Measuring Uncertainty Qualitatively (MUQ) Working Party

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Institute and Faculty of Actuaries

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GIROC Reserving Survey Recommendations
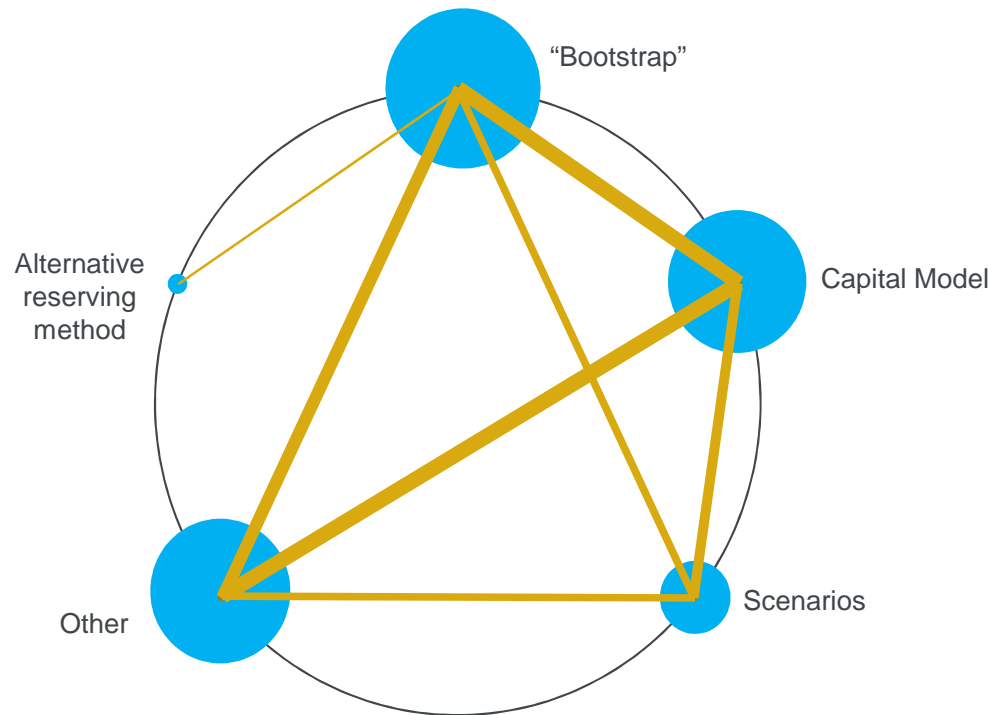
Uncertainty
- both measurement and communication

Reporting

  – Practice varies considerably from actuary to actuary

  – GIROC recommending more to be done on sharing best practice

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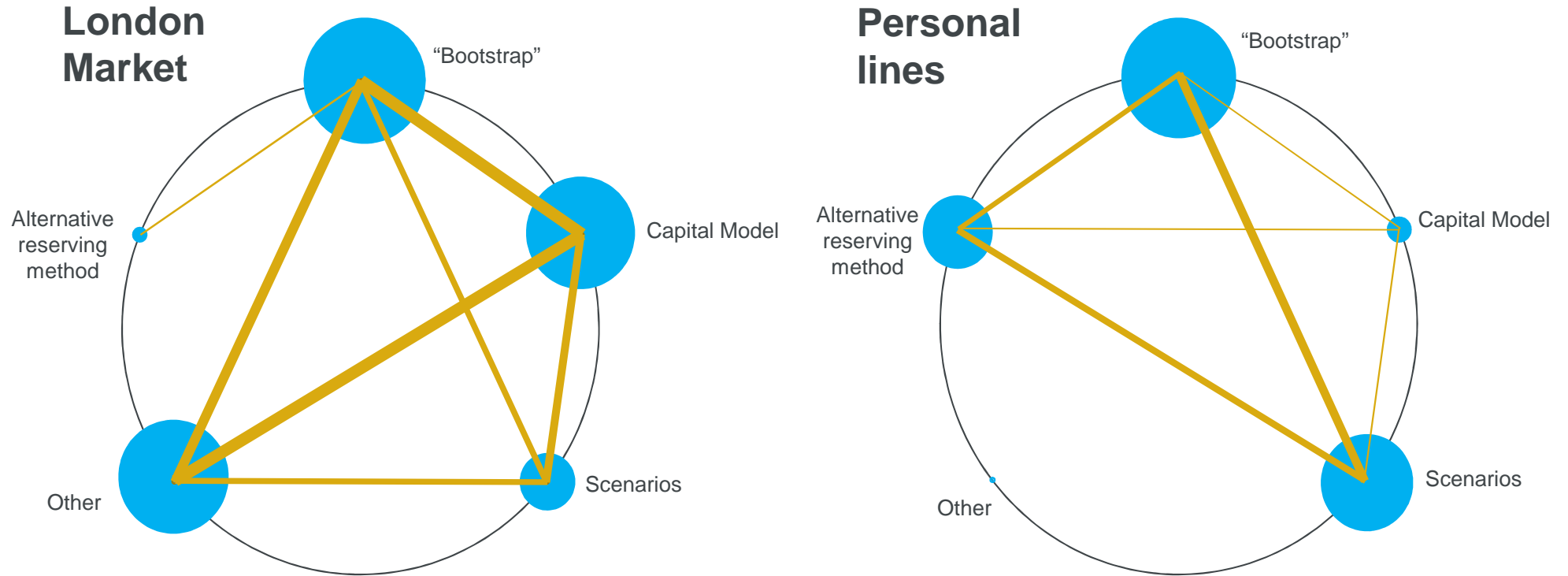of Actuaries

Survey results
Measuring uncertainty

'Other' methods

- Benchmark CoVs (coefficient of variance)

- Uncertainty around development factors

- Frequency/severity – stochastic methods

- Tails

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Survey results
Measuring uncertainty

London Market

Personal lines

Sizeable minority actively do not bootstrap at all

25%

20%

MUQ
Measuring Uncertainty Qualitatively

Remit

- Consider all areas of uncertainty outside of "bootstrap"* methods

- *Not* specifically focussing on communication

Aim

Stage 1:
- Gather current thinking and what has been done to date
- Collate in one easily accessible place

* "Bootstrap" - a generic term to incorporate stochastic chain ladder methods such as ODP bootstrap, also includes Mack method

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MUQ workstreams

Uncertainty framework

Expert judgement

Risk appetite

Language

Use of capital models

Data uncertainty

Effectiveness of methods

'Other' methods from the survey

GLMs on aggregate triangles

Individual claims reserving

What we can learn from elsewhere
- Australia
- US
- Ireland
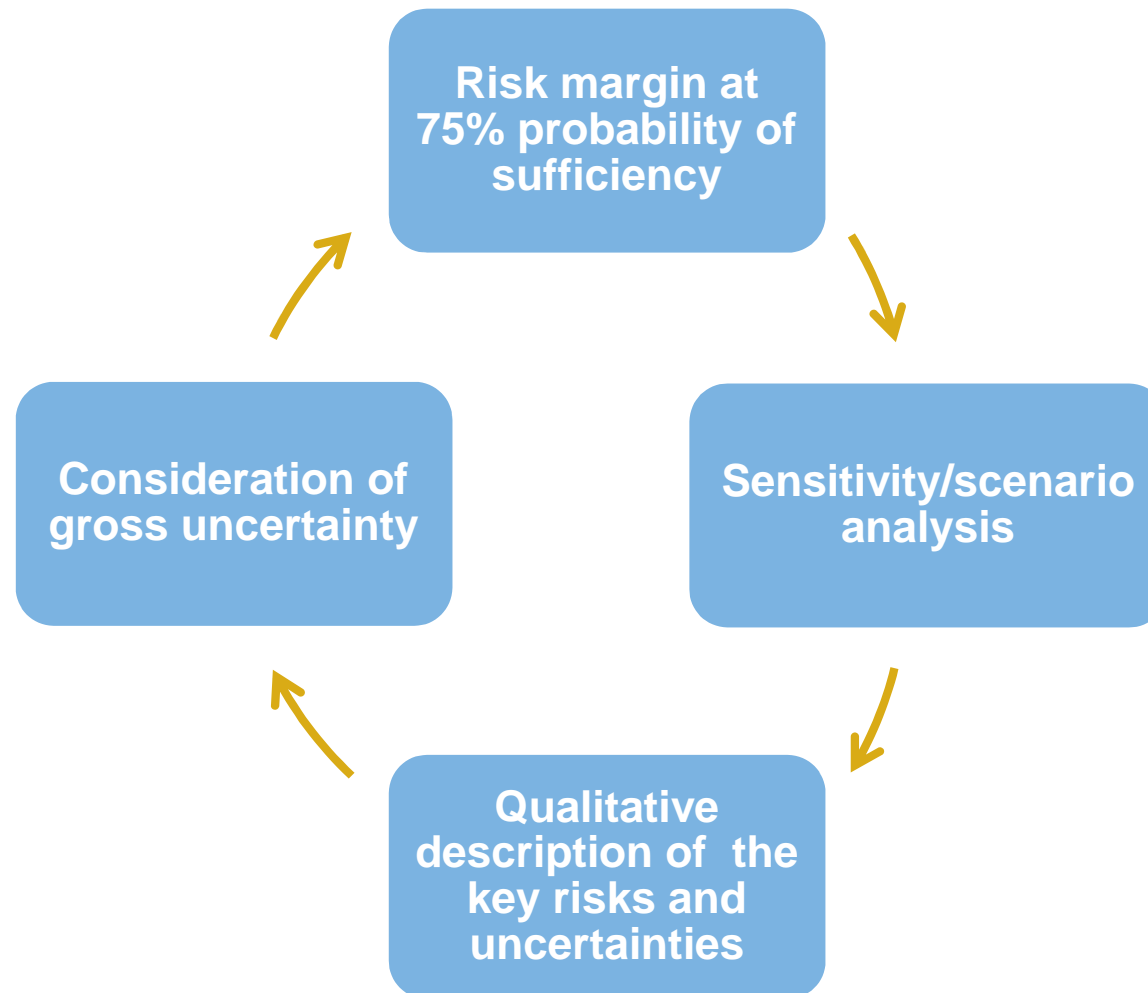
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An Australian perspective

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E PERITIA RATIO

Uncertainty

Prudential requirements for an Appointed Actuary

Risk Margin Requirement in Australia

Some history

Historically	2002	2008
Implicit risk margins by adopting **conservative assumptions**, but no accounting requirement	**Explicit risk margin** requirement	Actuaries Institute's new **framework for assessing risk margins**

Insurance liability provision to include a risk margin that is at least the greater of:
- § A value which provides an insurance liability provision with a 75% probability of sufficiency; and
- § One-half of a standard deviation above the mean.

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Determining risk margins – 'Bolt-on' approach

Determine mean estimate and risk margin separately

Determine coefficient of variation (CoV)

Apply dependency structure across class of business

Assume a distribution

Risk margin at 75% (and test against half the CoV)

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Determining risk margins – 'Bolt-on' approach

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Risk margin at 75% (and test against half the CoV)

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Sources of uncertainty

What could cause the valuation estimate to be wrong?

Independent risk (random/process error)
- Inherent volatility associated with the insurance process
- Randomness compromising the ability to select correct parameters

Internal systemic risk (parameter & model error)
- Uncertainty arising from the model being an imperfect representation of real life

External systemic risk
- Uncertainty arising from future systemic trends external to the modelling process (eg economic, legal, natural peril events etc)

Quantitative modelling techniques (eg bootstrap/mack) are backwards looking and will only look at independent risk and past episodes for external systemic risk

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Sources of uncertainty

Internal systemic risk – how wrong could the actuary get it?

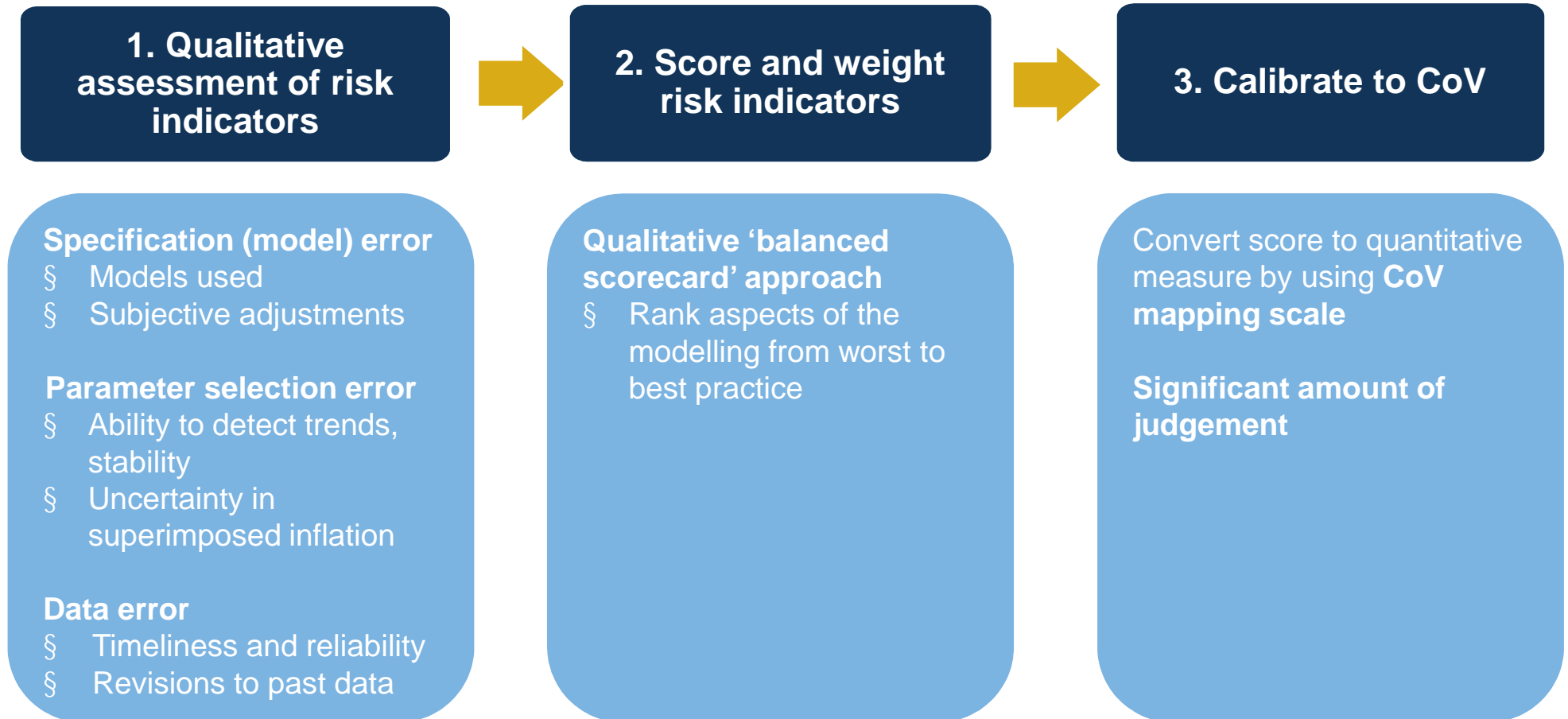| Independent risk (random/process error)	• Inherent volatility associated with the insurance process • Randomness compromising the ability to select correct parameters
Internal systemic risk (parameter & model error)	• Uncertainty arising from the model being an imperfect representation of real life
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'New' Framework

Internal systemic risk – how wrong could the actuary get it?

1. Qualitative assessment of risk indicators	→	2. Score and weight risk indicators	→	3. Calibrate to CoV

Specification (model) error
§   Models used
§   Subjective adjustments

Parameter selection error
§   Ability to detect trends, stability
§   Uncertainty in superimposed inflation

Data error
§   Timeliness and reliability
§   Revisions to past data

Qualitative 'balanced scorecard' approach
§   Rank aspects of the modelling from worst to best practice

Convert score to quantitative measure by using **CoV mapping scale**

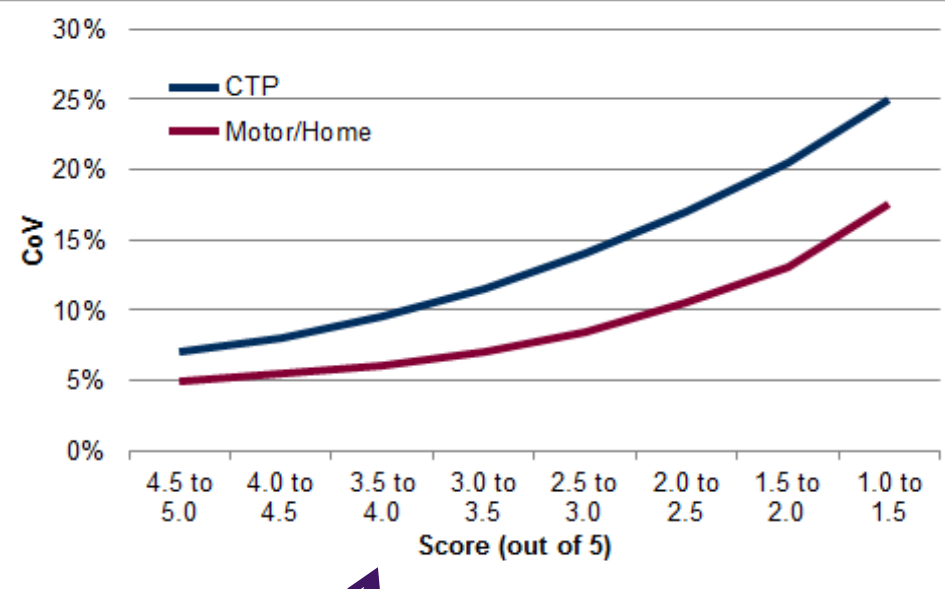**Significant amount of judgement**

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'New' Framework

Internal systemic risk – how wrong could the actuary get it?

1 ←——→ 5

Risk component	Potential risk indicators	Motor score OSC	Motor weight	Home score OSC	Home weight	CTP score OSC	CTP weight
Specification error	Number of independent models used	4	7	4	7	3	2
	Extent to which models separately analyse different claim/payment types	3	3	4.5	5	2	7
	Range of results produced by models	4	5	4	4	2	2
	Checks made on reasonableness of results						
	Confidence in assessment of model 'goodness of fit'						
	Number and importance of subjective adjustments to factors						
	Extent of monitoring and review of model and assumption performance						
	Ability to detect trends in key claim cost indicators						
	Sophistication and performance of superimposed inflation analysis						
	Level of expense analysis to support CHE assumptions						
	Ability to model using more granular data, e.g. unit record data						
Parameter selection error	Best predictors have been identified, whether or not they are used						
	Value of predictors used						
Data error	Knowledge of past processes affecting predictors						
	Extent, timeliness, consistency and reliability of information from business						
	Data subject of appropriate reconciliations and quality control						
	Processes for obtaining and processing data are robust and replicable						
	Frequency and severity of past mis-estimation due to revision of data	5	3	3	3	5	5
	Extent of current data issues and possible impact on predictors	4	3	5	3	5	3
Total weighted average score - outstanding claims (OSC)		4.1		4.0		3.5	
Total weighted average score - premium liabilities		4.5		4.5		4.0	

Chart: CoV vs Score (out of 5) — CTP and Motor/Home curves. Score ranges: 4.5 to 5.0, 4.0 to 4.5, 3.5 to 4.0, 3.0 to 3.5, 2.5 to 3.0, 2.0 to 2.5, 1.5 to 2.0, 1.0 to 1.5.

Sources of uncertainty

External systemic risk – non random risks outside the modelling process

Independent risk (random/process error)	• Inherent volatility associated with the insurance process • Randomness compromising the ability to select correct parameters
Internal systemic risk (parameter & model error)	• Uncertainty arising from the model being an imperfect representation of real life
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'New' Framework

External systemic risk – non random risks outside the modelling process

Economic and social risks

Legislative, political and claims inflation risk

Claim management process change risk

Event risk

Latent claim risk

Recovery risk

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Representing uncertainty

Further requirements

Sensitivity analysis	**Scenario analysis**
Qualitative description of the key risks and uncertainties	**Consideration of gross uncertainty**

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CHECKLIST

Are you adequately capturing all sources of uncertainty?

Does the Board have appropriate understanding?

New approaches to estimating and reporting

MUQ - Get involved

Still open to new volunteers
- via IFoA volunteering pages, or email Sarah

Share your thoughts and experiences with us
- Particularly if you have experience of
  - Benchmark CoVs
  - Uncertainty around dev factors
  - Tails
  Or any alternative methods

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Questions

Comments

Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenter.

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