AIG

IMIF Case Study : Advance uses of Internal Models to support reinsurance business decisions

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Agenda

We'll give a brief introduction to IMIF and the Advance Uses workstream then proceed to the reinsurance case study

IRM's Internal Model Industry Forum (IMIF)	▪ Introduction to IMIF ▪ Advance Uses of Internal Model workstream
Stakeholders requirements	▪ Typical stakeholders and what do they want from the Internal Model ▪ Validation and Management understanding of the Internal Model
Model Capabilities	▪ Gross less recoveries model ▪ Claim type split
Analysis & Limitations	▪ Trade-off between risk and return ▪ Breakeven return periods ▪ Breakdown of claims and recoveries by return period and claim type ▪ Impact on company's risk appetite ▪ Investigating alternative reinsurance strategies ▪ Data Limitations & Modelling Limitations

IRM’s Internal Model Industry Forum (IMIF)

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The Internal Model Industry Forum (IMIF)

- The Institute of Risk Management (IRM) set up the IMIF in 2014 to address the key questions and challenges that insurers face in the use, understanding and validation of internal risk models.
- The IMIF work is led by a steering committee comprising modelling experts from insurers alongside representatives from Deloitte, EY, KPMG, Milliman, PWC, the Institute and Faculty of Actuaries, ORIC and the Bank of England Prudential Regulation Authority.
- A number of workstreams are undertaking research and we aim to publish the results along with other useful resources and guidance at the link below:

https://www.theirm.org/knowledge-and-resources/thought-leadership/creating-value-through-internal-models/documents-and-resources/

Advance Uses of Internal Model workstream

- Supporting reinsurance business decisions

https://www.theirm.org/media/1685695/IMIF-reinsurance-case-study-v10.pdf

- Choices, results and capabilities of flood risk models for financial risk carriers

https://www.theirm.org/media/1665395/IMIF-flood-risk-case-study-v10.pdf

- Supporting risk management
- Risk pricing

Stakeholder Requirements

Stakeholders requirements

Typical stakeholders	What do stakeholders want from the Internal Model
Reinsurance team	Cost benefit analysis
Underwriters	Impact on net profitability and risk appetite
Economic Capital Modelling (ECM)	Validation that the Model is giving sensible results (Calibration, Methodology)
Enterprise Risk Management (ERM)	Impact on risk appetite
Senior Management	Impact on financial statements with a focus on bottom line improvement and capital impact
Board of Directors	As owners of the Internal Model, the Board would want to see an embedded use of the Internal Model when making business decisions.
Regulator	Satisfies Use Test for IMAP

Validation and Management understanding of the Internal Model

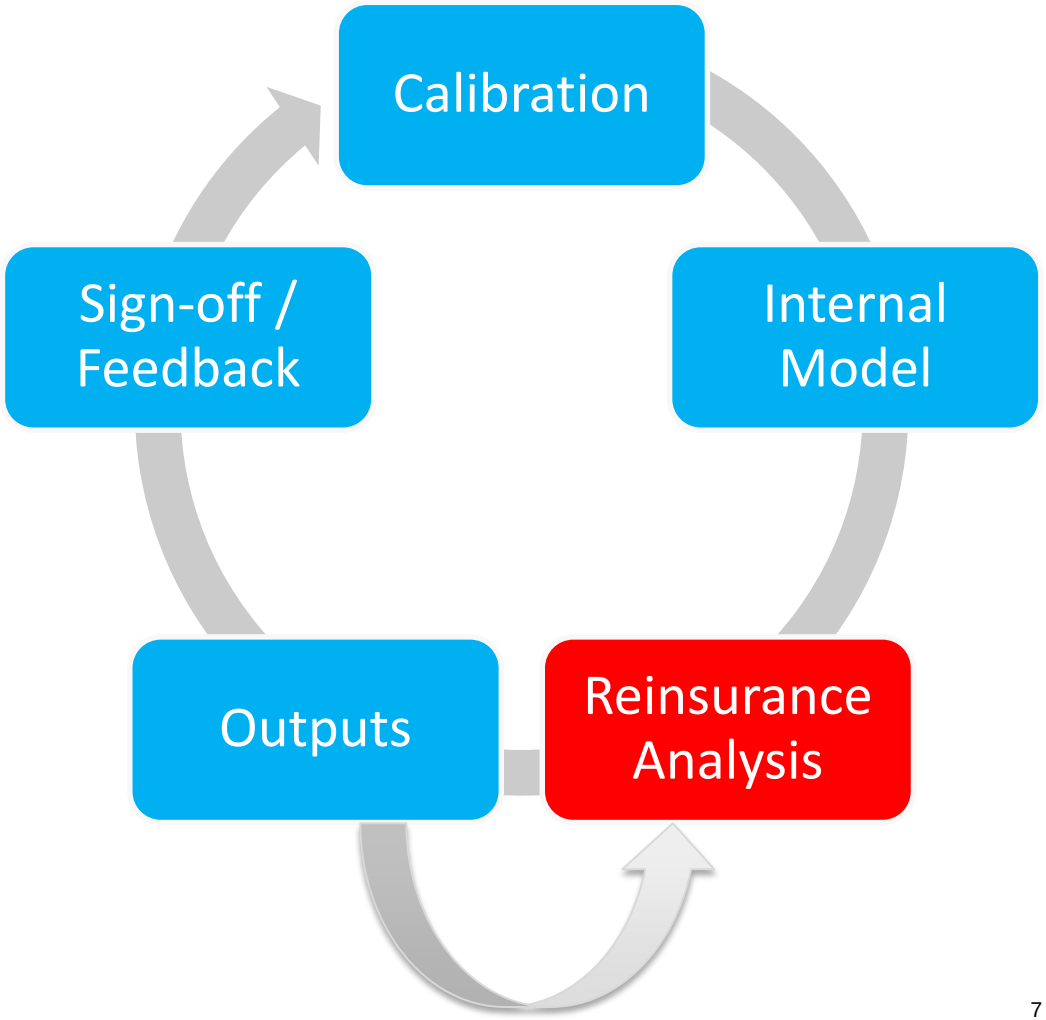
Calibration: The gross claims are dependent on the calibration of the Internal Model and the Business Plan.

Internal Model: Calculates reinsurance recoveries

Reinsurance Analysis: A separate tool is used to perform the reinsurance analysis using outputs from the Internal Model

Outputs: The analysis is summarised and presented to committees (Governance process)

Sign-off / Feedback: We obtain committee sign-off / feedback of results

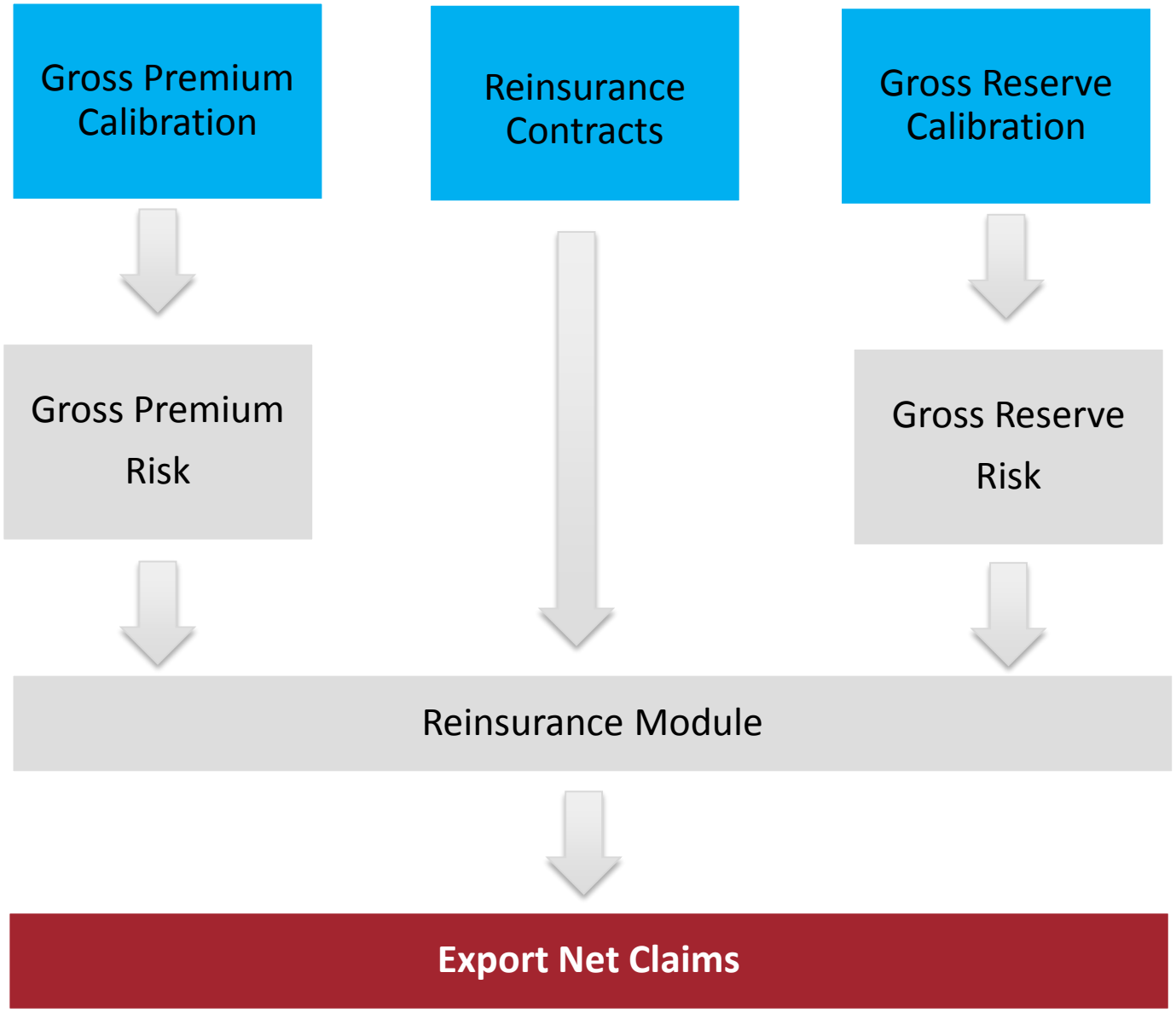


Model Capabilities

Model Capabilities

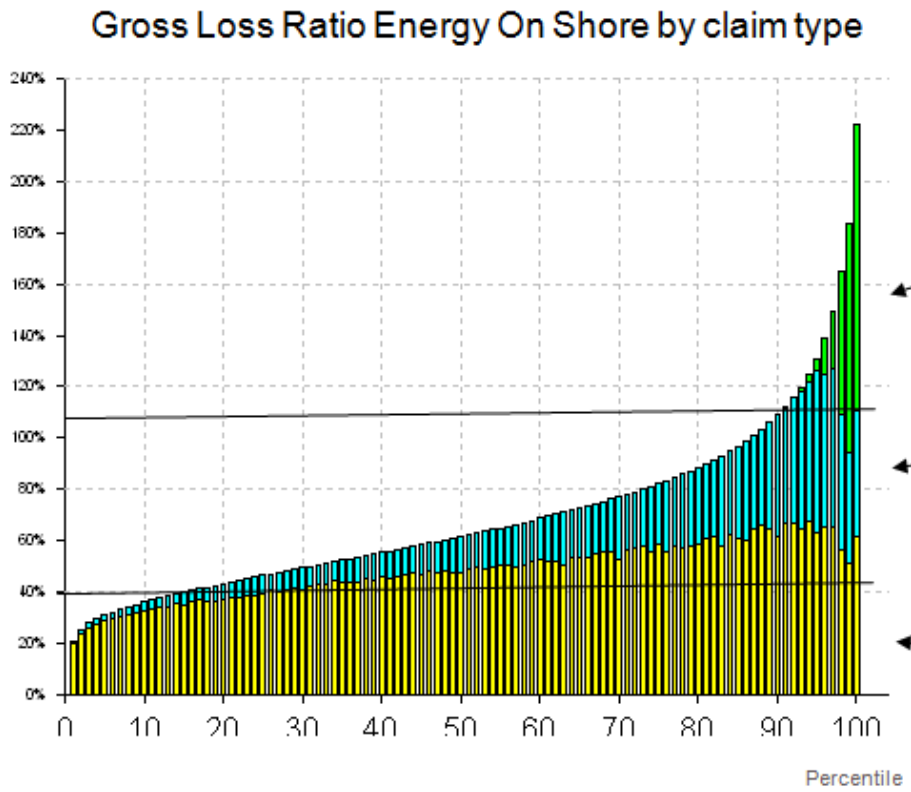
Capabilities	Description
Gross less recoveries	Model needs to simulate gross claims and its recoveries
Frequency – severity	For XoL contracts, model needs to simulate number of claims (frequency) and average claim size (severity)
Reconciliation / P&L Attribution	Financial statement distribution generated by the Internal Model has to be reconciled to Business Plan
Full range loss curve	e.g. to compare breakeven point of reinsurance premium vs. recoveries
Granularity	Flexible grouping of lines of business
Link to risk appetite	Assess impact on risk appetite
Dependency	Dependency structure between lines of business is necessary when modeling multiline / aggregate RI
Benchmarking	Reinsurance premium quoted by the commercial reinsurers acts as a form of benchmarking

Gross Less Recoveries Model



Claim type split

Layering of Attritional, Large and Catastrophe.



CAT losses.

Very extreme losses that only affect the tail of the distribution.

Large losses

Atypic claims, whose severity range is more volatile.

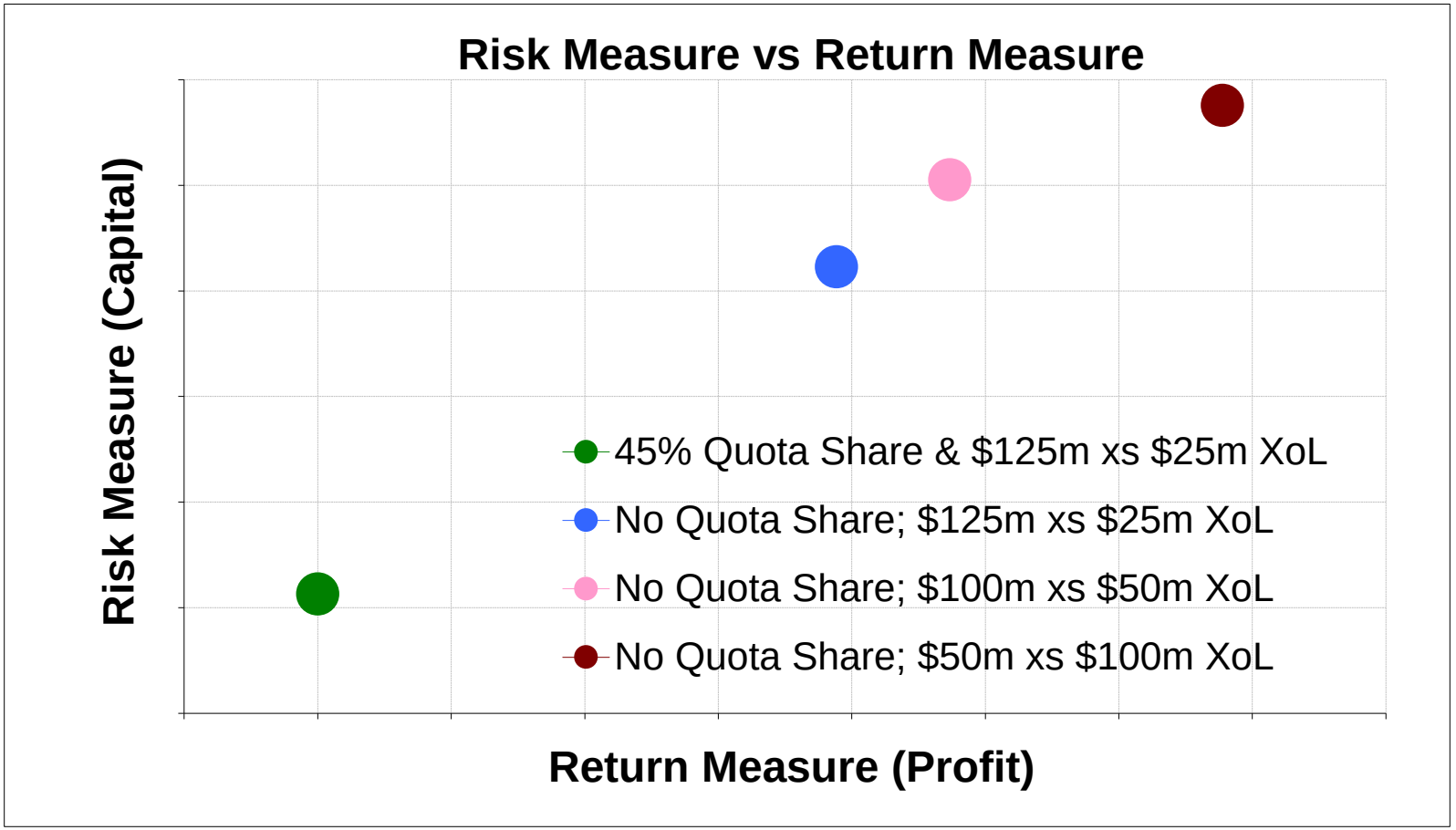
Attritional losses

Homogeneous « frequency » claims, whose severity within a fixed and stable range.

Main contributor to the global incurred volume.

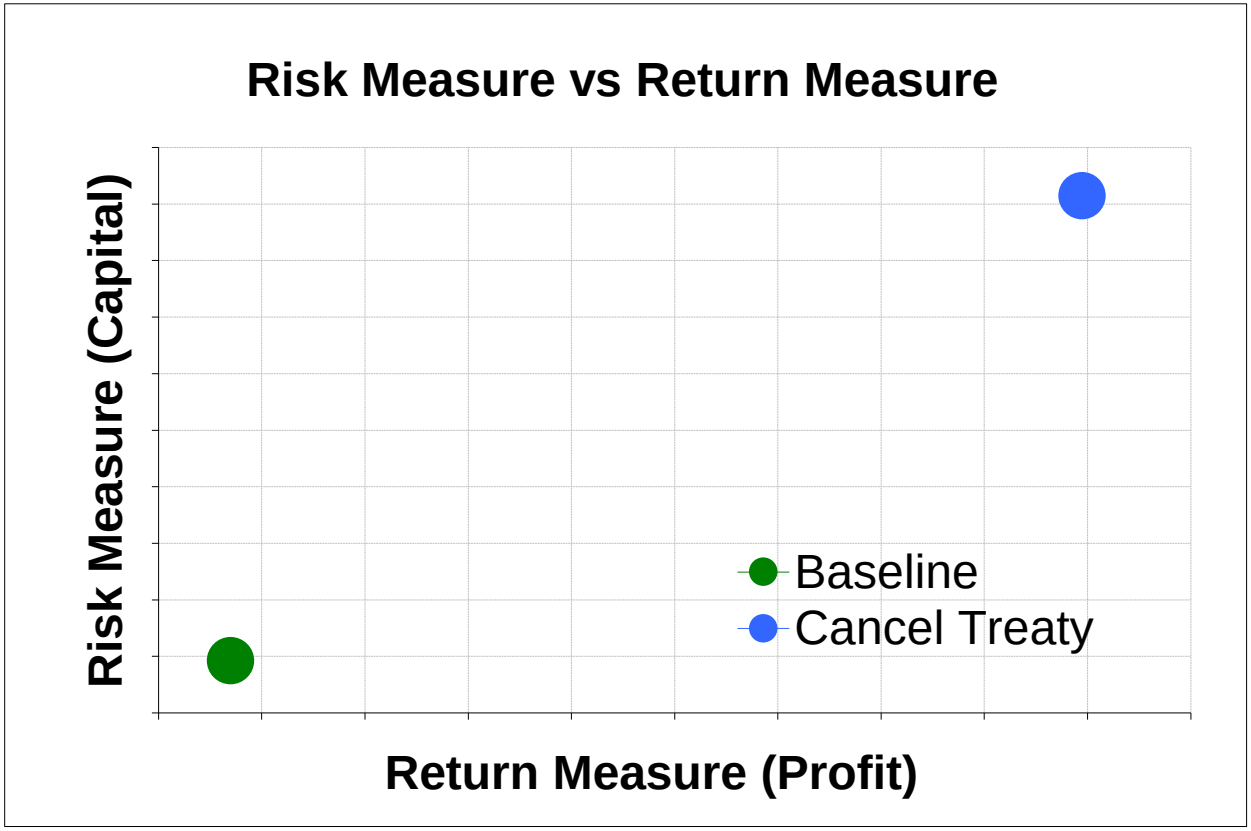
Analysis & Limitations

Trade-off between risk and return



- The diagram above illustrates an example of trade off between risk (99.5% capital) and return (P&L profit) for multiple combinations of quota share and excess of loss for a line of business.
- As expected, we observe that the reduction of reinsurance coverage increases the risk retained by the company while simultaneously increasing the profit measure due to the savings in reinsurance premium.

Case Study Background



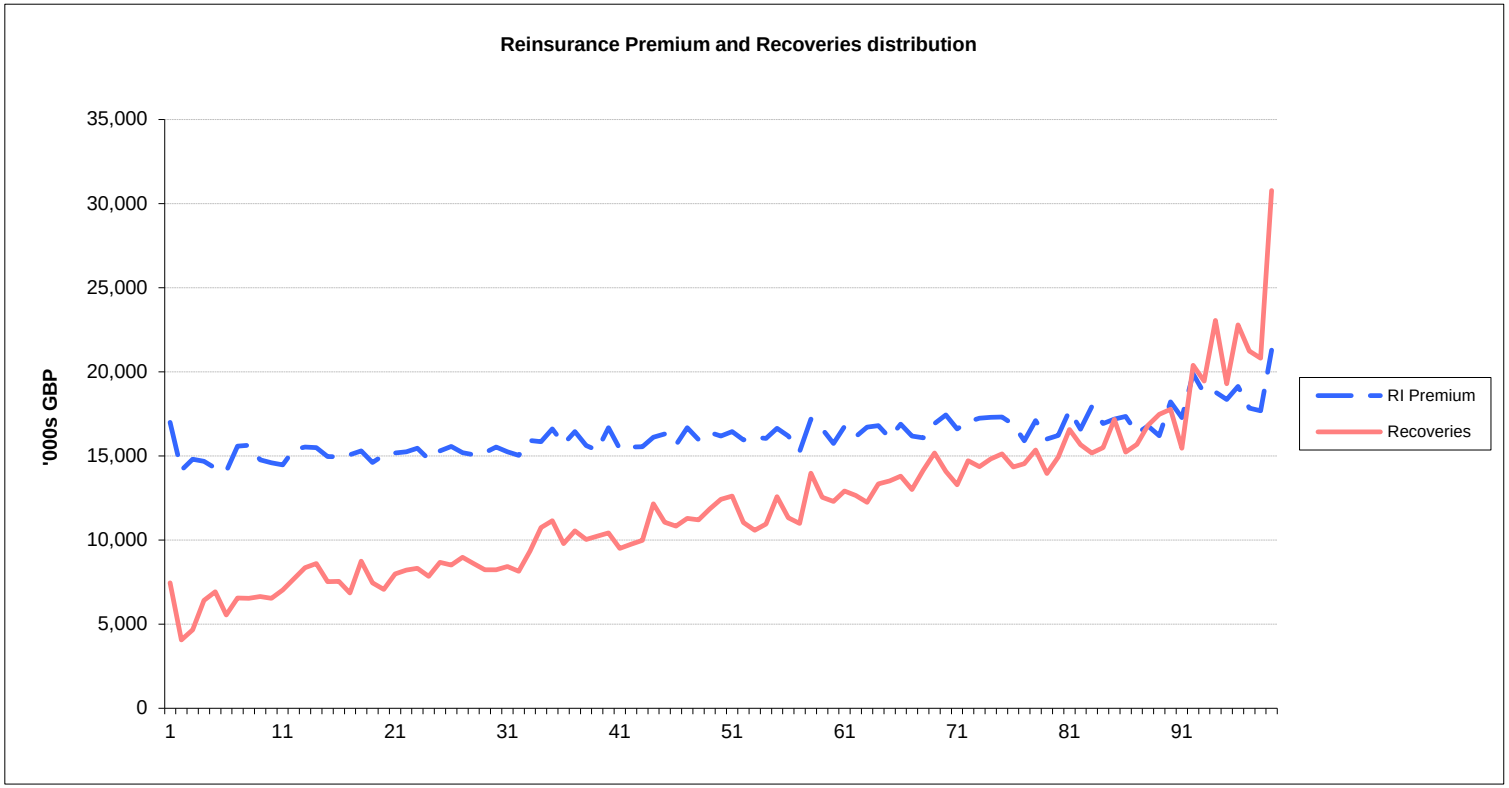
- Q: To understand the impact that a specific treaty cancellation would have on the company's P&L and risk profile.
- The use of internal model outputs identified a positive economic impact over the longer term despite some breaches in risk appetite.
- The cancellation was approved by Management and ultimately the Risk & Capital Committee (RCC) and Board Risk Committee (BRC).

Economic View

			Baseline (£m)	Cancel Treaty (£m)
A	Benefit in year 1	Treaty Premium net of commission (at the mean)	16.1	
B		Recoveries (at the mean)	11.9	
C = B - A		Profit (Loss) from treaty - before cost of capital	(4.2)	
D= -C		Profit (Loss) compared to base		**4.2**
E		Treaty Premiums net of commission (1 in 200)	22.3	
F		Recoveries (1 in 200)	38.4	
G = F - E		Increased (Decrease) in Required Capital	16.1	
H= G		Increased (Decrease) in Required Capital compared to base		16.1
I	Multiplier for sucessive years - RAP factor			1.25
J = H x I	Ultimate Capital Increase (Decrease)			20.1
K	Cost/(saving) of capital for change @ 6.5%			**1.3**
L = D - K	Total economic profits (loss) compared to base			**2.9**

- At the mean, we suffer a loss of £4.2m as the treaty premium is higher than the expected recoveries of £11.9m.
- In the long run, after factoring in an ultimate cost of capital, the economic benefit from the cancellation of this treaty.is £2.9m

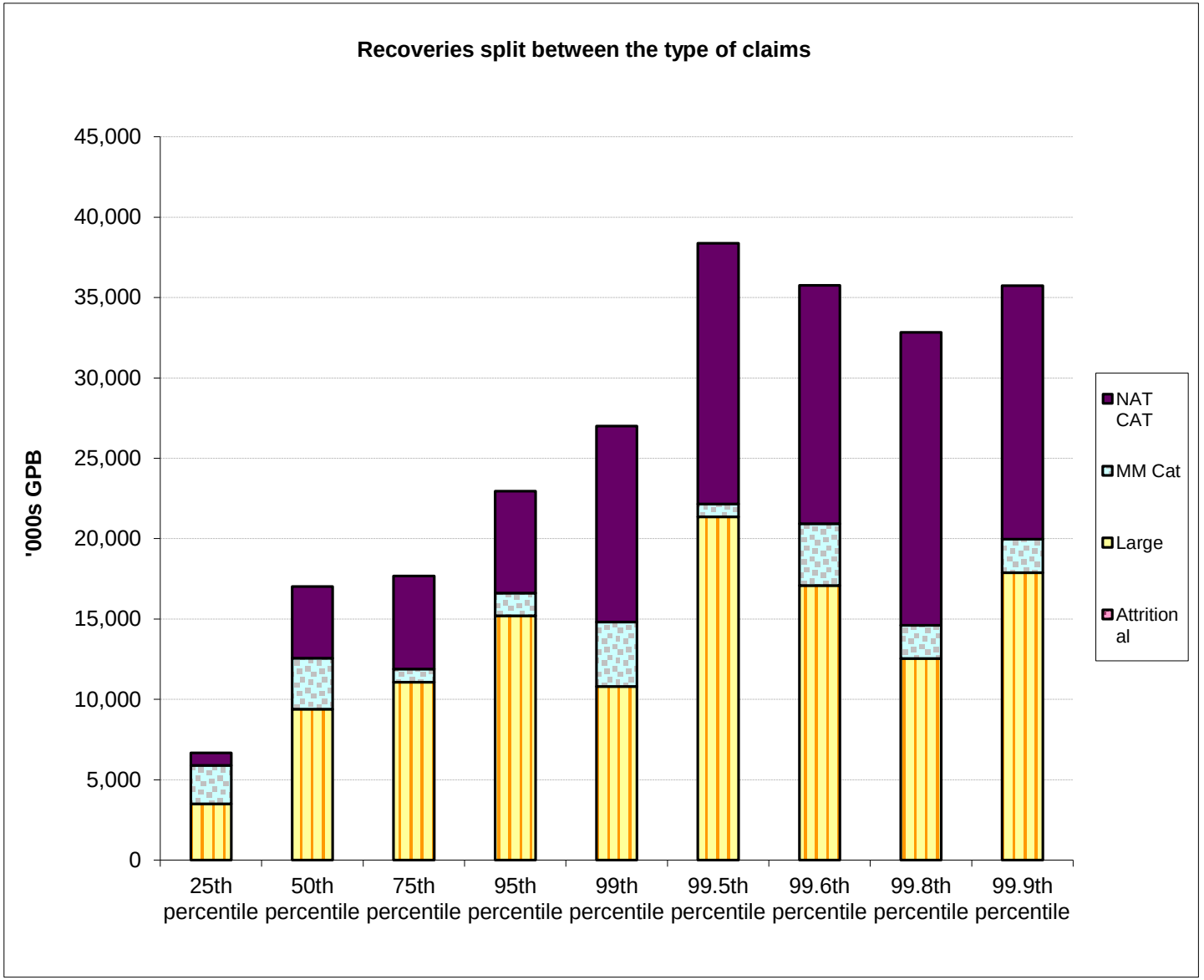
Breakeven return periods



Compare reinsurance premium against recoveries to obtain breakeven point

- The graph above shows that the break-even point of this treaty is around the 92nd percentile.
- This means that losses greater than a 12.5 year event (the 92nd percentile equivalent) needs to occur in order for this treaty to be beneficial

Breakdown of claims and recoveries by return period and claim type



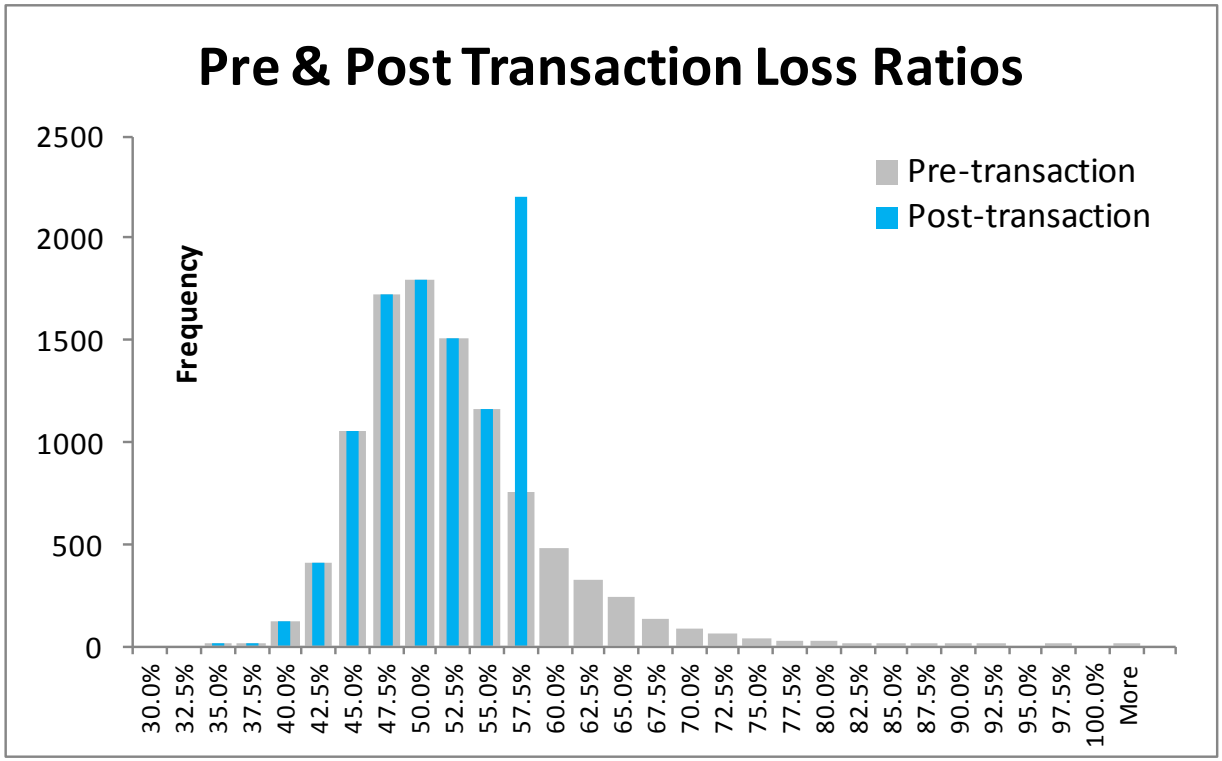
Impact on company's risk appetite

		Target Risk Profile	Amber Flag (+10%)	Red Flag/ Absolute Limit (+20%)	Current Risk Profile	Risk Profile after cancellation
Total Entity	1:7					Increase
	1:200					Increase
- Insurance Risk	1:7					Increase
	1:200					Increase
-- Premium Risk	1:7					Increase
	1:200					Increase
-- Reserve Risk	1:7					Increase
	1:200					Increase
-- Natural Catastrophe Risk	1:7					Increase
	1:200					Breached
-- Man-Made Catastrophe Risk	1:7					Breached
	1:200					Increase
- Market Risk*	1:7					Unchanged
	1:200*					Unchanged
- Credit Risk	1:7					Increase
	1:200					Increase
- Operational Risk	1:7					Increase
	1:200					Increase
- Pension Risk	1:7					Unchanged
	1:200					Unchanged

cancelling the treaty results in a breach of the:

- 1:200 amber threshold for natural catastrophe risk; and
- 1:7 year amber threshold for man-made catastrophe risk.

Investigating alternative reinsurance strategies



An Internal Model could be adapted to price aggregate reinsurance contracts such as stop loss contracts and adverse development covers

- It utilises the Internal Model's dependency structure to calculate the recoveries across multiple lines.
- As at YE2015, AIG PC has implemented stop loss contracts across c. 30 countries worldwide on $1.7b original NPE p.a. using it's group model to price these contracts.

Limitations

Data Limitations

- Not able to model small lines of business or sub-sections separately
- Not able to model new lines of business which have not been parameterised
- Not all lines of business have an attritional / large claim split
- Unmodelled perils

Modelling Limitations

- Not able to model cross-country contracts which covers countries not included in the Model.
- Certain feature of reinsurance contracts are difficult to model:
  - Indexation clause
  - Hour clause (for Catastrophe XOL)
  - reinstatement premiums that are pro rata as to time
  - Sliding scale commissions
- Fixed rates of FX specified in reinsurance contracts