responses
  - Analysis of survey results and impact of data in pricing assumptions
  - Detailed paper discussing impact of data quality and completeness in overall assumptions and pricing results (to be published BAJ)

How much does quality of submission impact your price?



Overview of paper by chapter

1. Introduction
2. Motivation and results of survey
3. ***Insurance company's (cedant) considerations***
4. ***Reinsurance company's considerations***
5. ***Experience and exposure data elements***
6. ***Amount of insurance definition***
7. ***Types of risk profiles***
8. Loss ratio information
9. ***Historical risk profiles***
10. Traditional COPE and portfolio extensions
11. ***Large claims information***
12. Rate monitoring information
13. Using property cat submission information
14. ***Practical considerations: winner's curse, overconfidence and submission bias***
15. Country specific issues
16. Conclusions

Chapter 3: Insurance company's considerations (Cedant)

- Process starts when risk is presented to the insurance underwriter
- Data collection depends on insurance company's rating models and databases
- Data quality and completeness benefit for all parties

Chapter 4: Reinsurance company's considerations

- Reinsurers benchmark parameters based on market data
- Benchmarks used in the absence of credible data from cedant
- Fair Price vs. Smooth Price
- New vs. Renewal treaties
- Reinsurance brokers
- Long term relationships and consistent pricing
- Overconfidence and submission bias

Chapter 5: Data elements

Exposure rating

- Historical and prospective loss ratios
  - Gross of THIS treaty
  - Cat vs. non-cat (definition of cat loss)
  - Accident Year vs. UW Year
- In-force risk profile (banded) – what is a risk?
- Individual in-force risk listing
  - Amount of insurance
  - Excess/deductible
  - Premium allocated to each risk

Experience rating

- Large losses preferable with development
  - Amount of insurance and excess
  - Loss description
  - Date of loss vs. policy date
- Historical premium (earned vs. written)
- Historical and prospective rate changes
  - Basis of calculation

Chapter 6: Amount of insurance (AOI) definition

- **How does the treaty respond to a loss?**
  - Usually risk excess treaties respond per location/building
- **What is the amount of insurance?**
  - Policy limit is maximum loss an insurer would pay in the event of a loss.
  - The amount of information contained in that one single value is extremely limited.
  - Is it building only or does it include other coverages, e.g. business interruption?
- **What is a risk?***
  - A policy covering multiple locations
  - The location with highest amount of insurance (top location)
  - A single location (building)

*Source: Riegel, U. (2010). On fire exposure rating and the impact of the risk profile type. ASTIN Bulletin, 40(02):727–777.

Chapter 6: Amount of insurance

- **Common presentations**
  - Total insured value (TIV)
  - Maximum probable loss (MPL)
  - Possible maximum loss (PML)
  - Maximum feasible loss (MFL)

  } Could be per location or aggregated for the policy

  - Average TIV across all locations in the policy
  - Largest/top location or key location
- **Subscription market policies**
  - Common presentation: one policy with lowest attachment and total programme participation.
  - Cedant's participation per layer: % share, limit and attachment with stack code

Chapter 6: Amount of insurance - Reference

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Figure 4 - Reference List for AOI Definitions

Acronym	Short For:	Meaning
AOI TSI	Amount of Insurance Total Sum Insured	The amount of insurance (AOI) purchased, the policy limit, the total sum insured (TSI), or total insured value (TIV) (but TIV could have two meanings as below). Includes **direct loss** such as buildings and business personal property (contents), as well as **indirect loss** such as business interruption (also called time element). Different policy limits are typically purchased for buildings, contents, and business interruption.
TIV	Total Insured Values Or Total Insurable Values	**Total Insured Values** can be defined as the total AOI or policy limit. Or **Total Insurable Values** can be a reduction to the full AOI values and relates to the MPL and other estimated values. Statistically, buildings and contents are unlikely to suffer a total loss. The MFL, PML, EML, and NLE are all percentages less than the MPL. Estimating these values will depend on many variables specific to the risk including combustibility of the building, various COPE attributes and may include complex engineering scenarios with extensive exposure and loss simulations.
MPL	Maximum Possible Loss	The **MPL** is the **maximum amount of loss possible**. From a **direct loss** perspective, the MPL of a building and the business personal property (contents) within the building is 100% of the total values at risk which are measurable. From an **indirect loss** perspective, the MPL of business income can only be estimated because there is no definitive measure of the period of restoration (POR) following a worst-case, business closing loss. The **MPL may be larger than the AOI** or policy limits issued.
MFL	Maximum Foreseeable Loss	The **MFL** is the worst loss that is likely to occur if **a key loss reduction system fails** such as automatic fire alarms and sprinklers, watchman services, public fire suppression, etc.
PML	Probable Maximum Loss	The **PML** is an estimate of the largest loss the risk is likely to suffer when **critical protection systems are functioning as expected** and takes into account any relevant COPE attributes.
EML	Estimated Maximum Loss	The **EML** can and usually will **ignore any particularly unlikely events** or "remote coincidences" even if they are possible.
NLE	Normal Loss Expectancy	The **NLE** may assume that all active and passive protection systems and features are **fully operating as expected** under normal conditions.
SOV	Statement of Values	A declaration of the value held at each location to be insured. **The SOV should state which of the above valuation measures are used to estimate the displayed AOIs.**

Chapter 7: Types of risk profile submissions

- **Banded profile with TIV, Premium and number of risks per band**
  - normally received by 93%, ranked 1 in exposure rating importance

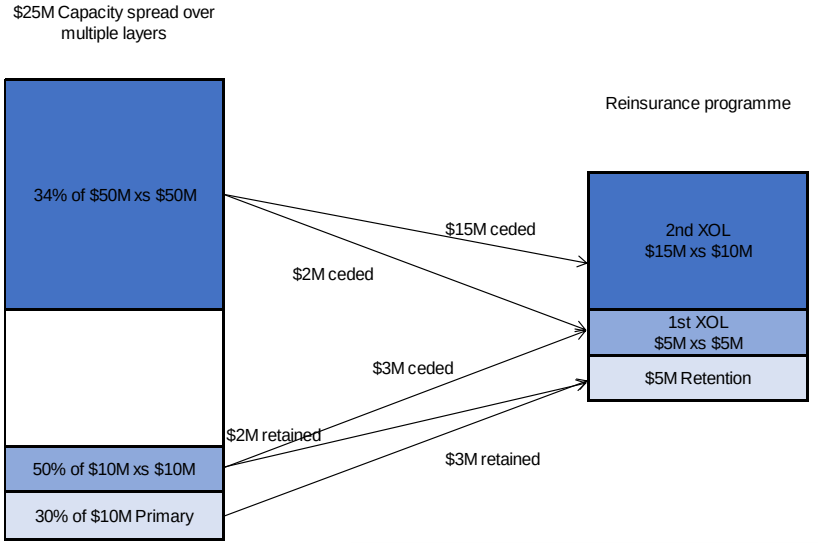
TIV Band		%TIV	TIV in band	Avg TIV	No Risks	% Prem	Premium
0	1,000,000	35%	437,500,000	759,549	576	44.12%	6,562,500
1,000,001	2,000,000	25%	312,500,000	1,554,726	201	24.16%	3,593,750
2,000,001	3,000,000	20%	250,000,000	2,688,172	93	16.47%	2,450,000
3,000,001	4,000,000	15%	187,500,000	3,232,759	58	11.60%	1,725,000
4,000,001	5,000,000	5%	62,500,000	4,166,667	15	3.66%	543,750
Total		100%	1,250,000,000		943	100.00%	14,875,000

Risks exposing a $4m xs $1m layer

- What is a risk? A policy or a single location?
  - Significant impact on exposure rating results

Chapter 7: Types of risk profile submissions

- **Shared and layered programmes with ventilation**
  - Standard practice: aggregate cedant's participation (limit) with lowest attachment for the cedant.



Stack code	Participation	Policy Limit		Attachment	Cedant's premium
A	30%	10,000,000	xs	0	145,000
A	50%	10,000,000	xs	10,000,000	72,000
A	34%	50,000,000	xs	50,000,000	32,500

In a banded profile the total premium of $249,500 for this risk will be counted in the band with 0 attachment and $25M limit

Chapter 7: Types of risk profile submissions

- **Impact on pricing:** using exposure curve of the "Swiss Re" type with parameter c=5 (approximation to Lloyd's industrial curve)*

Policy limit	Attachment	TIV	Share of Premium	Ceded premium $5m xs $5m	Ceded premium $15m xs $10m
25,000,000	0	25,000,000	249,500	26,435	26,073

Policy limit	Attachment	TIV	Share of Premium	Ceded premium $5m xs $5m	Ceded premium $15m xs $10m
10,000,000	0	100,000,000	145,000	0	0
10,000,000	10,000,000	100,000,000	72,000	33,765	0
50,000,000	50,000,000	100,000,000	32,500	26,317	6,183
				60,082	6,183

*Bernegger, S. (1997) "The Swiss Re exposure curves and the MBBEFD distribution class.". Astin Bulletin, Vol.27, No.1, 99-111.

Chapter 9: Historical AOI Profiles

- Increase TIVs over time main reason experience lacks credibility.
- Layer more exposed than prior years
- Traditional approach is to apply exposure adjustment based on total sum insured or premium
- Chapter shows how the use of historic TIV profile could help refine experience rating results compared to standard exposure adjustment

Adjusting experience for changes in historical profile

2007							
Low	High	%TIV	TIV in band	Avg TIV	No Risks	% Prem	Premium
0	1,000,000	35%	437,500,000	759,549	576	44.12%	6,562,500
1,000,001	2,000,000	25%	312,500,000	1,554,726	201	24.16%	3,593,750
2,000,001	3,000,000	20%	250,000,000	2,688,172	93	16.47%	2,450,000
3,000,001	4,000,000	15%	187,500,000	3,232,759	58	11.60%	1,725,000
4,000,001	5,000,000	5%	62,500,000	4,166,667	15	3.66%	543,750
Total		100%	1,250,000,000		943	100.00%	14,875,000
2009							
Low	High	%TIV	TIV in band	Avg TIV	No Risks	% Prem	Premium
0	1,000,000	30%	487,500,000	755,814	645	39.32%	7,215,000
1,000,001	2,000,000	22%	357,500,000	1,588,889	225	21.82%	4,004,000
2,000,001	3,000,000	24%	390,000,000	2,635,135	148	20.19%	3,705,000
3,000,001	4,000,000	17%	276,250,000	3,410,494	81	13.40%	2,458,625
4,000,001	5,000,000	7%	113,750,000	4,375,000	26	5.27%	966,875
Total		100%	1,625,000,000		1,125	100.00%	18,349,500
2016							
Low	High	%TIV	TIV in band	Avg TIV	No Risks	% Prem	Premium
0	1,000,000	27%	607,500,000	778,846	780	35.90%	8,808,750
1,000,001	2,000,000	22%	495,000,000	1,661,074	298	22.79%	5,593,500
2,000,001	3,000,000	23%	517,500,000	2,640,306	196	19.82%	4,864,500
3,000,001	4,000,000	15%	337,500,000	3,515,625	96	11.83%	2,902,500
4,000,001	5,000,000	13%	292,500,000	4,642,857	63	9.66%	2,369,250
Total		100%	2,250,000,000		1,433	100.00%	24,538,500

Exposure rating $3m xs $2m layer: growth is not uniform across bands

Adjusting experience for changes in historical profile

Policy year	On-level premium	Inflation adjusted TIV	Exposure rate using historical profiles	Trended ultimate losses in layer	Burn cost	Exposure adjusted losses: With OL Premium	Exposure adjusted losses: With adjusted TIV	Exposure adjusted losses: With exposure rate in layer
2008	14,427,641	1,380,777,657	1.327%	1,015,706	7.040%	1,865,600	1,839,011	1,621,911
2009	13,509,518	1,725,835,360	1.327%	0	0.000%	0	0	0
2010	16,343,110	1,759,642,147	1.731%	0	0.000%	0	0	0
2011	17,100,229	1,801,187,392	1.731%	646,389	3.780%	1,001,700	897,170	791,663
2012	18,733,394	1,857,660,264	1.935%	0	0.000%	0	0	0
2013	18,592,448	2,049,469,598	1.935%	736,261	3.960%	1,049,400	898,112	806,487
2014	21,119,854	2,133,238,221	1.943%	1,926,131	9.120%	2,416,800	2,257,285	2,101,777
2015	22,383,158	2,215,147,150	1.943%	957,999	4.280%	1,134,200	1,081,191	1,045,360
2016	23,943,359	2,295,225,000	1.943%	0	0.000%	0	0	0
2017	25,274,655	2,444,200,000	2.120%	0	0.000%	0	0	0
2018 (proj)	26,500,000	2,500,000,000	2.120%		842,513	829,744	774,752	707,466
2018 Projected average loss cost excludes latest year					**3.179%**	**3.131%**	**2.924%**	**2.670%**

Burn cost method: take straight average and multiply by subject premium for 2018
Exposure adjusted with OL premium: adjust trended ultimate losses with relative growth in on-level premium to 2018
Exposure adjusted with TIV: adjust trended ultimate losses with relative growth in inflation adjusted TIV to 2018
Exposure adjusted with exposure rate in layer: adjust trended ultimate losses with relative growth exposure rate to 2018

Chapter 11: Large claim information and link to AOI

- **Claims and exposures are notoriously difficult to link**
  - but are required for any kind of reliable size-of-loss analysis
- **Data collection**
  - Data sourcing is complicated by the fact that different departments within a company may store different information
- **Data quality and granularity**
  - An important proxy for the exposure would be the TIV at location, however, this is often not available
- **Small sample issues**
- **Integration of data sources**:
  - there is very limited availability of public data sources

Chapter 14: Bias in data provision

- **Cedants incentives**
  - Better data may lead to more accurate risk assessment (expected loss cost)
  - Would only better risks provide such data?
  - Would risks with insufficient data be assumed to be worse risks?
  - Hard vs. soft market incentives
- **Reinsurers incentives**
  - Not all reinsurers request same information
  - Internal referral processes greatly drive request for information
  - Detailed modelling vs. timeliness – first one to quote

Closing remarks

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- Considerable gap between information provided in submission and requirements for thorough reinsurance pricing
- Problem builds up from insurance company's rating models
- Key data items significant impact on pricing
- Commercial considerations
  - Incentives: hard vs. soft market
  - Winner's curse
  - Bias in data

Thank you very much for your attention!

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