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Living the dream

Reserves and Reserve Uncertainty in an SII world – One Regulator's Tale

Stefan Claus & Cameron Heath

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Living the dream

1. What is SII and what's it changed

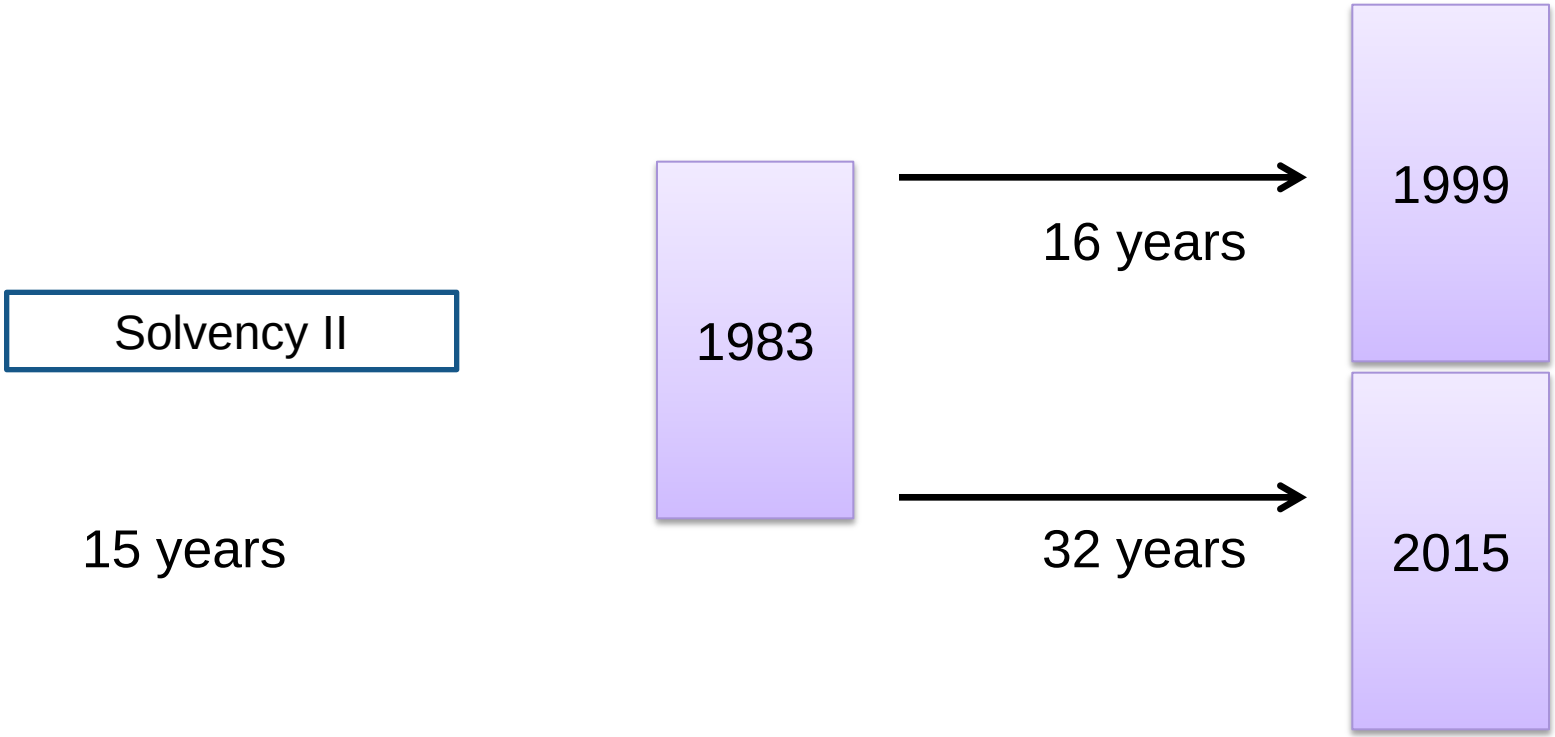
2. Regulation of General Insurers under SII
   a) Supervisory focus
   b) Actuarial focus: reserve uncertainty

3. Where next for this changing market?

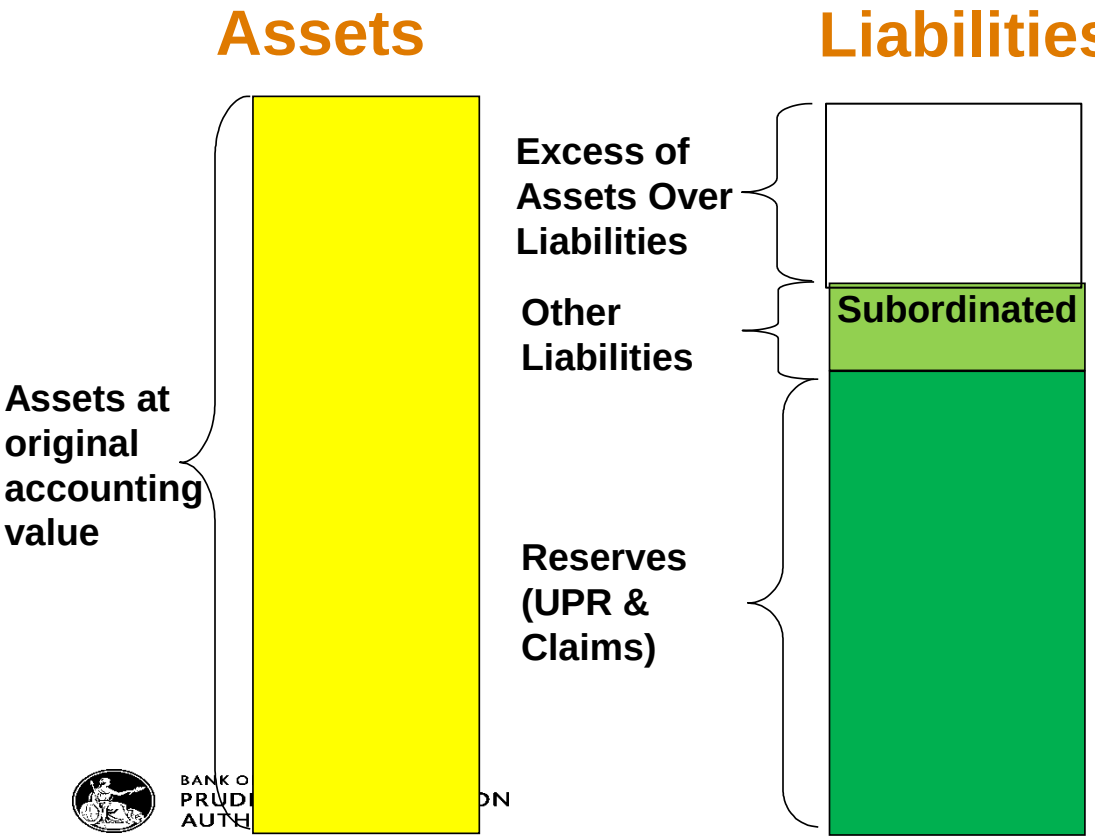
1. What is SII and what's it changed?

- It is the new regulatory framework for insurers in the EU
- It took a while; it was first discussed in 2001 and it finally came into force on 01/01/2016
- It is a 'maximum harmonising directive'
- It defines new rules for what assets and liabilities should be included on the Balance Sheet and how they should be valued
- If defines a Standard Formula (SF) for the Solvency Capital Requirement (SCR) firms must hold, to cover their 1-in-200 risk of default over the next year, but firms may instead use an Internal Model (IM), if approved by their regulator

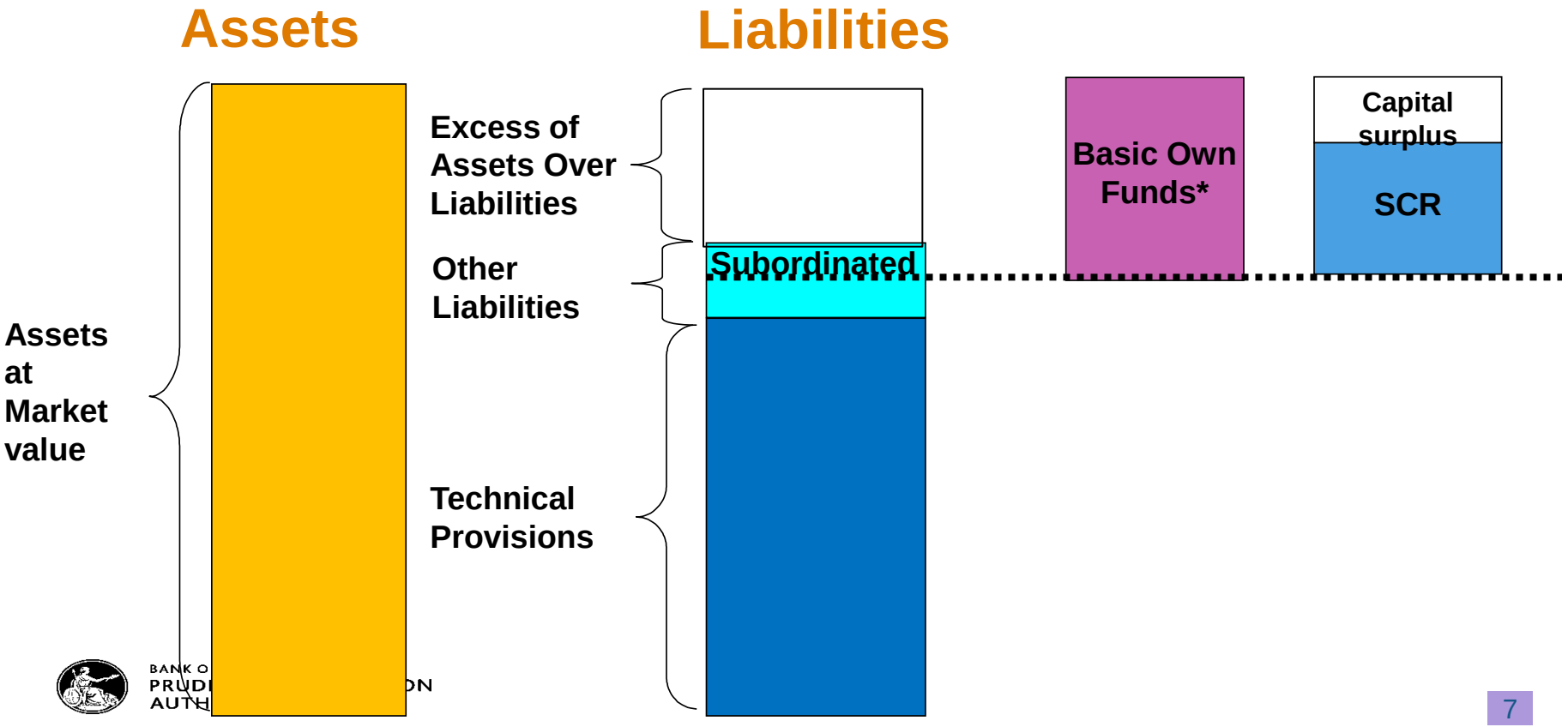
It took a while but not as long as you might think…



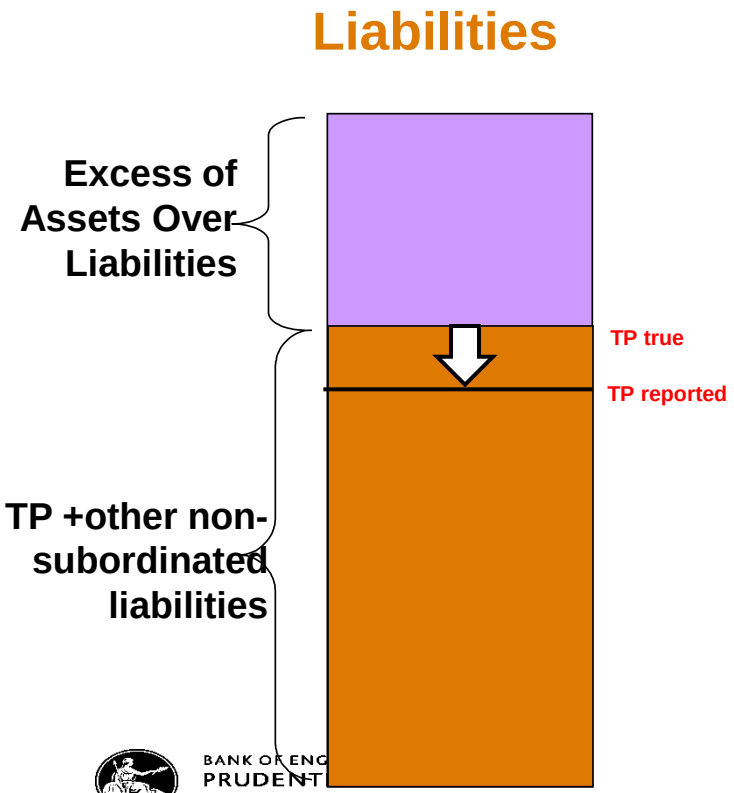
Solvency I Balance Sheet

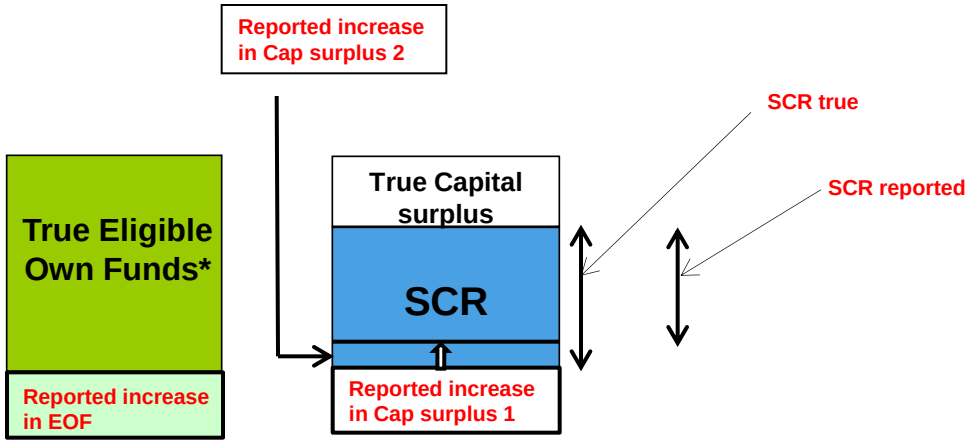


Solvency II Balance Sheet



Why are Technical Provisions important? Getting it wrong…….





Impact on capital surplus of underestimating TP.
Can see a double whammy:
Effect 1: Eligible $OF_{reported}$ increases by the same amount as the drop in technical provisions; this amount is now considered as Tier 1 capital and directly increases the reported capital surplus
Effect 2: The $SCR_{reported}$ will probably also be lower than the true SCR. This will also increase the reported capital surplus

Impacts on capital ratio can be pronounced. The firm perceives this as an improvement in the capital position and it will write more business.

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* Simplifying assumption all excess assets are eligible

(Gross) Technical Provisions

=

Provision for Claims Outstanding

+

Premium Provisions

+

Risk Margin

Key Technical Provisions Article in Directive

"The best estimate shall correspond to the probability weighted average of future cashflows, taking into account of the time value of money (expected present value of future cashflows), using the relevant risk-free interest rate term structure." [Article 77(2)]

Key Technical Provisions Article in Directive

"The **best estimate** shall correspond to the probability weighted average of future cashflows, taking into account of the time value of money (expected present value of future cashflows), using the relevant risk-free interest rate term structure." [Article 77(2)]

KEY POINT: NO MARGINS FOR PRUDENCE IN RESERVES

Key Technical Provisions Article in Directive

"The best estimate shall correspond to the **probability weighted average of future** cashflows, taking into account of the time value of money (expected present value of future cashflows), using the relevant risk-free interest rate term structure." [Article 77(2)]

KEY POINT: INCLUDE AVERAGE OF WHAT **COULD** HAPPEN
NOT WHAT **HAS** HAPPENED (include Events Not In Data / binary events)

Key Technical Provisions Article in Directive

"The best estimate shall correspond to the probability weighted average of future **cashflows**, taking into account of the time value of money (expected present value of future cashflows), using the relevant risk-free interest rate term structure." [Article 77(2)]

KEY POINT: CASHFLOW APPROACH (no earnings patterns)
so UPR and DAC do not appear in the SII balance sheet

KEY POINT: INCLUDE ALL FUTURE EXPENSE CASHFLOWS
(that relate to bound policies)

KEY POINT: INCLUDE ALL FUTURE PREMIUM PAYMENT IN TPs
(as negative cashflows)

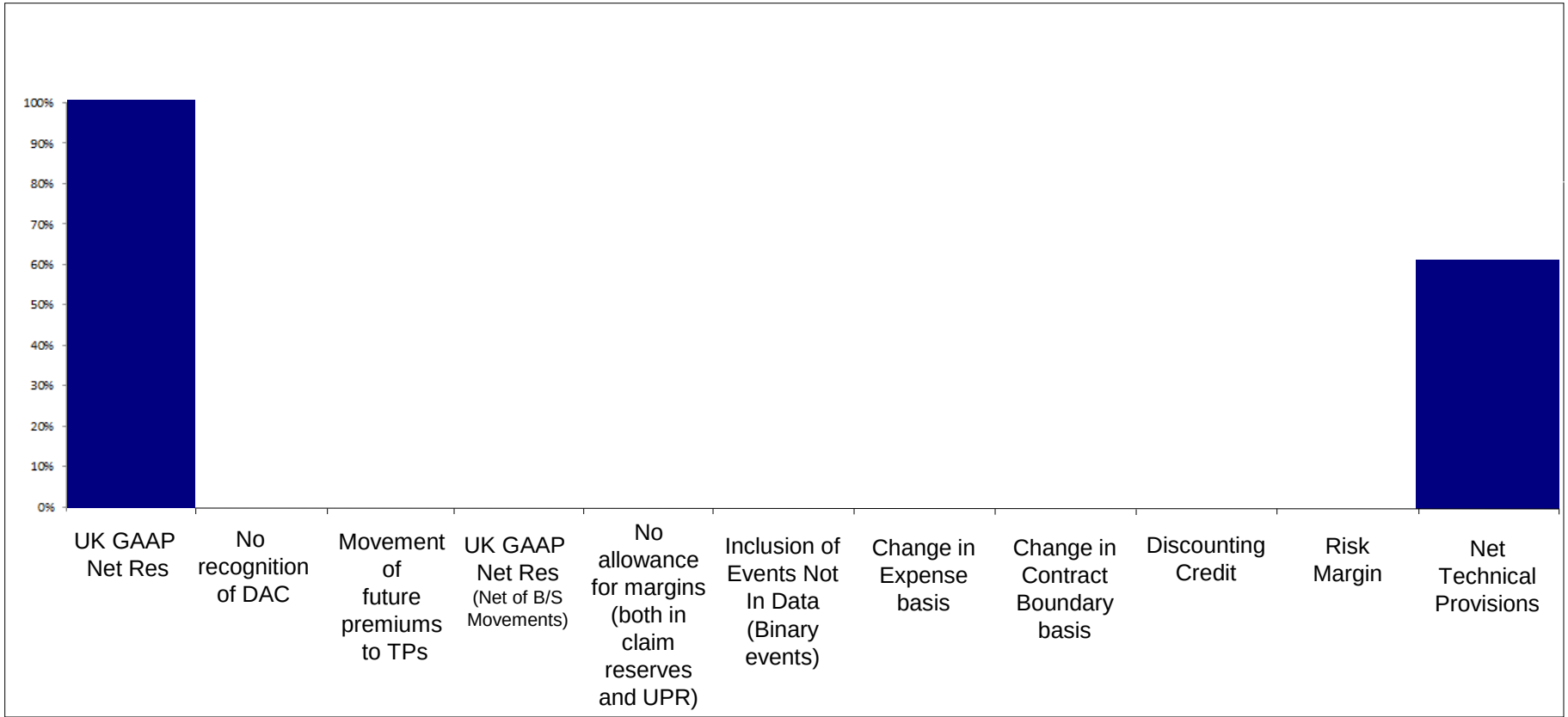
Key Technical Provisions Article in Directive

"The best estimate shall correspond to the probability weighted average of future cashflows, taking into account of the **time value of money** (expected present value of future cashflows), using the relevant risk-free interest rate term structure." [Article 77(2)]

KEY POINT: DISCOUNTING IS REQUIRED
(at the risk free rate prescribed)

QUIZ: Movement in TPs SI to SII

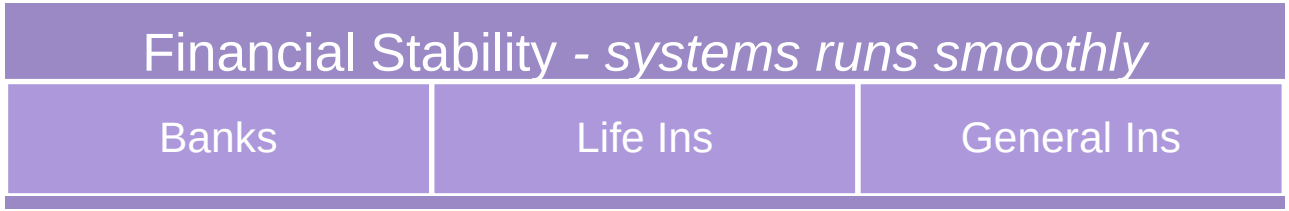
Guess… higher or lower?



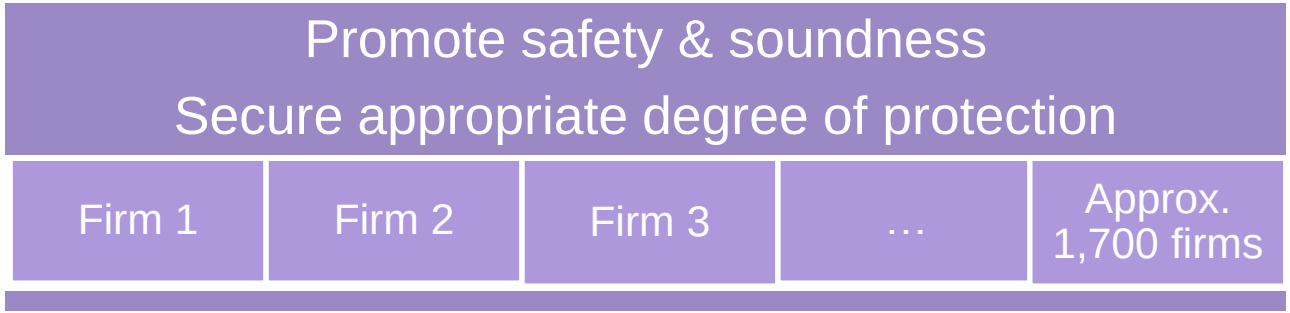
Part 2a: Regulation of P/C insurers under SII

- Supervisory focus

Background: Bank of England objectives



Macro view

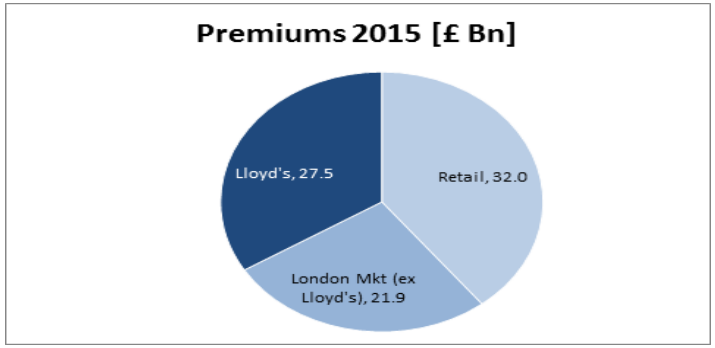


Micro view

Background: *Operating model for Supervision*

General Insurance

Retail	London Market	Actuarial	Technical Agenda
9 Cat 2 22 Cat 3 20 Cat 4 293 Cat 5	2 Cat 1 10 Cat 2 26 Cat 3 41 Cat 4 1 Cat 5		



Focus on technical support for firm supervision

Focus on sectorial analysis for benefit of macro & micro supervision

Dedicated division supporting firm supervision

Limited no. of dedicated technical resources – instead supported by resource across GI (*Supervision & Actuarial*)

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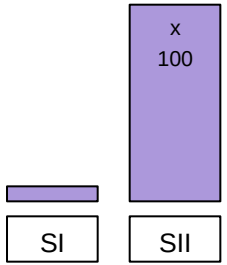
SII implications on supervisory operating model

- Amount of regulatory data received has substantially increased (*approx. 650m per year*)
- Complexity in assessing capital resources & requirements has substantially increased
- Resources / head-count / budgets have not increased!



- Technical Agenda designed to
  - Use analysis of both Solvency II and market data to support forward looking evidence-based Supervision
  - Bring a wider context to the analysis of firm-specific data, providing a link between supervision and sectorial trends

Technical Agenda: joins sectorial analysis & firm supervision

Firm Supervision: assessing a firm's ability to manage risk as well as the sustainability of the business model

Underwriting	Reserving	Reinsurance	Investments	Capital

Product Specialism (Motor, Property, etc…)

Solvency I / Solvency II Metrics - peer analysis (regulatory view)

Market metrics - peer analysis (investor/analyst view)

Ad Hoc supporting initiatives – e.g. Stress Testing, Renewal questionnaire

Market / firm intelligence (quarterly internal / external forums)

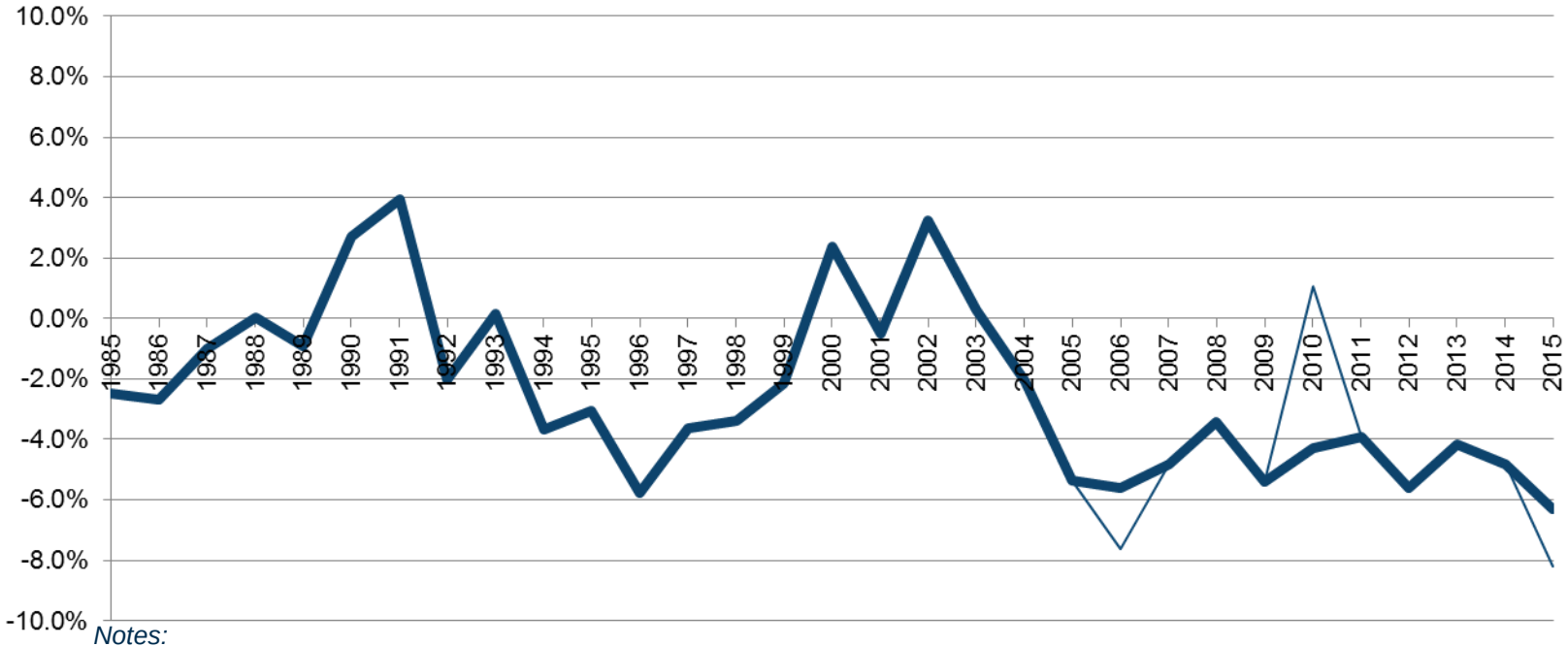
Collated in regularly updated sectorial reports covering a limited number of the largest insurers (Retail, Commercial, Corporate)

Reserving – as part of the Technical Agenda

- Reserving Specialism carries out market reviews – overall direction
- Product Specialisms support in understanding different sector trends and identifying firm outliers
- Firm supervisors review metrics – understand firm specific issues, and propose supervisory strategy / action (if any)

- Technical Agenda assists this process by bringing the different strands of analysis together and making connections to additional relevant sources (e.g. ad-hoc analysis, market intelligence) – either supporting or challenging findings

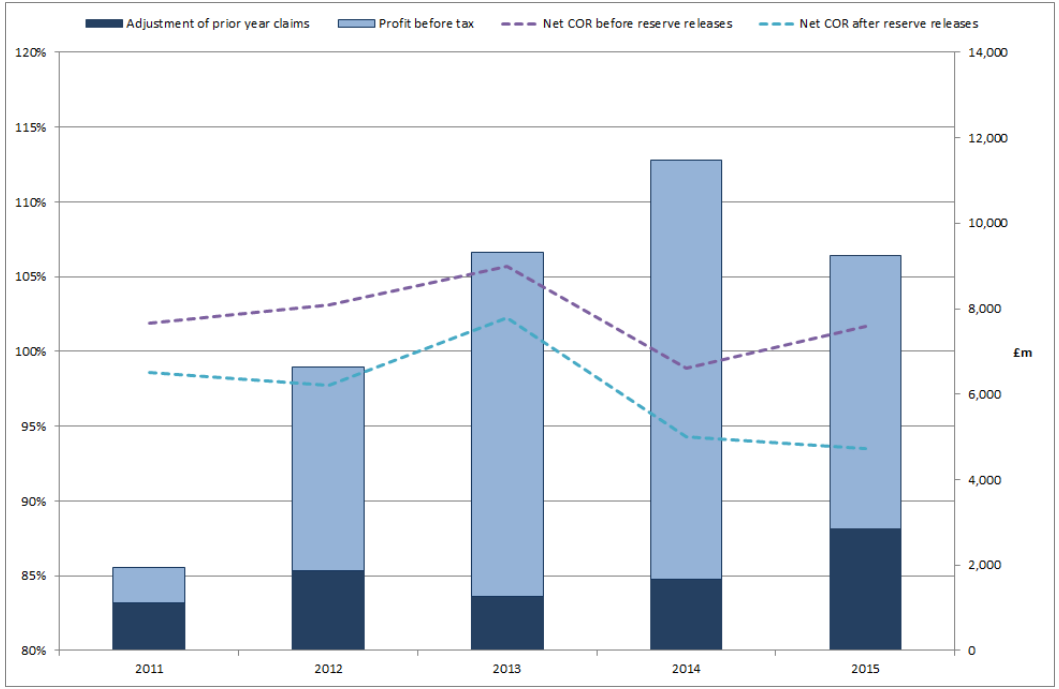
Reserving Specialism carries out market reviews: overall direction



Notes:
Graph shows deterioration or release of prior year net reserves as a % of net reserves brought forward.
A negative value is a release and a positive value is a deterioration.
In 2006, 2010, 2015 – distortions due to specific large idiosyncratic issues have been removed.

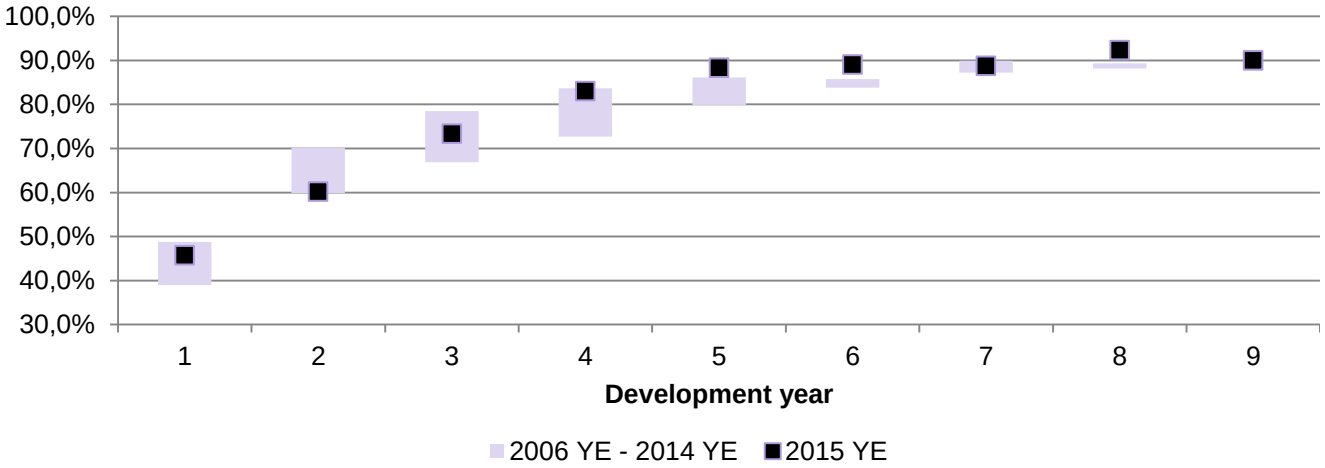
Reserving Specialism carries out market reviews: overall direction

- Reserve releases increasingly propping up current year profitability;
- As well as supporting the impact of falling yields



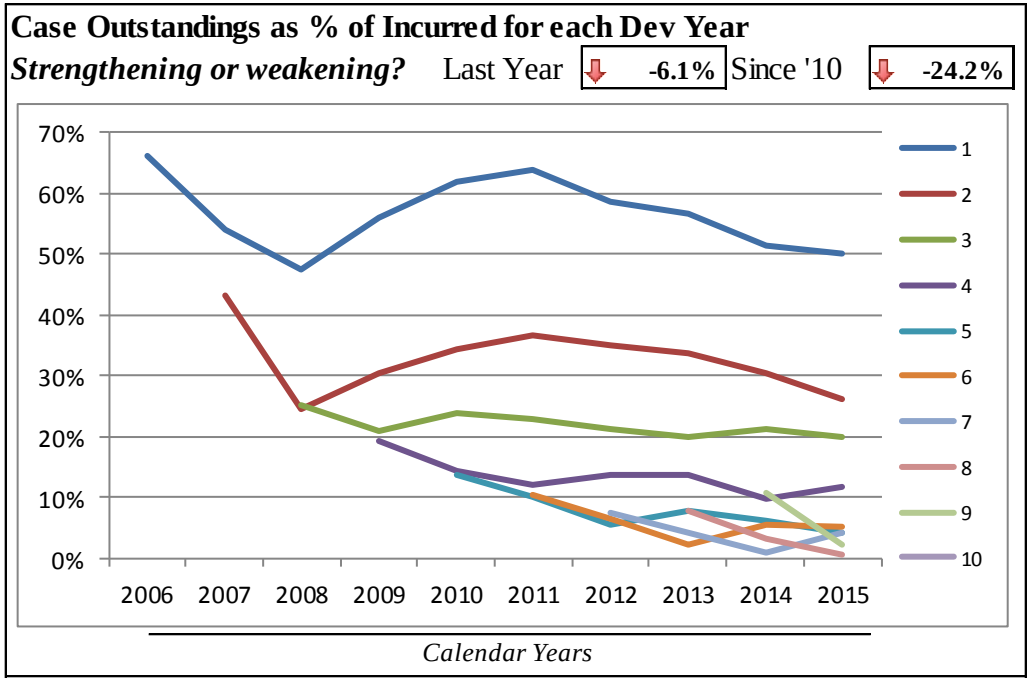
Product Specialisms assist in understanding sectors

Paid as percentage of ultimate claims for each development year, personal motor



- One-off exercises to clear out any excess in reserves left in older years of account.
- A movement more towards a (Solvency II technical provisions) best estimate basis.
- Pressure to maintain a certain level of profitability.
- A speeding up in the reporting and settlement of claims, reflecting improvements in claims processes.

Firm supervisor reviews individual insurer metrics



- Directionally trend in line with market (i.e. claims payments are speeding up)
- But significantly worse than the market

- In part explained by changes in claims processing & portfolio mix
- However, review is ongoing

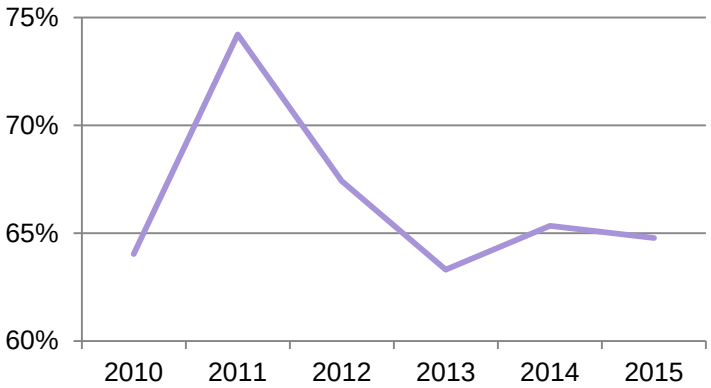
Note: this is one of a suite of metrics which includes consideration of:

- *Strength of case estimates*
- *Consistency of reserves over time*
- *IBNR utilisation*
- *Overall profitability*
- *Gross / net consistency*
- *Survival ratios*

Technical Agenda brings different strands together

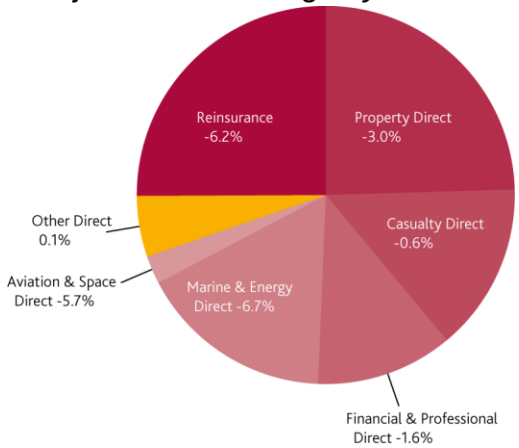
Reserving Analysis

Net loss ratio for Commercial Liability



Underwriting Analysis

Risk adjusted rate change by line of business



Highlighting that the feedback loop between pricing, reserving and business planning may not be sufficiently robust

Potentially leading to the following outcomes

- *Micro-Supervision:*
  - In-depth reserve review (carried out by the PRA or an external party) covering one or more of Governance, Process, Method & Data using structured tool-kit
  - Dear CEO communications to the market (e.g. December 2015, July 2016)

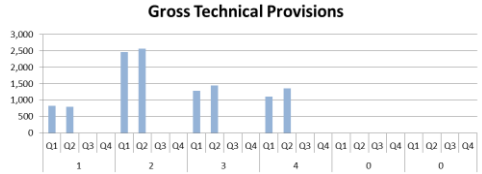
- *Macro-Supervision*:
  - Informing stress test exercises that feed into understanding system wide risks if applicable

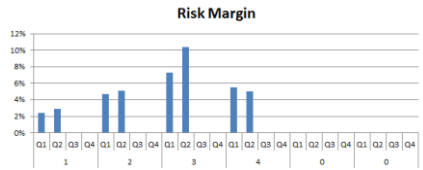
Solvency II reporting introduces new data, increased complexity…
… but framework is still appropriate for assessing risks

- Framework leads responsible for defining metrics to monitor risks

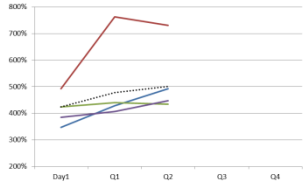
Underwriting	Reserving	Reinsurance	Investments	Capital

- Product Specialists provide narrative for market movements / developments





- Supervisors provide firm specific issues to avoid misinterpretation



Technical Agenda provides forum to join the dots assisting Supervisors & Macro analysis

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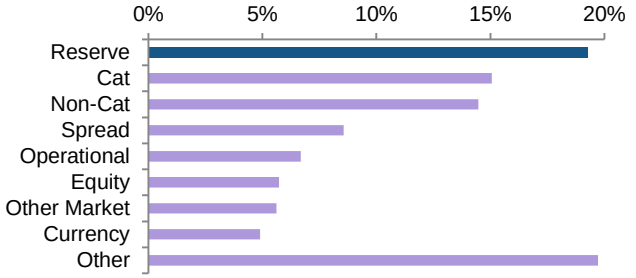
That said we are only at the beginning in using SII data…

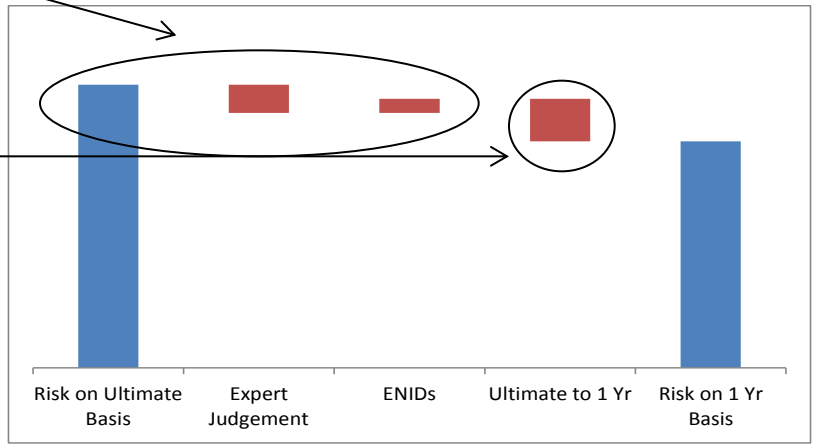
- Solvency II provides industry with a step change in the granularity, nature, breath and structure of regulatory data
- Firms have enhanced their capture, management and governance of data
- Firms, industry groups and the PRA wish to maximise the benefit of the SII investment
- Significant advancement in the software and skills to deliver enhanced business insight and advanced analytics

OPPORTUNITIES

Part 2b: Regulation of P/C insurers under SII

- Actuarial focus areas: ***Reserve uncertainty***
  - Reserving Risk to Ultimate
    - Methodology
    - Numerical Comparisons
  - Reserving Risk over 1 year Horizon
    - Methods
    - Issues
  - Dependencies





Reserving risk to ultimate: much of this is BAU…

- Volatility in Historical Data
  - Well established methods
  - Think about outliers and limitations
- Does the past predict the future?
  - Events Not In Data (ENIDs)
  - Internal process systemic risk
  - External systemic risk
- Do the results make sense?
  - Scenario Analysis
  - Stress Tests
  - Backtesting
  - Where APH would be in the reserve risk output distributions

But there are key areas for additional scrutiny under SII

- Governance and Justification
- Validation
- Working out which are the key assumptions
- … and moving to the One Year Horizon

Reserving risk to ultimate: Methodology

- **There is no preferred or ‘right’ method for calculating reserve risk – either on an ultimate OR one-year basis – but firms must acknowledge and manage the limitations of their approach.**

- All methods have their strengths and weaknesses. It is key that firms understand and evidence these, and make allowances for weaknesses where appropriate.

- We expect firms to consider and test more than one method for their material lines of business and provide evidence of this.

- Our thinking on one-year methods in particular will evolve over time and we expect further market-wide developments of best practice methodologies to emerge in future.

Reserving risk to Ultimate: Methodology

- **Stochastic Methods**
  - Bootstrap Mack
  - Bootstrap Over-Dispersed Poisson
  - Fitting statistical model to the loss triangles
  - Methods ensuring consistency between recent reserving years and premium risk
- Adjusted with Expert Judgement
- Other ad hoc methods
- Usually combination of the above

Methodology: ENIDs (*Events Not In Data*)

- **Data alone is rarely likely to be sufficient to fully parameterise models, and so expert judgement may play a significant role in the derivation of parameters.**
- Expert Judgement, including allowance for ENIDS, is likely to play a significant role in driving the final reserve risk parameters. As such we need to understand:
  - what adjustments have been made to input data and output results;
  - how ENIDs have been allowed for.
- We also need to carry out an assessment of whether we consider the data to be complete, accurate and appropriate and also the amount of historic data available.

- **This is currently particularly relevant because the loss environment has been fairly benign in liability classes**
- The impact of ENIDs varies a lot by line of business and Firm.
  - From a few percentage points
  - To the main factor of risk charges where there are few losses, but the risk is there

Methodology: Expert Judgement

- **Clearly documented, approved as part of a robust governance process and within an overarching expert judgement framework**

- Extracting the right information in the right form is not easy

- The sophistication of the methods of extracting expert judgement from experts increases slowly but steadily as a result of the SII governance

- Positive examples:
  - Firms organise internal and external workshops where
  - Risks are identified and scored
  - Appropriate models are built or loadings are applied

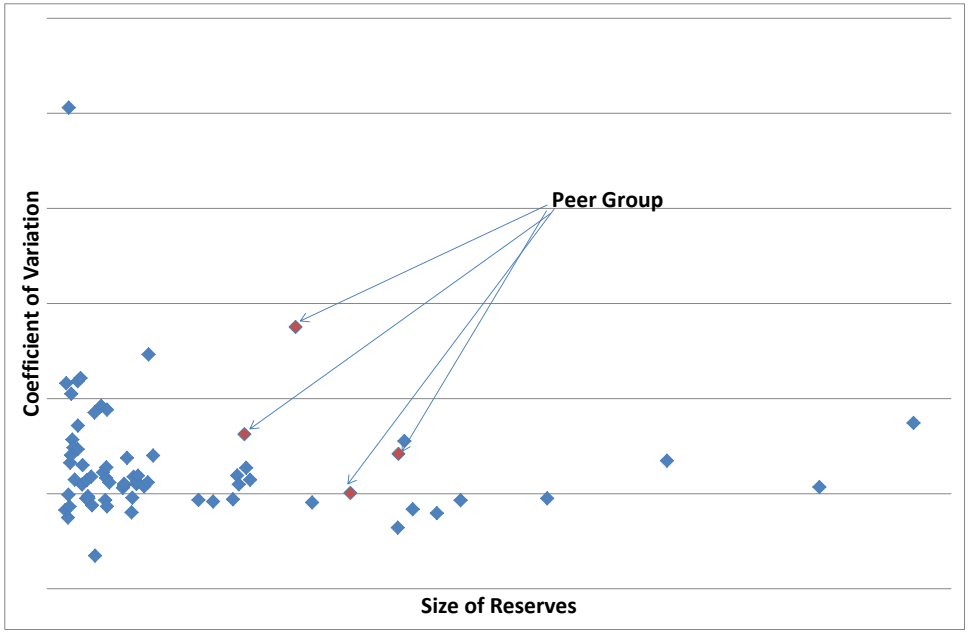
Methodology: Segmentation & Granularity

- Key aspects we expect to be addressed in a firm's documentation:
  - Segmentation of business into modelling classes / Lines of Business (LoBs)
  - Any within LoB segmentation, eg into large and attritional claims (thresholds should be given), into accident and underwriting years.
  - Any cross-LoB segmentation eg for catastrophe events or individual very large losses
  - Clarity as to what is / is not included in premium / reserve risk: If the premium provision at the reference date is included in the reserve risk part of the model, is the premium provision modelled as a separate segment?

- ***High Granularity -> Higher Volatility and Lower Correlations Harder to Assess***

Reserving Risk: Numerical Comparisons

- We test the impact of assumptions on risk charges
- We compare similar classes between Firms in the effort to ensure consistency



One Year Risk

One Year Emergence

- **We do not have any quantitative indicators for one-year risk emergence factors.**
- PRA actuaries carry out further investigations if the emergence factors for firms fall below certain ‘thresholds’ set out in this paper, by tail of class.
- These are *purely thresholds* for more investigations – they are by no means ‘benchmarks’ or ‘Indicators’
- PRA actuaries should understand a firm’s risk profile and the methodologies employed, to help evaluate whether the resulting emergence factors by line of business appear sensible.
- Firms should be able to explain why they consider the one-year outputs to be sensible, particularly in adverse scenarios.
- Actuaries carry out a peer comparison on one-year to ultimate ratios to check for consistency

Methods used

- Re-reserving (or ‘actuary-in-the-box’)
  - Mack bootstrap
  - Merz-Wuthrich (analytical solutions)

- Methods directly analysing the historical 1 year movements of the reserves

- Other
  - Time-scaling
  - Ultimo

- Methods developed by Firms
- Usually all the above are adjusted using Expert Judgement

Risk on 1yr basis compared to Ultimate basis

- The percentage of the standalone reserving capital on one year basis to that on ultimate basis varies significantly by line of business

- For short tail property catastrophe business firms often assume a ratio of close to 100%

- For very long tail, slow risk emerging lines, such as Periodic Payment Orders (PPOs) the ratio is often below 50%

- On average the ratio is around 80 to 85%

Dependencies

Dependencies Identify Key correlations

- A model can have hundreds of correlations
- Which ones are important?

Correlation Table

	Capital	100	100	50	30	20
Capital		Risk 1	Risk 2	Risk 3	Risk 4	Risk 5
100	Risk 1	100%	20%	10%	10%	10%
100	Risk 2	20%	100%	10%	5%	5%
50	Risk 3	10%	10%	100%	5%	2%
30	Risk 4	10%	5%	5%	100%	5%
20	Risk 5	10%	5%	2%	5%	100%

Materiality Table

		Risk 1	Risk 2	Risk 3	Risk 4	Risk 5
	Risk 1	0.308642	0.308642	0.154321	0.092593	0.061728
	Risk 2	0.308642	0.308642	0.154321	0.092593	0.061728
	Risk 3	0.154321	0.154321	0.07716	0.046296	0.030864
	Risk 4	0.092593	0.092593	0.046296	0.027778	0.018519
	Risk 5	0.061728	0.061728	0.030864	0.018519	0.012346

Dependencies

- Dependencies between premium and reserving risks
- Dependencies between reserving classes
  - May not be the same as between premium risk classes
- Dependencies between reserving risk and market risk
  - Especially important for the financial lines
  - Consider tail dependency

Assessment of dependencies

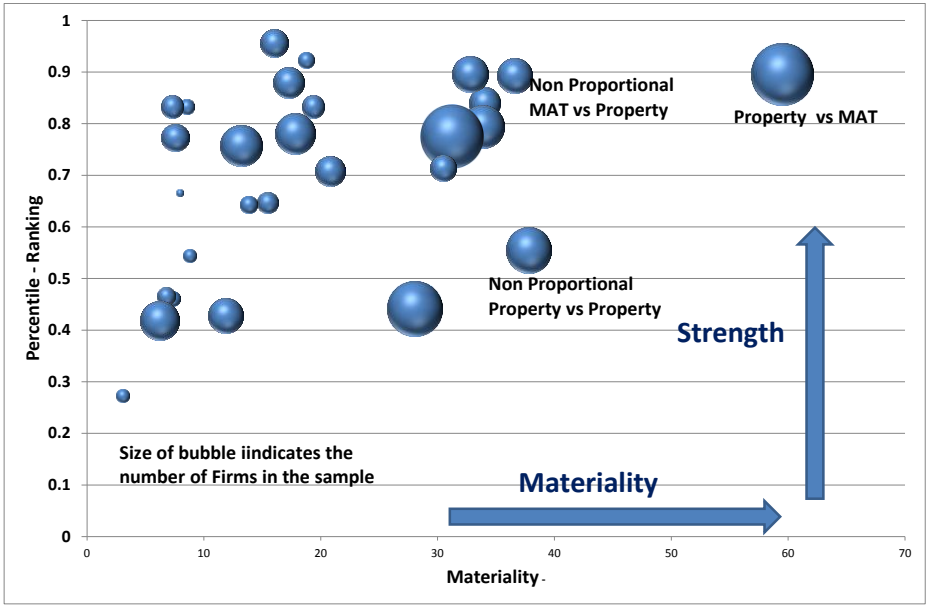
- For the same pair of classes of business the correlations for reserving risk tend to be higher than that between premium risk on average. Big variation

- There is not an obvious relation between the same correlations for 1 year risk and ultimate. We see a lot of variation depending on Firm and line of business.
  - Some firms tend to use lower correlations for 1 year risk than for ultimate. This is not always justified properly

Assessment of dependencies

- Data usually not enough. Expert Judgement is used
- Methodology considered
- Link between expert judgement and knowledge of the business and setting dependency parameters
- Collection of information comprising of Internal Model Output correlations
- Peer comparison

Assessment of dependencies – Peer Comparison



- The y – axis indicates ranking. It does NOT indicate correlation

Part 3: Where next for this changing market?

Part 3: Where next?

- Structural changes are occurring irrespective of Solvency II
  - Low interest rate environment & low NatCat losses encouraging alternative capital
  - Broker pressure on rates / commissions: increase in delegated underwriting / facilities
  - Increase in global diversification (intra-group pooling)
- However, Solvency II should ensure appropriate risk capital; hence expect:
  - more retrospective transactions (low yield environment has increased cost of reserve risk); and
  - increased use of intra-group pooling arrangements

Part 3: Where next?

- Implications for the regulator:
  - Over-reliance on benign data experience
  - Increased focus on exposure management and ability of firms to assess/monitor risk adjusted rate changes (note: the BoE is not a pricing regulator)
  - Increased focus on adequacy of reserves (& ability to assess changing claims settlements in a softening market)
  - Development of analytical tools as more Solvency II data becomes available
  - Continued use of Stress Testing to assess market resilience

  - Medium term considerations: Impact of FinTech / InsurTech in disrupting aspects of (re)insurer business models