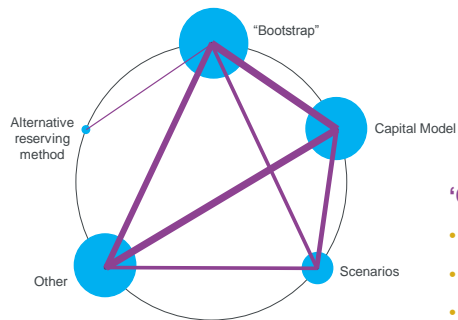# Institute and Faculty of Actuaries

A Tried and Tested Framework for Reserve Uncertainty

James Widdows, Chaucer
Sarah MacDonnell, LCP

13 November 2015

GIROC survey results
Measuring uncertainty

'Other' methods
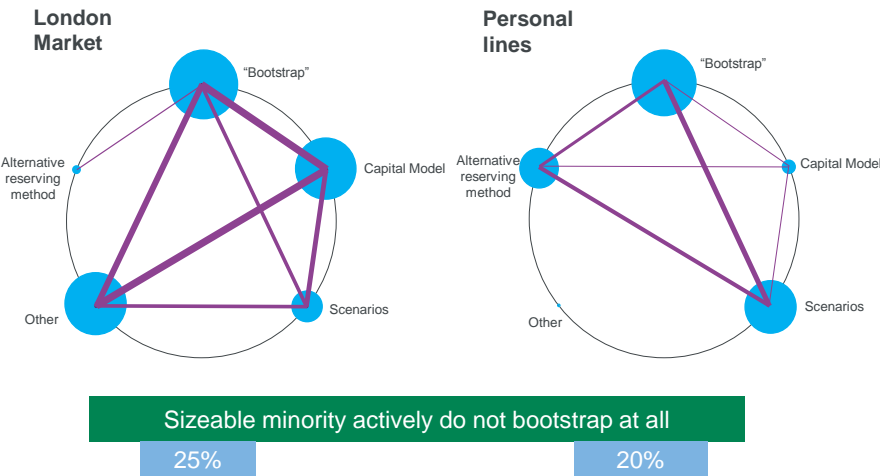
- Benchmark CoVs (coefficient of variance)
- Uncertainty around development factors
- Frequency/severity – stochastic methods
- Tails

GIROC survey results
Measuring uncertainty

London Market

"Bootstrap"

Capital Model

Alternative reserving method

Other

Scenarios

Personal lines

"Bootstrap"

Alternative reserving method

Capital Model

Other

Scenarios

Sizeable minority actively do not bootstrap at all

25%

20%

13 November 2015

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Beyond "Bootstrap"

Definition of "Bootstrap" - triangle techniques based on chain ladder, such as Mack or ODP bootstrap
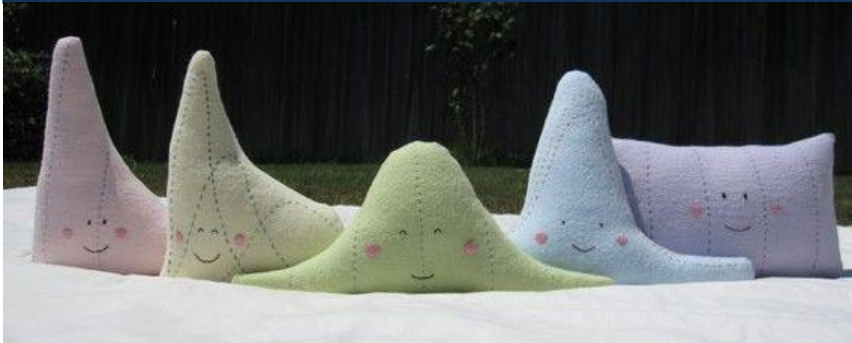
A limited measure

The past is not necessarily a good guide to the future

13 November 2015

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Beyond "Bootstrap"

Is it realistic to define a distribution of outcomes at all?

Ireland

Guidance on best estimate and margin for uncertainty

Guidance on margin for uncertainty

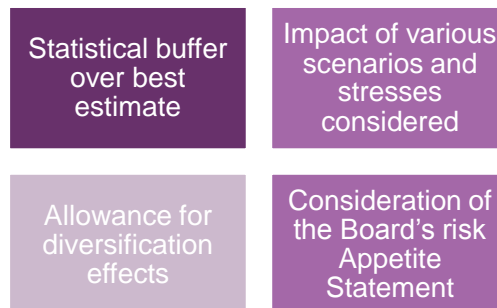"Stress and scenarios testing are key techniques…. Where appropriate, statistical methods … should also be employed."

Changes in claims environment – past and future	Exposures to latent claims or new types of claim	Exposure to binary events
Data quality issues	Mergers and acquisitions	Changes in claim handling

Guidance on margin for uncertainty

"The board should enumerate the constituents of the Margin for Uncertainty."

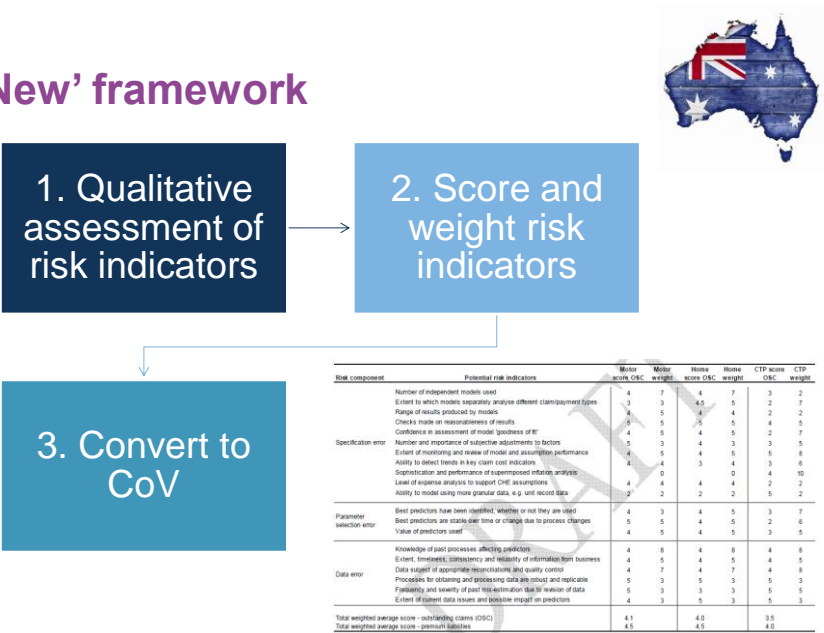|	
Statistical buffer over best estimate	Impact of various scenarios and stresses considered
Allowance for diversification effects	Consideration of the Board's risk Appetite Statement

Australia

Requirement to report at the 75th percentile

New framework developed

'New' framework

1. Qualitative assessment of risk indicators

2. Score and weight risk indicators

3. Convert to CoV

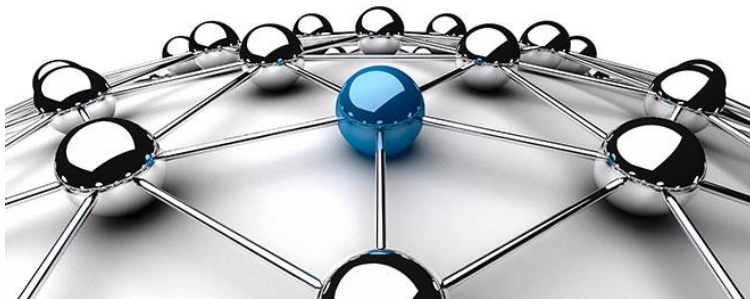| Risk component	Potential risk indicators	Motor score OSC	Motor weight	Home score OSC	Home weight	CTP score OSC	CTP weight
Specification error	Number of independent models used	4	7	4	7	3	2
	Extent to which models separately analyse different claim/payment types	3	3	4.5	5	2	7
	Range of results produced by models	4	5	4	4	2	2
	Checks made on reasonableness of results	5	5	5	5	4	5
	Confidence in assessment of model 'goodness of fit'	4	5	4	5	2	7
	Number and importance of subjective adjustments to factors	5	3	4	3	3	5
	Extent of monitoring and review of model and assumption performance	4	6	4	5	5	8
	Ability to detect trends in key claim cost indicators	4	4	3	4	3	6
	Sophistication and performance of superimposed inflation analysis		0		0	4	10
	Level of expense analysis to support CHE assumptions	4	4	4	4	2	2
	Ability to model using more granular data, e.g. unit record data	2	2	2	2	5	2
Parameter selection error	Best predictors have been identified, whether or not they are used	4	3	4	5	3	7
	Best predictors are stable over time or change due to process changes	5	5	4	5	2	6
	Value of predictors used	4	5	4	5	3	5
Data error	Knowledge of past processes affecting predictors	4	8	4	8	4	8
	Extent, timeliness, consistency and reliability of information from business	4	5	4	5	4	5
	Data subject of appropriate reconciliations and quality control	4	7	4	7	4	8
	Processes for obtaining and processing data are robust and replicable	5	3	5	3	5	3
	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	

But still not forgetting

Sensitivity analysis

Scenario analysis

Qualitative description of key risks and uncertainties

Developing a framework

A Framework for Reporting
Reserve Uncertainty
October 2015

Introduction

- Background on Chaucer
- The RPPR
- Why do a workshop on it?
- The data has been changed so you can't glean anything about Chaucer but the trends are those you might see

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Overview of the sections

Chaucer

- Executive Summary
- Monitoring of performance against reserving risk tolerance
- Tracking of Actuarial Best Estimate gross ultimate loss ratios over time
- Key areas of uncertainty and expert judgement
- New(er) potential/emerging risks
- Quarterly summary of where basis has changed
- Loadings as a percentage of unpaid claims
- Loadings
- Operational risk monitoring
- Stress tests

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Performance vs reserving risk tolerance

Chaucer

- Level of loading vs reasonable range of loadings

Syndicate	Lower	Upper	CFO Proposed	Rating
S9876	£20m	£80m	£60.5m	Green

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Performance vs reserving risk tolerance

Chaucer

- Prior year reserve movements as a percentage of opening reserves

Risk Measure	Rating
Prior year booked deterioration in the quarter	1.5%
Best estimate prior year quarterly reserve deterioration	£3.5m
Best estimate prior year annual reserve deterioration	-2.2%

+ve = reserve deterioration

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Performance vs reserving risk tolerance

Chaucer

- Level of loading vs reasonable range of loadings

Reserve Loading Ranges vs. CFO Estimate
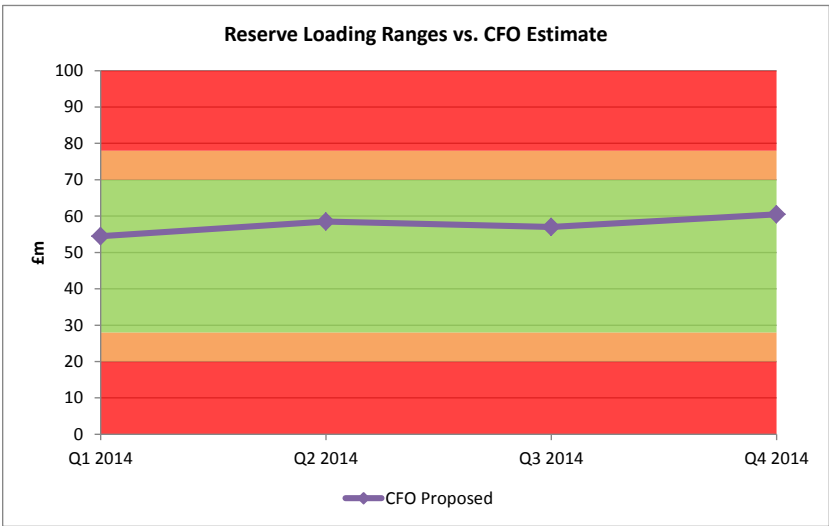
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Performance vs reserving risk tolerance

- Prior year reserve releases

Prior Year Reserves excluding Cat
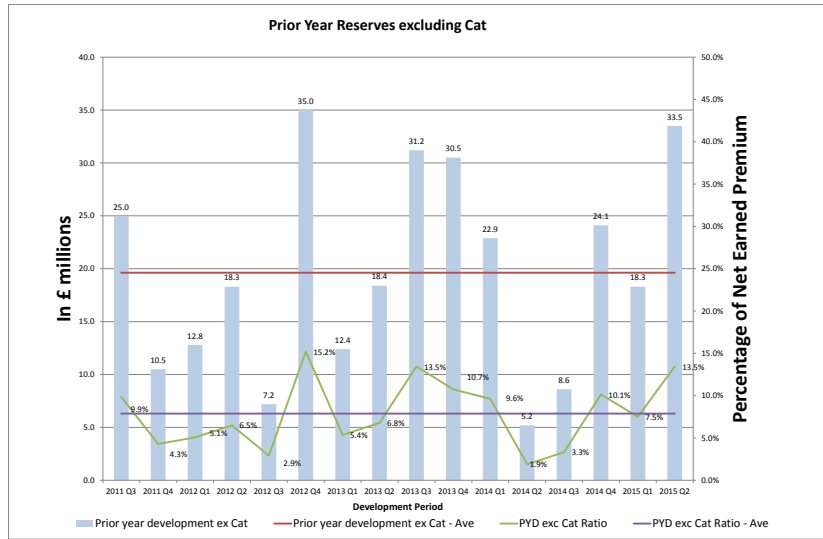
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Performance vs reserving risk tolerance

- Sources of prior year releases (1)

Source	Description	Current quarter experience
Loadings	Reductions in specific loadings or run-off of new class loadings	2013 Year of Account loading of £2m removed as ABC explosion claim settled
Exchange rates	Rates of exchange on non-settlement currencies	Improvement in AUD rate leading to increased prior year releases of approximately £1m
Initial loss ratios	Changes to our prior loss ratio assumptions	No update this quarter
Premiums	Reductions in premium estimates for prior years impacting prior year claims ultimates	Net earned premiums for the quarter on prior years increased by £3m leading to a reserve deterioration of approximately £1m

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Performance vs reserving risk tolerance

Chaucer

- Sources of prior year releases (2)

Source	Description	Current quarter experience
Inflation	Impact of inflationary environment	Current low inflation environment has continued contributing to prior year releases
Cat/Big losses	Reductions in estimates of cat and big losses	Reduced NZ earthquake estimates by £1.5m
Attritional and Big development patterns	Changes in reserving assumptions	No changes to assumptions this quarter
Other		

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Performance vs reserving risk tolerance

Chaucer

- Commentary on ultimate movements

Division	2012 and Prior	2013	2014	2015
Marine				
Energy				
Treaty				
……				
Total				

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Ultimate Loss Ratio Tracking

- Ultimate Loss Ratio tracking over time
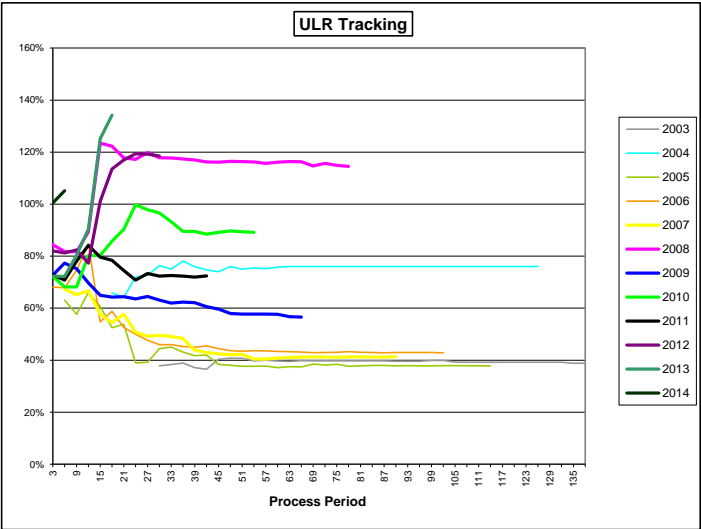
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Ultimate Loss Ratio Tracking

- Ultimate Loss Ratio tracking over time

UY	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014 to date
2003	0%	1%	2%	-1%	0%	0%	0%	0%	0%	0%	0%
2004		6%	6%	-2%	0%	0%	0%	0%	0%	0%	0%
2005			-27%	4%	-5%	-1%	1%	0%	0%	0%	0%
2006				-35%	-5%	-2%	0%	0%	0%	0%	0%
2007					-16%	-2%	-6%	-1%	0%	0%	0%
2008						28%	0%	-1%	0%	-1%	-1%
2009							-6%	-1%	-4%	0%	-1%
2010								20%	-10%	0%	-1%
2011									-12%	2%	0%
2012										42%	-1%
2013											44%
2014											

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Key areas of uncertainty and judgement

Chaucer

Area	Comments	Stress Test	Loadings
2015 Chile earthquake	Delayed notifications, reliance on underwriter estimates, exposure to exchange rate risk	RS-13	£2m loading added at 15 q3
NZ Earthquakes	Potential for coverage disputes, exchange rate risk	None	No loading currently held
ABC Big loss	Particulars of the claim	RS-5	Loading of £5m held
Changing development patterns	Uncertainty around the shape of the development pattern due to changes in legislative changes or changes in claims handling procedures	RS-10	Loading of £1m held
Long tail classes	Lengthy exposure periods and lack of historical data. Initial loss ratio developed with significant judgement	RS-8	No loading
New classes	Reserving is more judgemental and reliant on underwriting input and benchmarks	RS-9	New class loadings

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New(er) Potential and emerging risks

Chaucer

- Background details on what happened
- Year of account and class potential impacted
- Coverage details
- Potential impact
- Particular uncertainties
- Reinsurance position

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New(er) Potential and emerging risks

New(er) Potential and emerging risks

- Background details on what happened
- Year of account and class potential impacted
- Coverage details
- Potential impact
- Particular uncertainties
- Reinsurance position

Summary of changes in basis

Chaucer

- For example…..
- Changes in development patterns
- Changes in initial loss ratios
- Changes in methodology

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Loadings
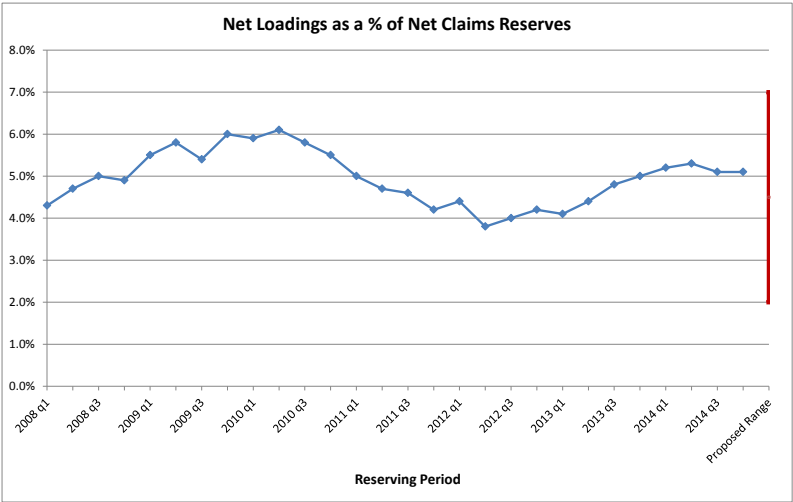
Chaucer

Proposed net loadings as a % of net best estimate unpaid claims:

Division	Net Earned Loadings	Net Earned Reserves	Percentage
……			
Total Syndicate	£50.5m	£982.4m	5.1%

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Loadings

Net loadings as a % of unpaid claims – tracking over time:

Net Loadings as a % of Net Claims Reserves

Loadings

Internal model results:

	Net Earned Loadings this quarter	Percentile this quarter	Net Earned Loadings last quarter	Percentile last quarter
Total Syndicate	£50.5m	82nd	£52.0m	82.5th

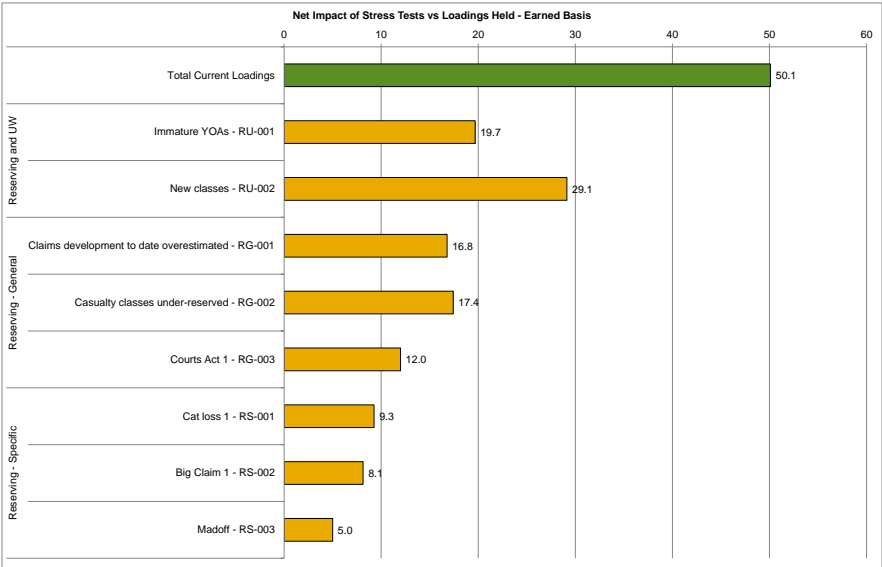|	Net Earned Loadings	Percentile
Total Syndicate	£45m	80th
Total Syndicate	£70m	90th

Operational Risk Monitoring

- For example…..
- IT issues
- A new acquisition
- Under-resourced/Over worked actuarial team!

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Stress Tests

Net Impact of Stress Tests vs Loadings Held - Earned Basis

Category	Item	Value
	Total Current Loadings	50.1
Reserving and UW	Immature YOAs - RU-001	19.7
	New classes - RU-002	29.1
Reserving - General	Claims development to date overestimated - RG-001	16.8
	Casualty classes under-reserved - RG-002	17.4
	Courts Act 1 - RG-003	12.0
Reserving - Specific	Cat loss 1 - RS-001	9.3
	Big Claim 1 - RS-002	8.1
	Madoff - RS-003	5.0

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Executive Summary

Chaucer

- New or increasing risks
- The main risks
- Summary of the loadings – how much they are, the percentage of reserves and the percentile of the reserving risk model
- Any issues from the reserving risk tolerances
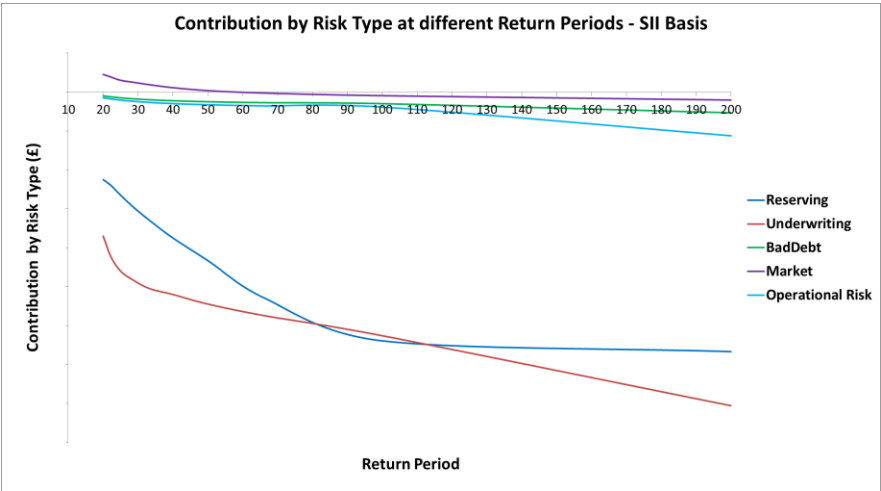
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Wider risk framework

Chaucer

- ORSA
- Auditors
- Lloyd's feedback
- Capital Modelling output

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Wider risk framework - ORSA
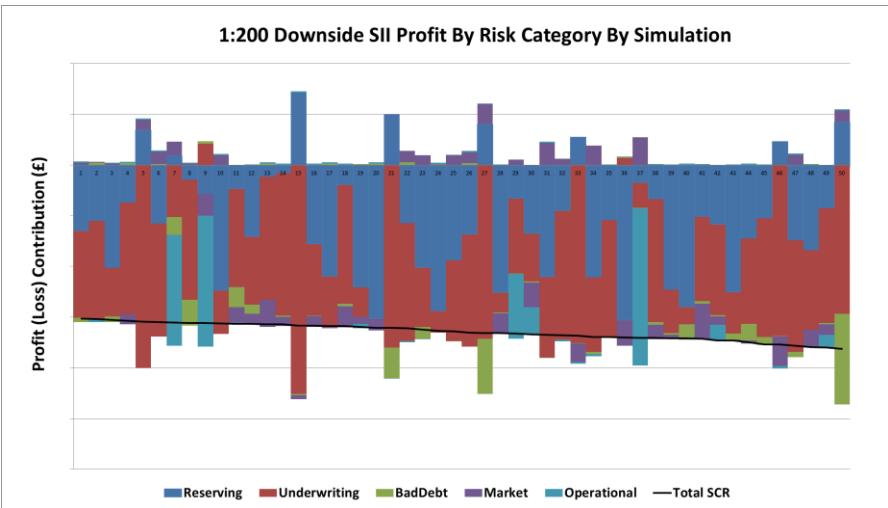
Chaucer

- Risk profile at different return periods

Contribution by Risk Type at different Return Periods - SII Basis

Legend:
- Reserving
- Underwriting
- BadDebt
- Market
- Operational Risk

Y-axis: Contribution by Risk Type (£)
X-axis: Return Period

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Wider risk framework - ORSA

Chaucer

- Risk profile at different return periods - detail

1:200 Downside SII Profit By Risk Category By Simulation

Legend: Reserving · Underwriting · BadDebt · Market · Operational · Total SCR
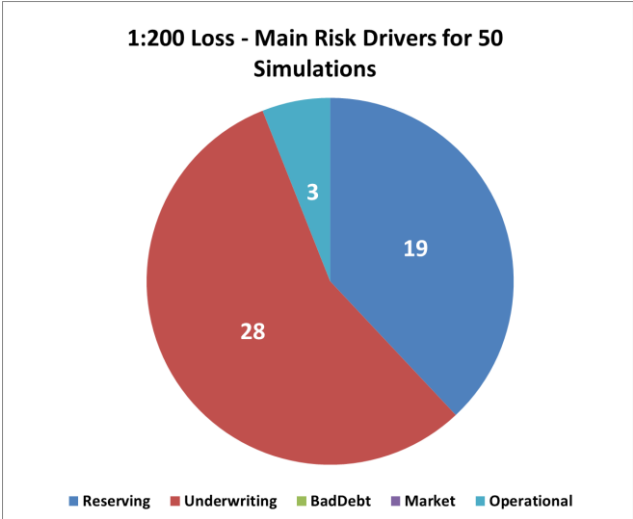
Y-axis: Profit (Loss) Contribution (£)

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Wider risk framework - ORSA
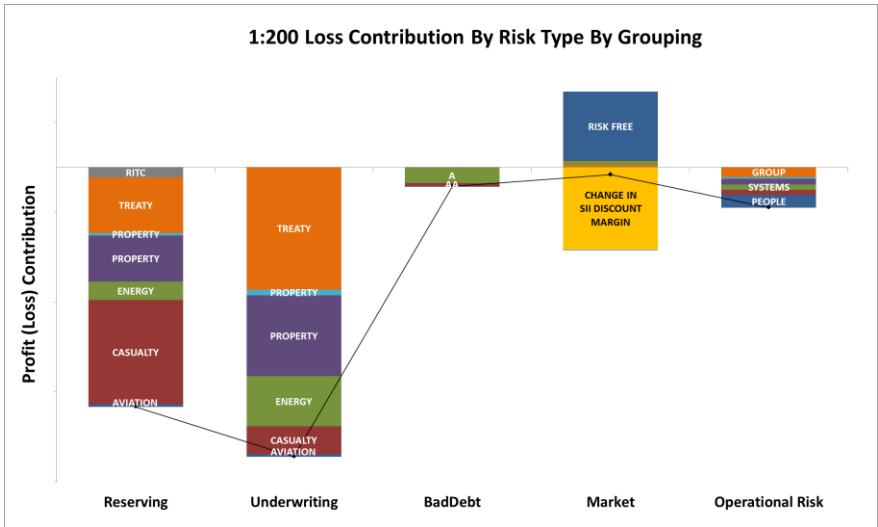
- Risk profile at different return periods - detail

Wider risk framework - ORSA

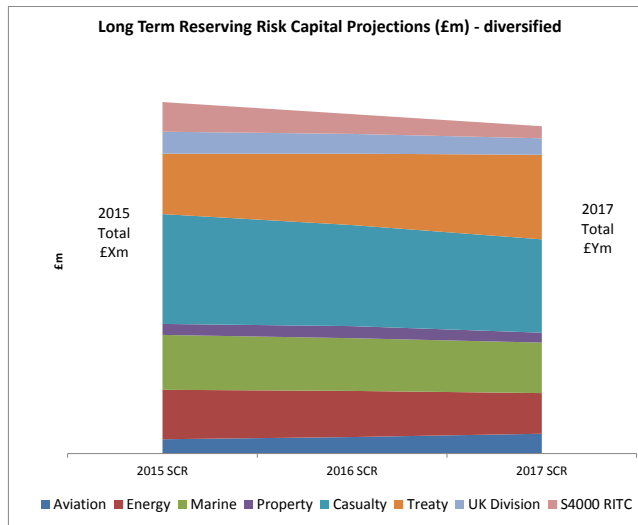- Risk profile at different return periods – further detail

Wider risk framework - ORSA

- Long term risk profile

Long Term Reserving Risk Capital Projections (£m) - diversified

2015 Total £Xm

2017 Total £Ym

£m

2015 SCR   2016 SCR   2017 SCR

■ Aviation ■ Energy ■ Marine ■ Property ■ Casualty ■ Treaty ■ UK Division ■ S4000 RITC

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Wider risk framework

- ORSA
- Auditors
- Lloyd's feedback
- Capital Modelling output

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Capital Modelling Output

- Actuarial focused scenario testing
- Business focused scenario testing
- Reverse stress tests:
  - Start with a point on the reserving risk distribution (e.g. 1 in 200)
  - Work with underwriters on scenarios that could generate such a deviation

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Questions

- Any questions?
- Does anyone want to share other things that they do?

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