Risk adjustments for life insurers

Presentation to 2016 NZSA conference

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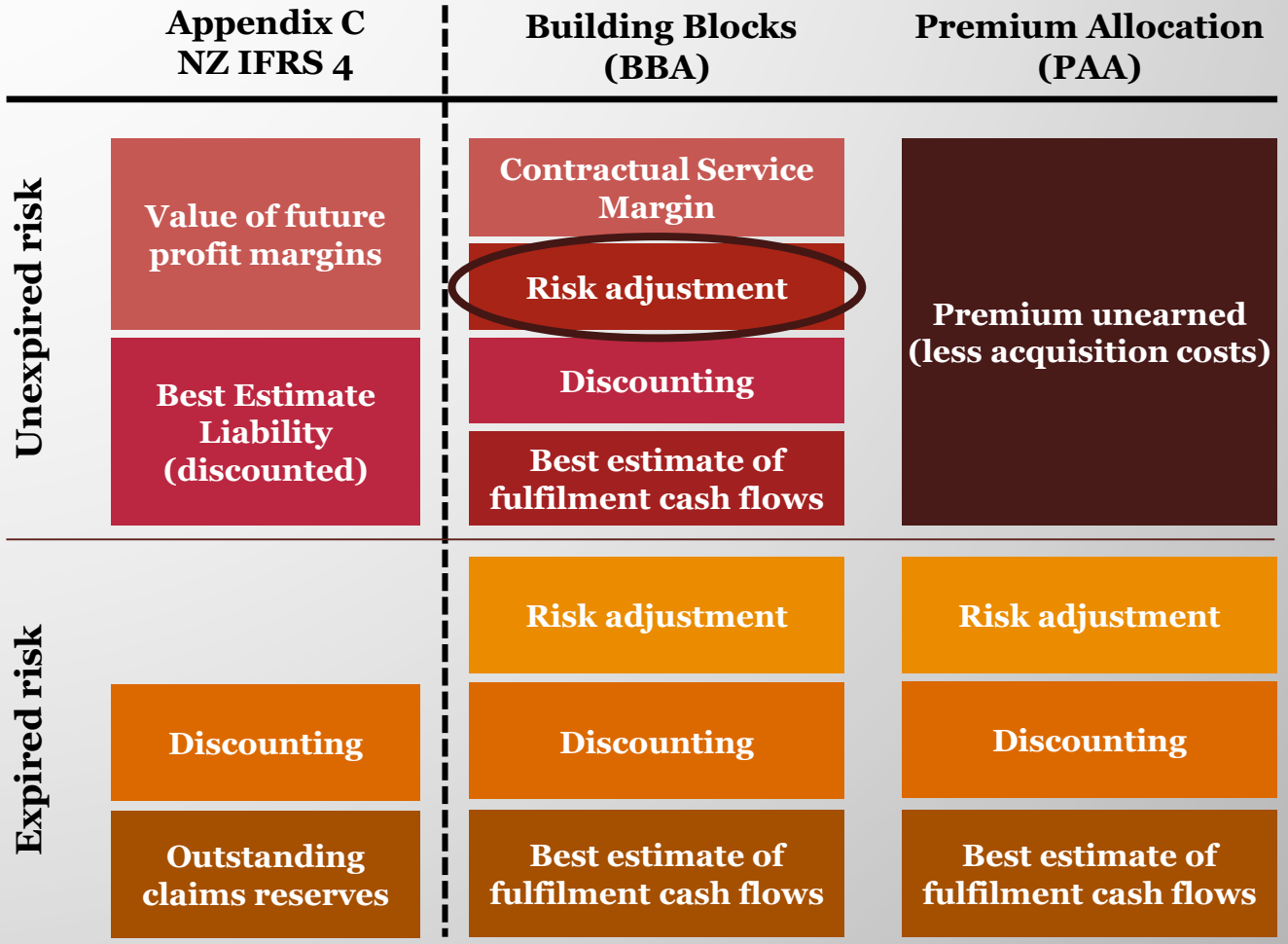
Key changes for insurers

- A new name (IFRS 17 vs IFRS 4)
- Optional premium allocation approach (PAA)
- Level of aggregation
- Acquisition costs that can be deferred
- Presentation of interest rate changes
- Risk adjustments

BBA and PAA re-cap



- **BBA like Margin on Services (MoS),** under Appendix C of IFRS 4, except profit margins split between CSM and risk adjustment
- PAA measurement model **like current GI accounting**
- Risk adjustments also apply to outstanding claims (but these are not addressed in this paper)

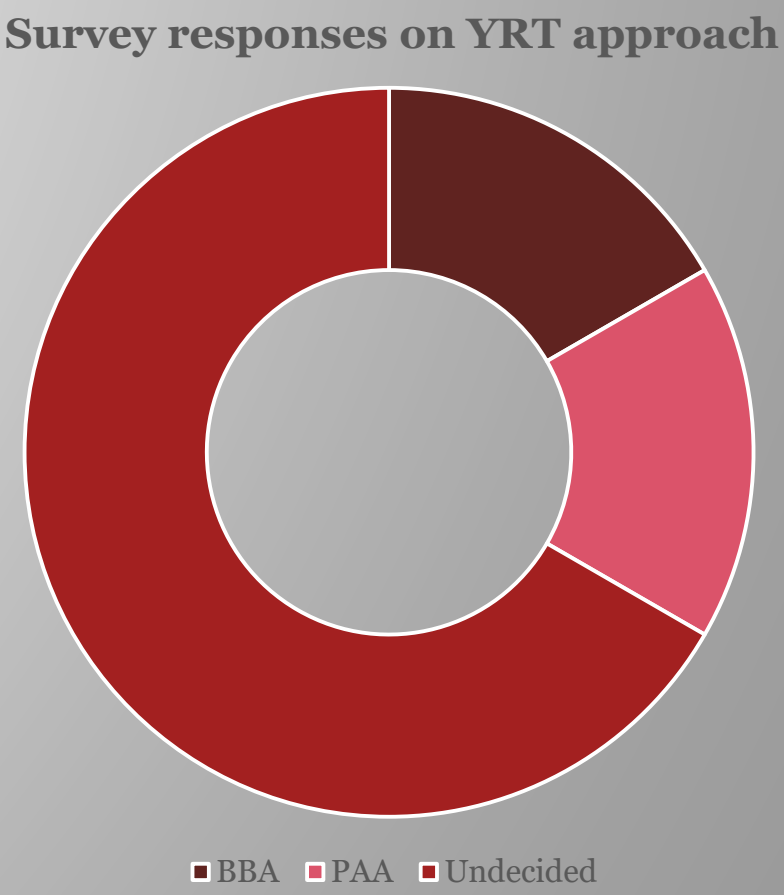
Which option will you use for YRT – BBA or PAA?

Survey results:

- Most insurers are undecided
- Split 50 / 50 between BBA / PAA for those that had thought about it

Comments:

- While YRT will be eligible for PAA, it remains an **option not an obligation**
- Many insurers are still likely to stick with BBA, the default model (similar to MoS)
- Risk adjustments are therefore required to be estimated for YRT contract liabilities



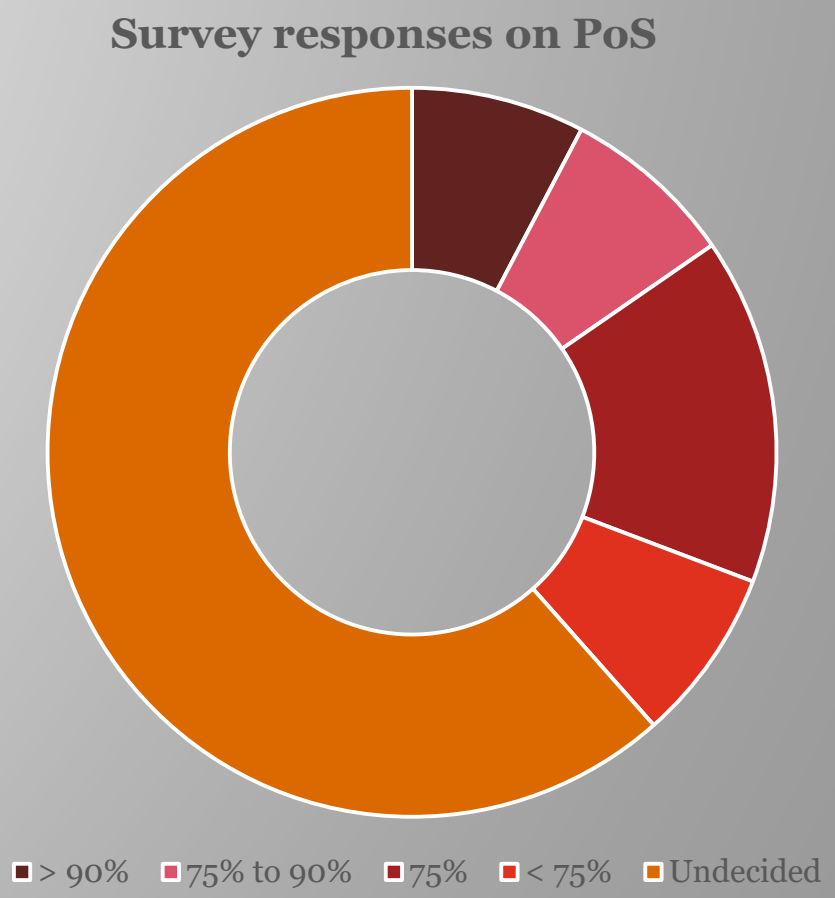
What probability of sufficiency will you target?

Survey results:

- Most insurers are undecided (or are waiting to see the impacts before deciding)
- Others are centred around 75% probability of sufficiency (PoS), which aligns with GI solvency

Comments:

- This paper **assumes a 75% PoS** as it align with current regulatory requirements for GI
- GI industry challenges around inconsistencies and comparability



Risk adjustments for unexpired risk on life contracts

Potential approaches:

- Cost of capital
  - *Linked with Solvency II*
- Prescribed margins
- "Quantile" approaches
  - *Stochastic, VaR, tVaR*

Approach considered:

- Stochastic model with adjustments for systemic risk
  - *Based on the GI framework for assessing risk margins*

Characteristic	Does the approach considered meet this? Why?	
1. Risks with low frequency and high severity will result in higher risk adjustments than risks with high frequency and low severity		Low frequency and high severity risks have a more skewed distribution and higher volatility, which will lead to a higher risk adjustment for any given probability of sufficiency
2. For similar risks, contracts with a longer duration will result in higher risk adjustments than contracts with a shorter duration		Expressing as a percentage of the present value (PV) of claims will achieve this because longer durations have higher PV of claims and risk adjustments will be held for over a longer period
3. Risks with a wide probability distribution will result in higher risk adjustments than risks with a narrower distribution		This is a natural outcome of a stochastic approach where the risk adjustment is based on the CoV of the distribution, which is a standardised measure of the spread (or width) of a distribution
4. The less that is known about the current estimate and its trend, the higher the risk adjustment		This requires judgement and is addressed within the adjustments for systemic risk to reflect the factors that may affect the mean of the distribution
5. To the extent that emerging experience reduces uncertainty, risk adjustments will decrease and vice versa		Expressing as a percentage of the PV of claims will achieve this because the PV will reduce as experience emerges and more is known

Risk adjustments for life – Approach considered

Independent Error

Stochastic model for **Independent Error** (i.e. variability around the mean)

- *Stochastic version of a projection model for a single contract with 10,000+ simulations*
- *Define the **Ultimate Liability** as a random variable where the BEL is the mean*
- *Lapses and mortality over a period are modelled using a Bernoulli distribution*
- *Expenses (unit costs and inflation) modelled using a normal distribution*
- *Premium and other assumptions derived from publicly available information*

Internal Systemic Risk

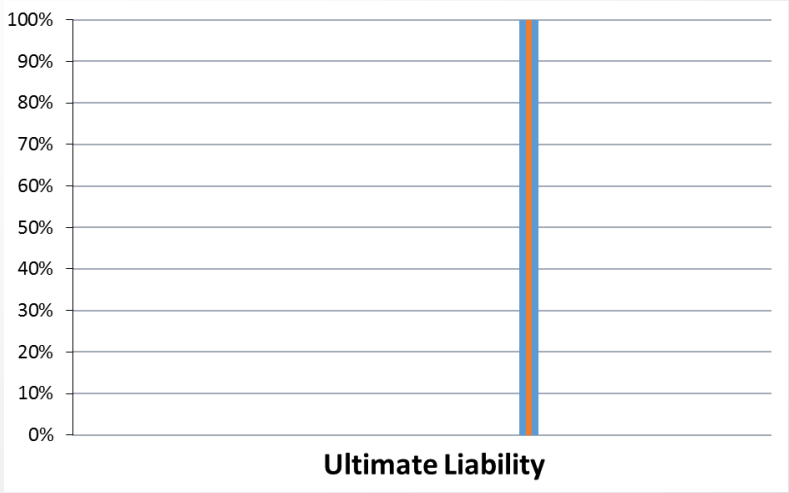
External Systemic Risk

Allowance for **Systemic Risk** made for risk of mis-estimation of the mean, its trend and other factors (internal or external to the insurer)

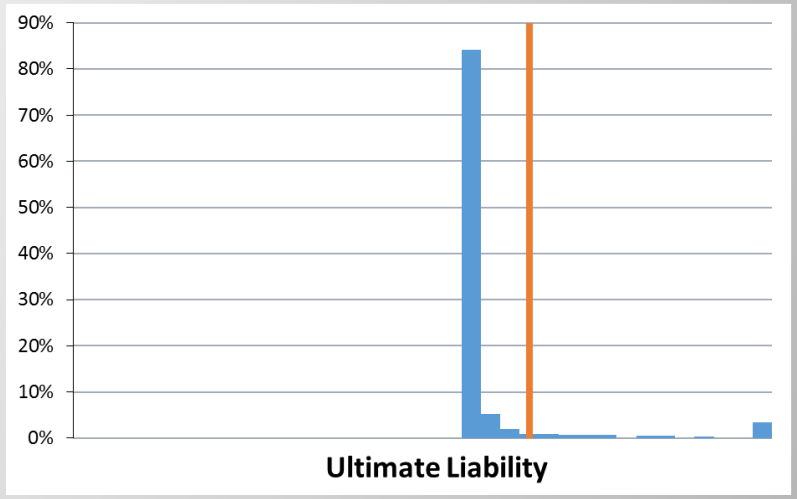
- *Based on the individual company's characteristics, confidence in its best estimate assumptions and sensitivity to changes in key assumptions*
- *Requires significant judgement to fit quantitative outcomes to qualitative assessments*

Stochastic modelling of Independent Error – Single YRT contract

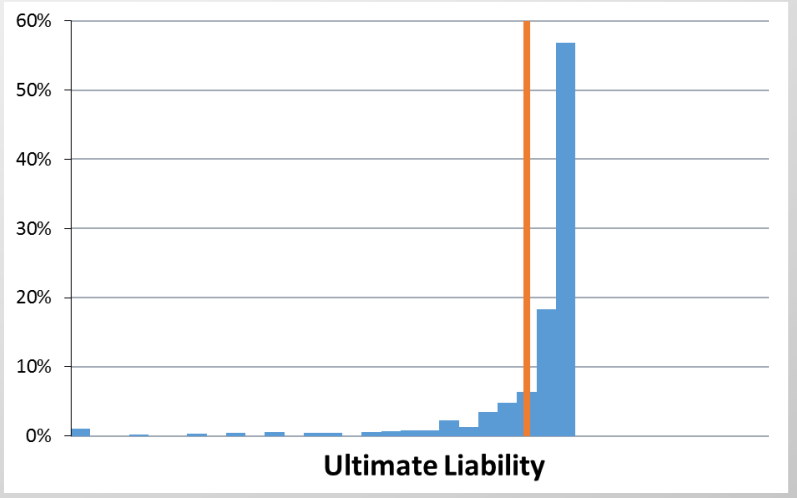
With stochastic expenses



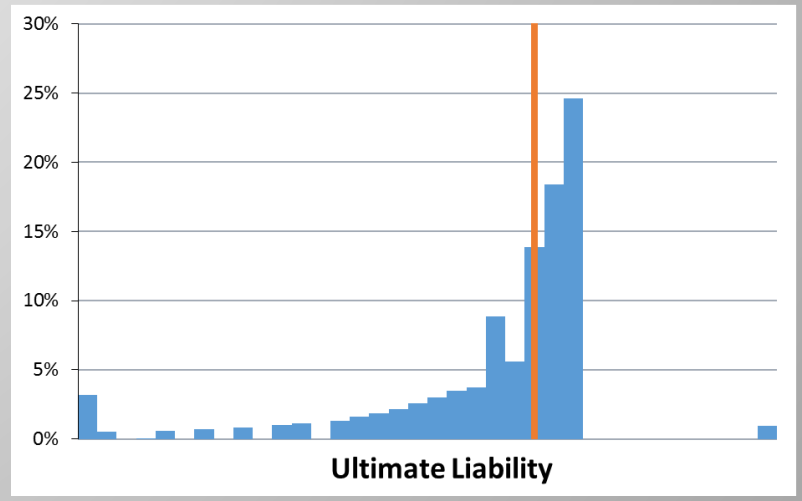
With stochastic claims



With stochastic lapses



Fully stochastic



Distributions of the Ultimate Liability with stochastic variables show that:

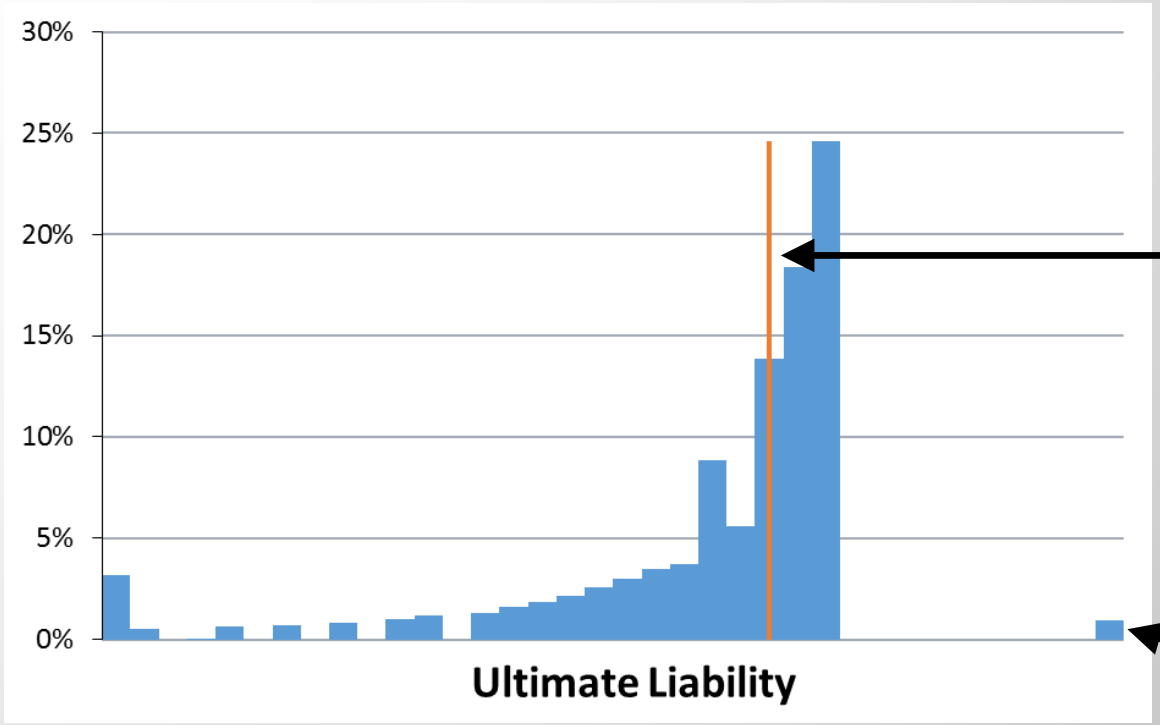
- The fully stochastic distribution is **highly skewed**
- **Claims risk** gives the distribution **a tail**
- **Lapse risk** gives the distribution **a body**
- **Expense risk** is not material

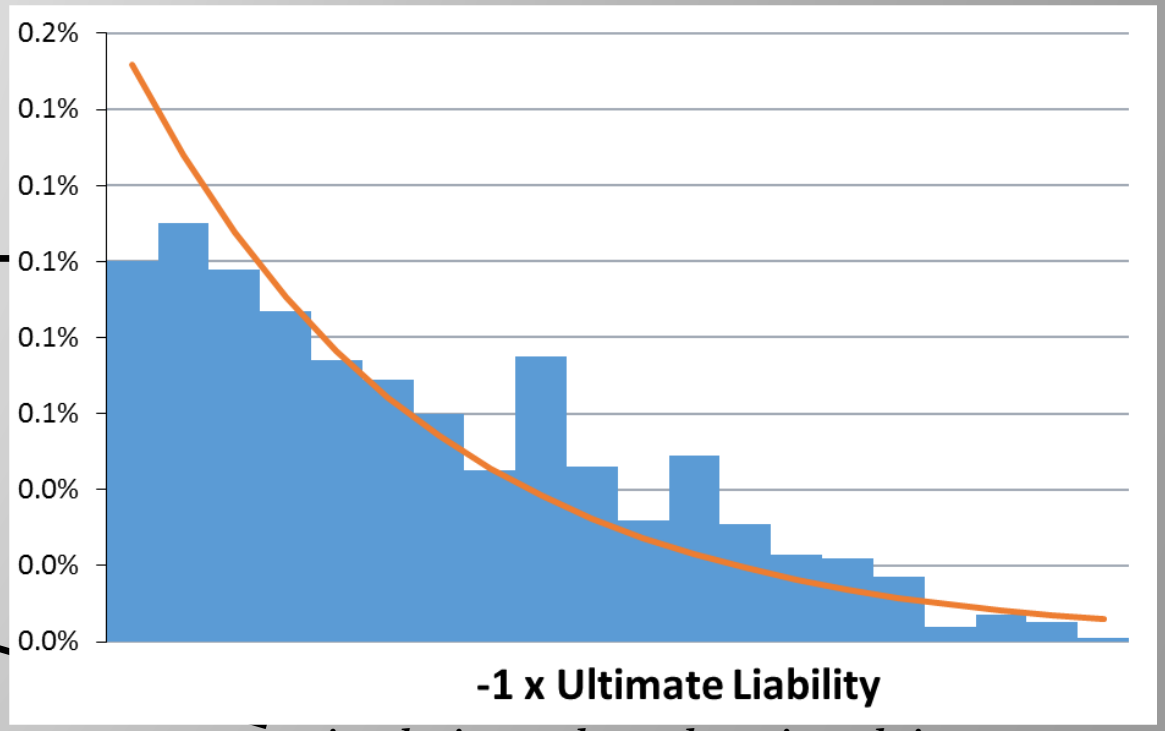
Stochastic modelling of Independent Error – portfolio of contracts

- The stochastic model has stochastic inputs for:
  - *Four assumptions (mortality, lapses, unit costs and inflation)*
  - *Projected out for 50 years*
  - *At least 10,000 simulations each contract*
  - *Potentially across 100,000's of contracts*
- Computationally quite difficult…

Is there a better way?

Stochastic modelling of Independent Error (continued)





simulations where there is a claim

*An **exponential distribution** provides a good approximation to the simulations **where there is no claim** during the life of the contract*

*An **exponential distribution** also provides a good approximation to the simulations **where there is a claim** during the life of the contract*

Parametric approximation for the Ultimate Liability

- A parametric approximation to the probability distribution of the Ultimate Liability for a YRT contract is possible
- It requires **five key variables** from the usual deterministic best estimate liability valuation

$$\boldsymbol{Pr(UL > X)} = \begin{cases} p.\int_0^{S+C-X} \alpha e^{-\alpha x}\,dx + (1-p).\int_0^{C-X} \beta e^{-\beta x}\,dx & if\ X < C \\ p.\int_0^{S+C-X} \alpha e^{-\alpha x}\,dx & if\ C \le X < S+C \\ 0 & if\ S+C \le X \end{cases}$$

$$= \boldsymbol{\max\{0, p.(1-e^{-\alpha.(S+C-X)})\} + \max\{0, (1-p).(1-e^{-\beta.(C-X)})\}}$$

where: $\alpha = 1 / [\,((PVC - BEL).(1-p) - BEL) / p + S + C\,]$

$\beta = 1 / [PVC - BEL + C\,]$

Fits well for values above the mean and **allows quicker simulations** for large portfolios

On a scale of one to ten,
how focused are you?
banana.
someecards
user card

Independent Error – Diversification in action

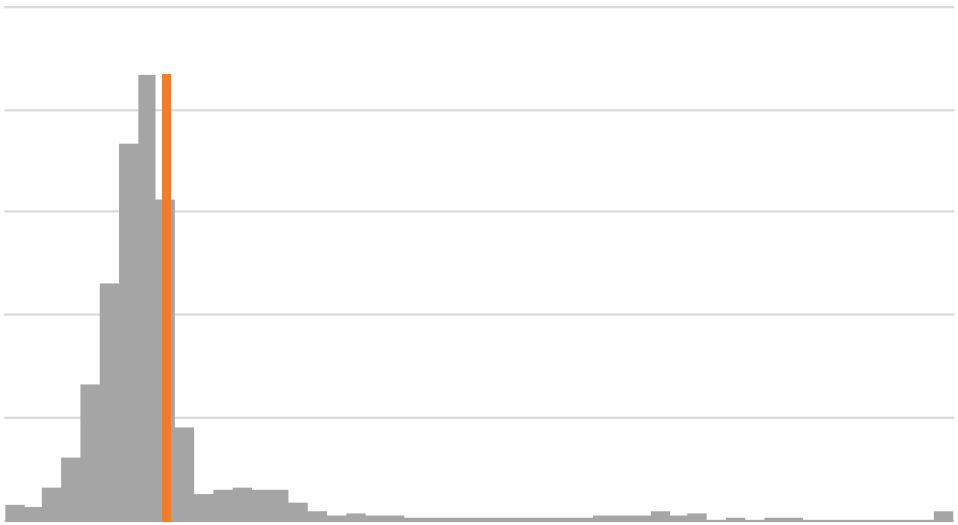
10 contracts

100 contracts

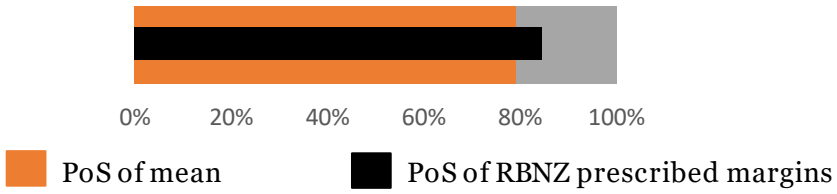
1,000 contracts

10,000 contracts

100,000 contracts



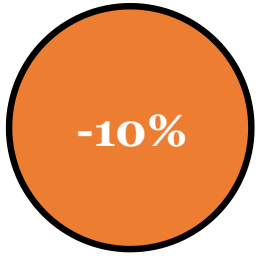
Total Ultimate Liability for portfolio



CoV 315%

Skew 3.7

Risk adjustment at 75% PoS (before systemic risk)



Independent Error – Diversification in action

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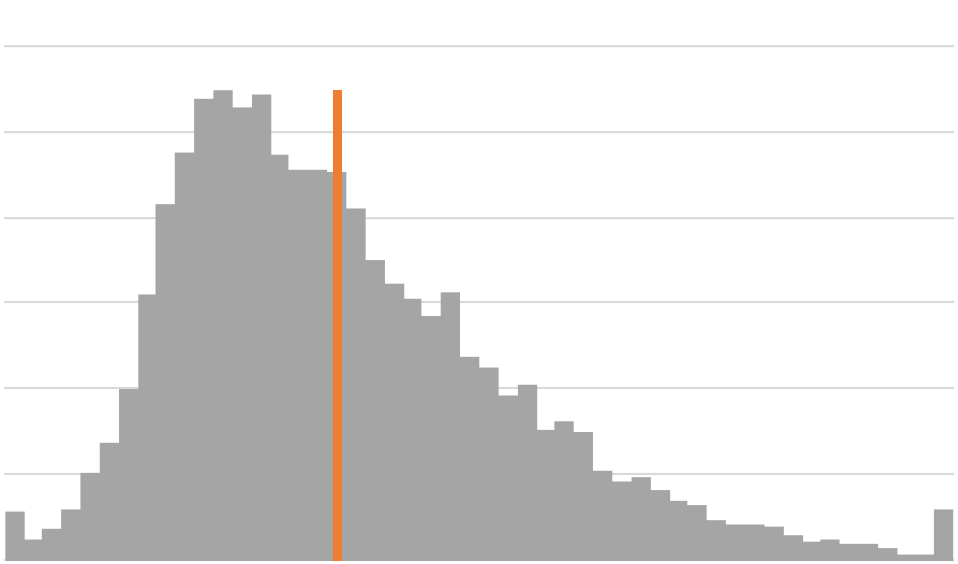
100,000 contracts



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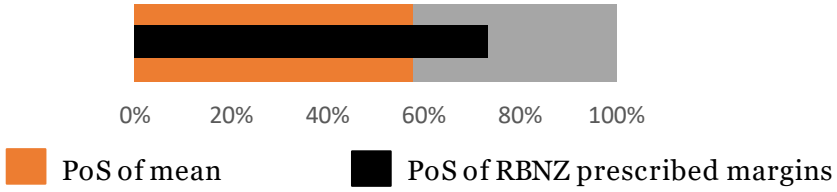
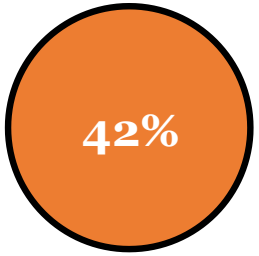


CoV 93%

Skew 1.0

Risk adjustment at 75% PoS (before systemic risk)



Independent Error – Diversification in action

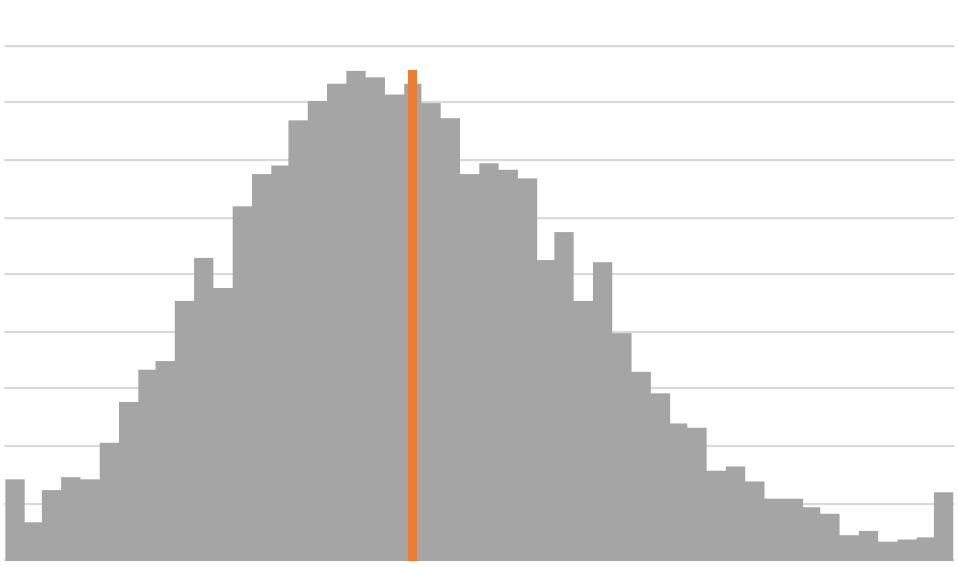
10 contracts

100 contracts

1,000 contracts

10,000 contracts

100,000 contracts



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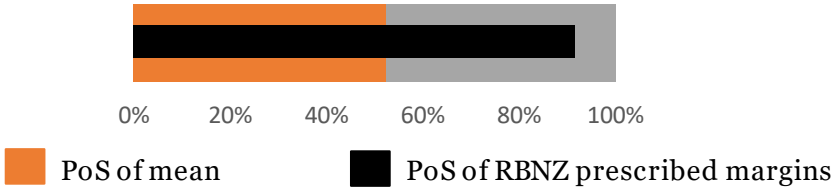
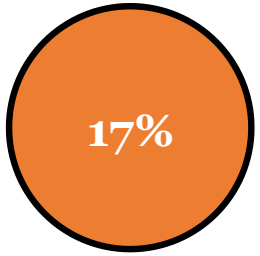


CoV 34%

Skew 0.4

Risk adjustment at 75% PoS (before systemic risk)



Independent Error – Diversification in action

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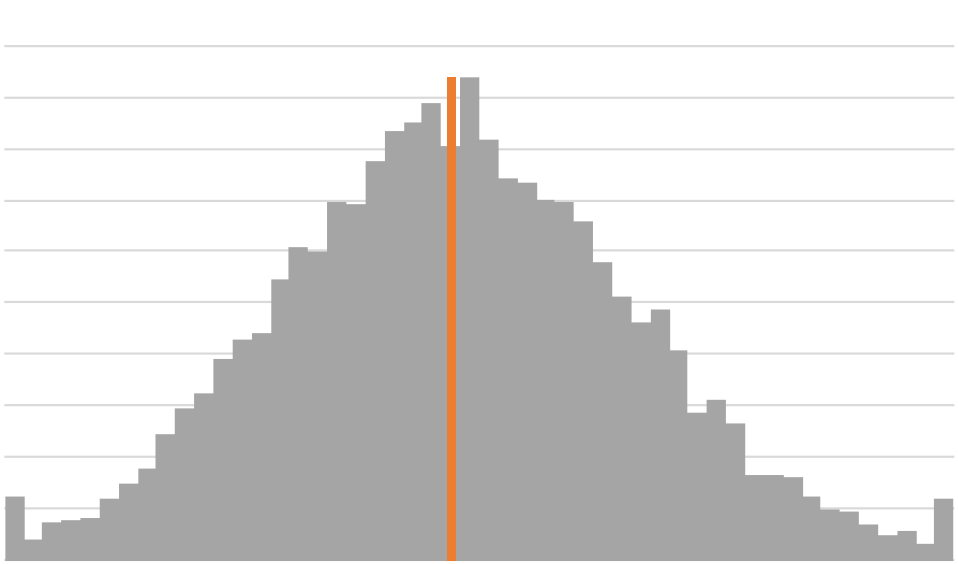
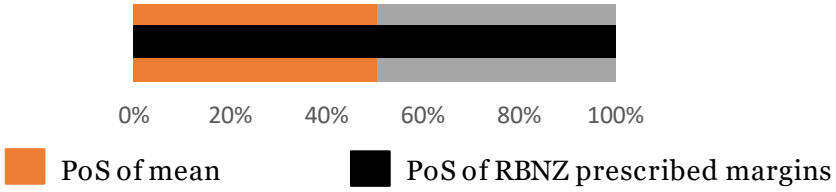
10,000 contracts

100,000 contracts



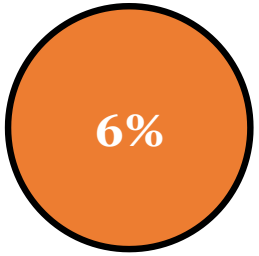
Total Ultimate Liability for portfolio



CoV 11%

Skew 0.1

Risk adjustment at 75% PoS (before systemic risk)



Independent error – Diversification in action

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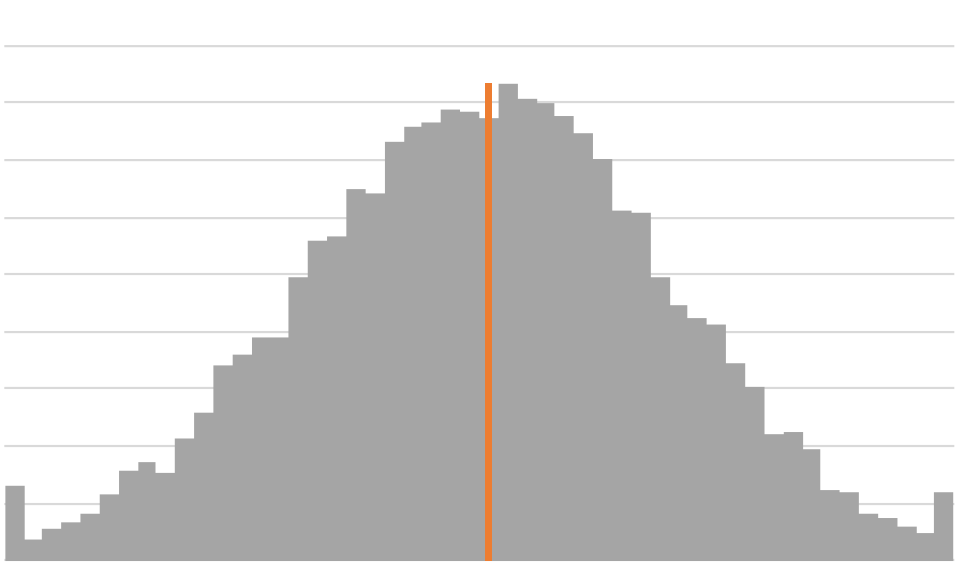
100 contracts

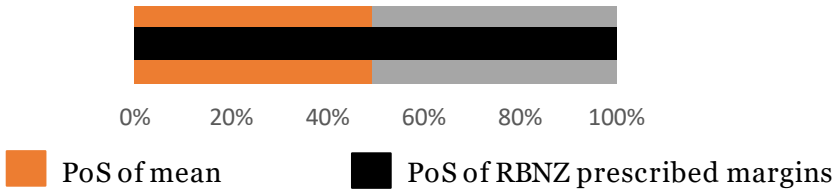
1,000 contracts

10,000 contracts

100,000 contracts



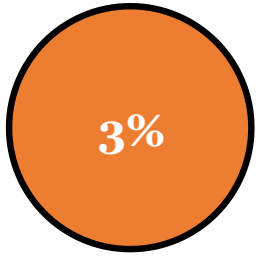
Total Ultimate Liability for portfolio



CoV 6%

Skew 0.0

Risk adjustment at 75% PoS (before systemic risk)



But wait there's more… Systemic Risk

Independent error considers volatility around the mean, but we need to allow for mis-estimation of the mean, the long-term trends, external factors and any other unknowns

	Internal systemic risk	**External systemic risk**
What is it for?	Risks that are within an insurer's control and affect the accuracy of the best estimate assumptions, in terms of both the mean and the long-term trends	Risks that are external to the company and beyond an insurer's direct control and would have impact the experience of multiple insurers in the market
Categories of risk	• Model error • Assumption error (mean or trend) • Data error	• Economic and commercial environment • Legal, regulatory, political or geopolitical • Natural catastrophe • Social and cultural shifts
Examples for a YRT life portfolio	• Known issues with actuarial models • New product or distribution channel • Recent changes to pricing or reinsurance • Lack of credible company experience to set assumptions • Large unexplained losses in the sources of profit • Data reconciliation issues (e.g. following a move to a new administration system or datawarehouse)	• Severe economic downturn leading to higher lapses • Failure of an insurer leading to distrust in the industry • Future changes to tax rules • Unexpected entry of a new aggressive competitor • Influenza pandemic • Societal changes towards purchasing this product over another alternative product (e.g. peer-to-peer)

Systemic Risk – Likely allowances

- Models in GI have Internal Systemic Risk CoV of 5% or more [*GI framework*]
  - *Potentially more risk in life models with more assumptions and longer time horizon?*
- Anecdotally external systemic risk is usually similar in size to internal systemic risk
- Therefore, Systemic Risk allowance of at least 10% CoV is reasonable
  - *This equals a **6.7% risk adjustment at 75% PoS** (normal distribution)*

- Note that there is **more risk** of mis-estimating the mean with higher upfront costs
  - *This is proven by sensitivity tests or considering the impact of prescribed RBNZ margins*
  - *Expect **higher Systemic Risk** allowances with higher upfront costs to reflect **higher lapse risk***

Systemic Risk allowances are a substantial component of the risk adjustment, but it requires significant judgement and will be specific to the insurer (one size does not fit all)

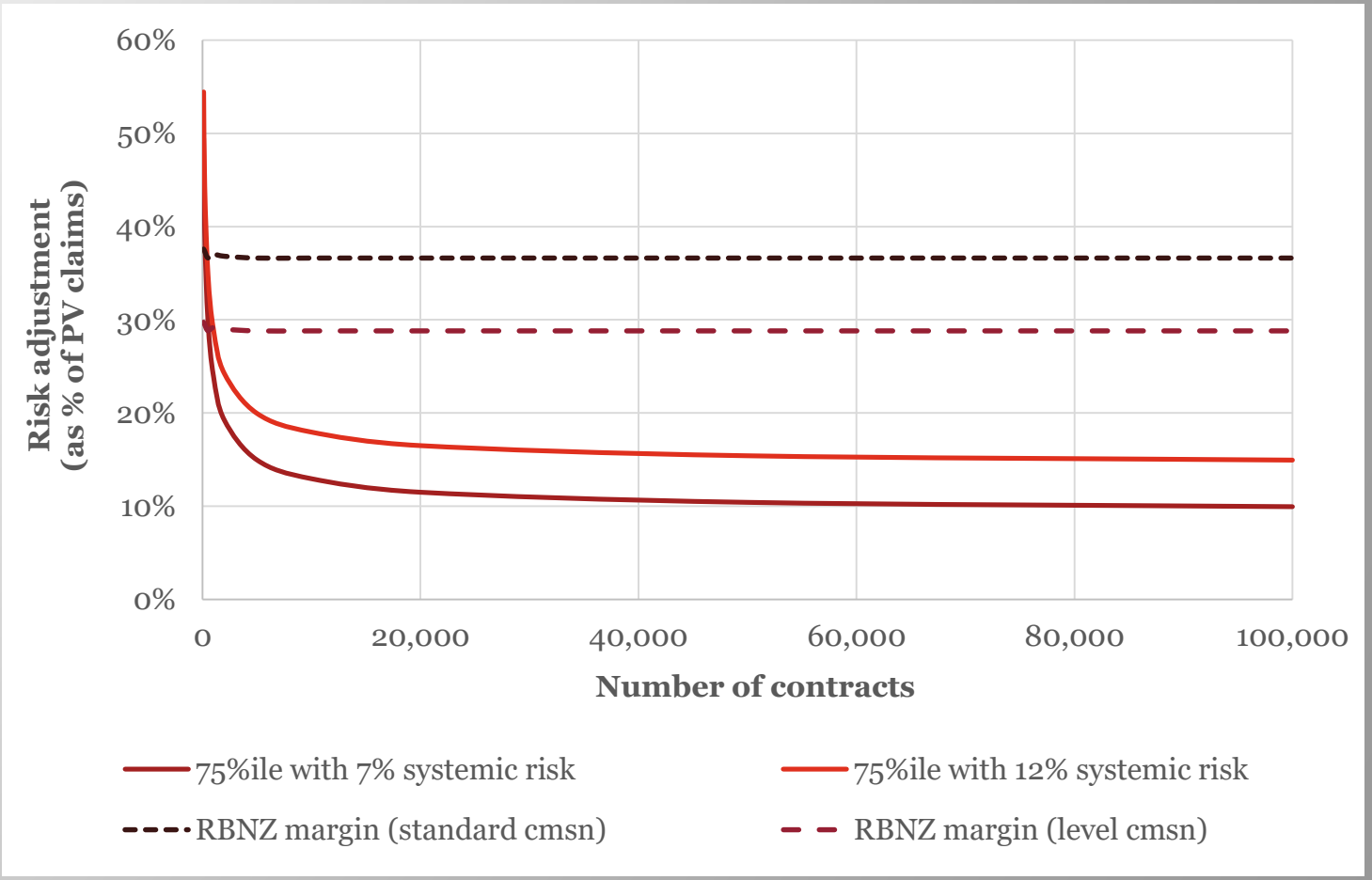
Risk adjustments – Putting it all together

Risk adjustments of **10-15**% are likely for large, stable portfolios

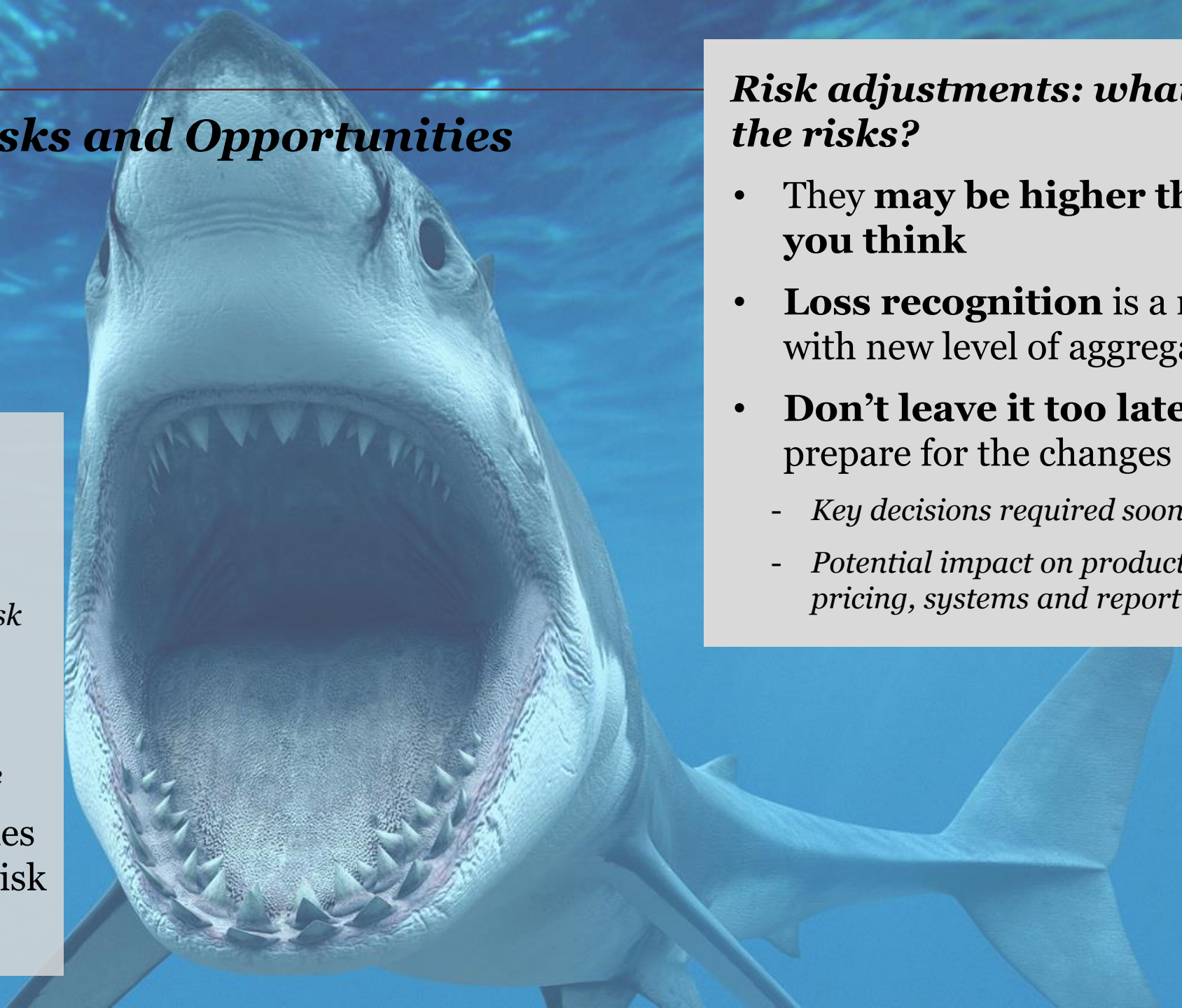
- *At a 75% PoS and applied as a % of value of future claims*
- *No material differences by duration of policy*
- *Compares well to GI benchmarks and impact of RBNZ margins*

Likely to be higher for:

- *Smaller portfolios*
- *Other riskier products*
- *Higher upfront costs*
- *Higher probabilities of sufficiency*



Concluding Risks and Opportunities



Risk adjustments: what are the risks?

- They **may be higher than you think**
- **Loss recognition** is a risk with new level of aggregation
- **Don't leave it too late** to prepare for the changes
  - *Key decisions required soon*
  - *Potential impact on products, pricing, systems and reporting*

Other opportunities

- Stochastic modelling for life insurers
  - *Useful for estimating risk adjustments*
  - *Also could help move **lapse risk from reactive to proactive***
- GI framework provides a great platform for risk adjustments

Thank you

Got a question or comment? Then let's chat…

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