ACTUARIAL SOCIETY OF SOUTH AFRICA

Economic Capital Modelling – Life Insurance

Phillip Olivier & David Park

Deloitte UK & Deloitte South Africa

The Business of Change: 2010 and Beyond

Agenda

1. What is economic capital?
2. Calculating economic capital
3. Embedding an economic capital model
4. Where the UK market is today
5. Challenges and lessons learnt
6. Looking forward
7. Conclusion

Risk taking is the essence of insurers' business

ACTUARIAL SOCIETY OF SOUTH AFRICA

- Economic capital measures risk using a common denominator
- Sufficient surplus to cover adverse outcomes, at a given level of tolerance, over a specified time horizon

Total risk

Credit risk	Market risk	Insurance risk	Operating risk
Credit spreads	Equities	Mortality	Operational risk
Credit default	Property	Morbidity	Expense risk
Reinsurance default	Fixed Interest	Withdrawals	Reputational risk
	Foreign Exchange	Catastrophes	Strategic risk

The Business of Change: 2010 and Beyond

Need to strike a balance between different stakeholders

ACTUARIAL SOCIETY OF SOUTH AFRICA

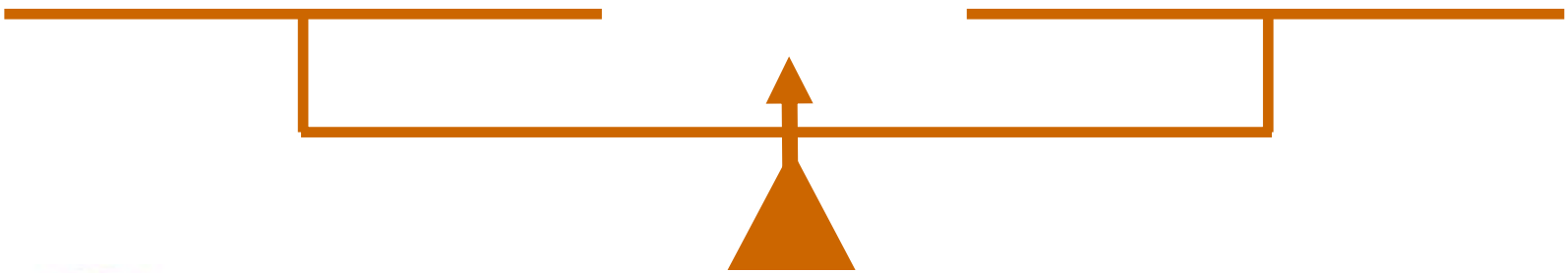
External stakeholders

- Regulator
  Loss minimisation — Return optimisation
- Rating agencies
  Loss minimisation — Return optimisation
- Policyholders
  Loss minimisation — Return optimisation
- Shareholders
  Loss minimisation — Return optimisation

Capital management

Internal stakeholders

- Board of Directors
  Loss minimisation — Return optimisation
- Group finance
  Loss minimisation — Return optimisation
- Group strategy
  Loss minimisation — Return optimisation
- Business units
  Loss minimisation — Return optimisation



The Business of Change: 2010 and Beyond

Establishing a framework

ACTUARIAL SOCIETY OF SOUTH AFRICA

What do I want to use EC for?	What decisions will I need to take?	What info do I need to take these decisions?	What do I need to believe / trust the results?	Where can I find the data needed?

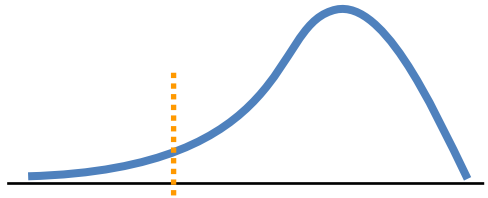
Scope / Coverage	Risk Profile / Identification	Quantification Methodology	Value Measure	Risk Measure	Risk Tolerance / Appetite	Time Horizon	Aggregation & Disaggr.
What business should you include?	What risks should you include?	How should each risk be quantified?	What measures of value should you use?	What measures of risk should you use?	How much risk do you want to take?	What period of assessment should you use?	How do you want to aggregate & disaggr. the results?
• Whole company • Insurance business • Key products • New business	• Insurance • Business • Market • Credit • Operational • Group • Liquidity • Other	• Stochastic simulation • Closed form solutions • Stress testing • Factor based • Other	• Statutory • Market Consistent • Economic Fair Value • IFRS	• Capital > 0 • Capital > Stat Capital • Capital > Resp. Capital • Other	• 99.5% VaR • 95% CTE • Equivalent to BB Rating • Other	• At calc date • 1 year • Multi-year • Run-off • Other	• Total co. • By BU • By product • By risk • Existing business • 1 yrs new business

Different measures of economic capital

EXAMPLES

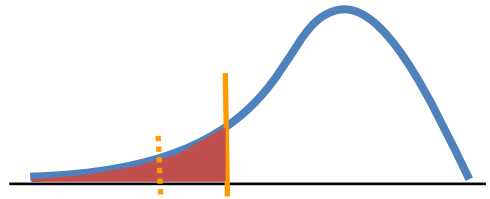
Common/legacy practices

Economic capital = Value-at-Risk at the tail



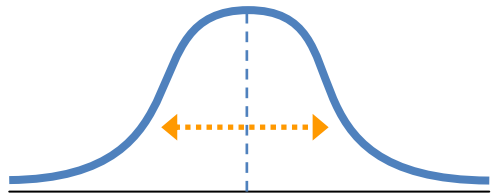
"Accurate" practices

Economic capital = Tail-Value-at-Risk (Expected shortfall)



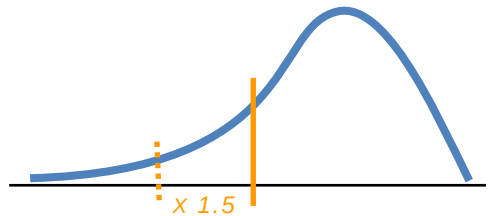
Practical approaches

Economic capital = 6.5 x Unexpected loss

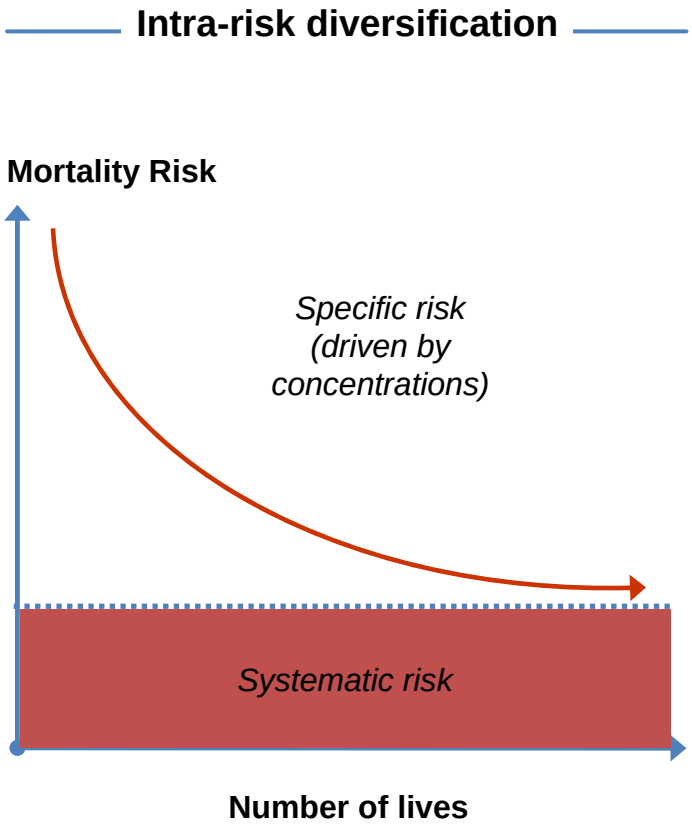


Combination

Economic capital = "Non-tail" VaR x Multiple e.g. 90% VaR x 1.5



Diversification

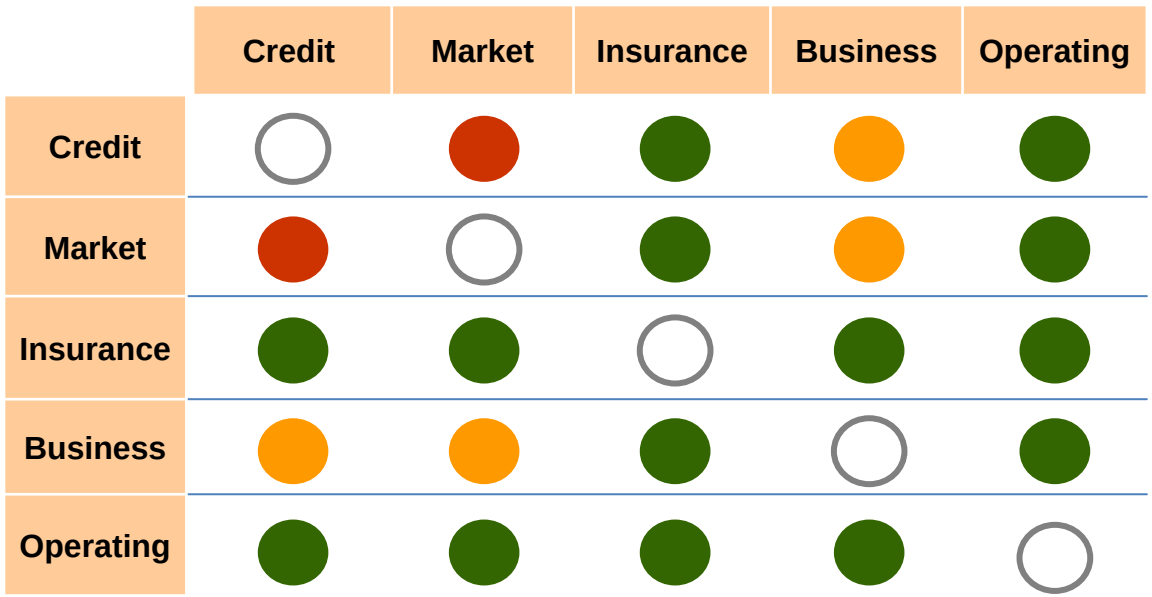


Aggregating

ACTUARIAL SOCIETY OF SOUTH AFRICA

The Business of Change: 2010 and Beyond

Inter-risk diversification



High
High correlation between financial risks

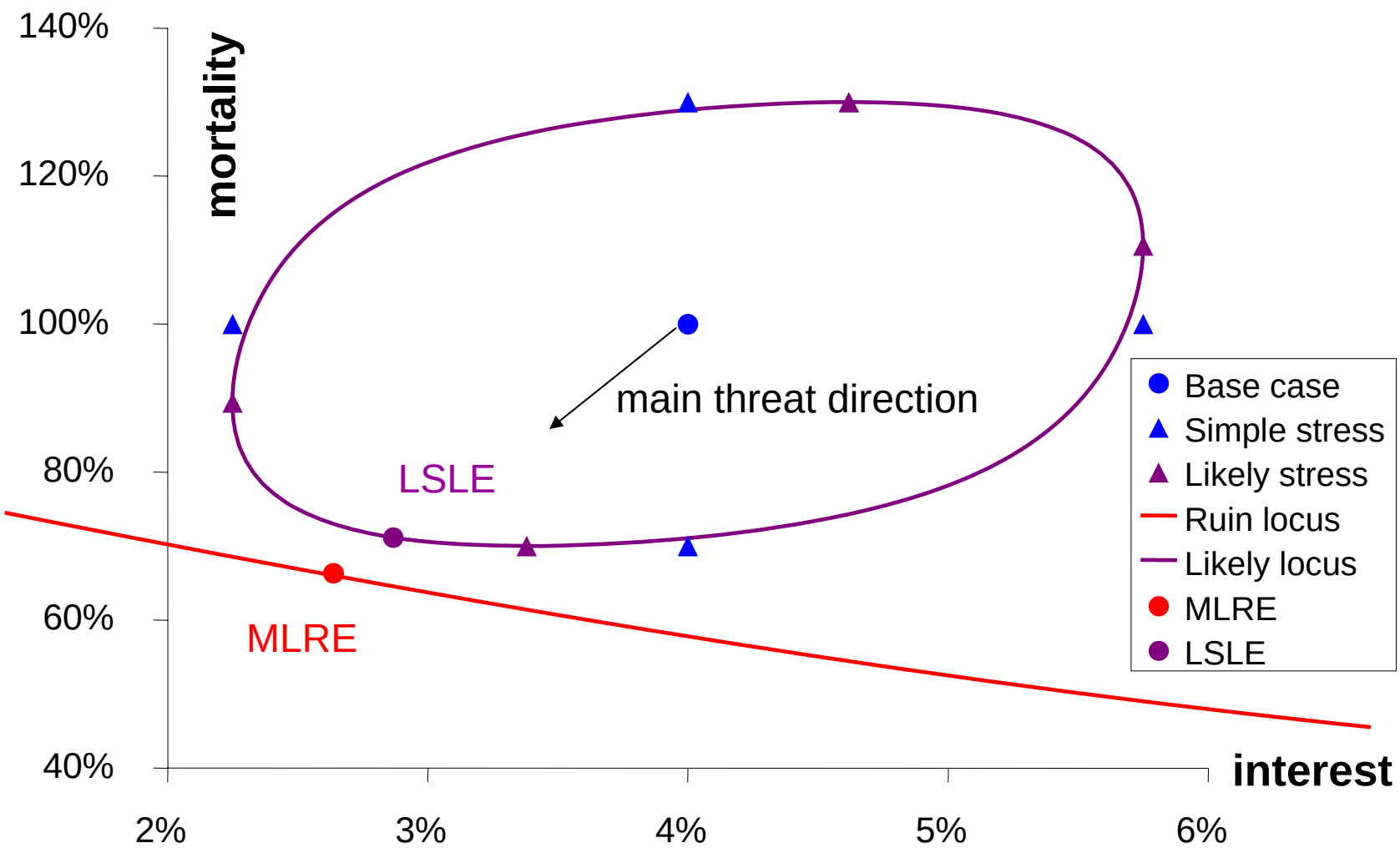
Medium
Medium correlation between financial and 'business' risks

Low
Low correlation between insurance and other risks

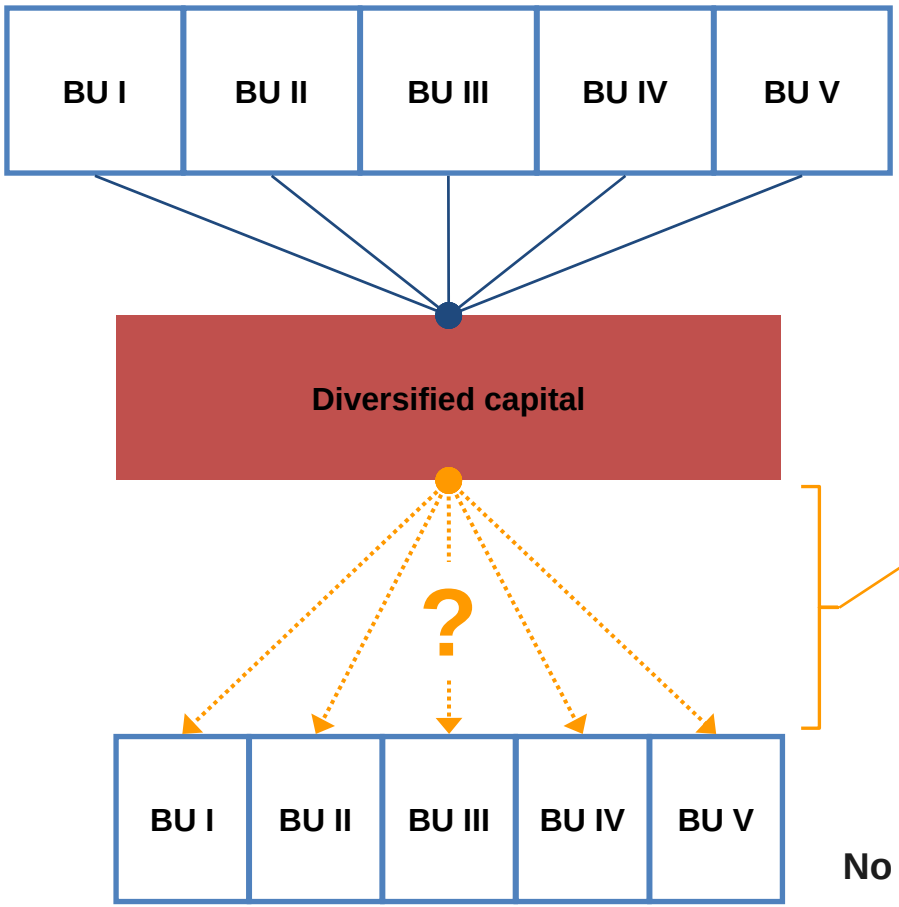
Non-linearity & double counting

- Brainstorming
  - What if?
  - Engage the Board
- Medium Bang
  - All stresses simultaneously, lower CI
- Risk Geographies
  - Most onerous combination of stresses at desired CI

Risk Geographies



Once diversified economic capital has been calculated the decision must be made as to how to attribute it back to the businesses



- Should the diversification benefit be allocated to business units, or held centrally ?
- If allocated, how should we recognise the contribution of each business ?

No single solution will work for all purposes

The Business of Change: 2010 and Beyond

The key requirements for a well embedded model

- Quick to produce
- Flexible to changing scenarios
- Must be able to project capital
- Comparable target
- Consistent with pricing
- Include all elements of risk appetite

- Include all elements of risk & risk mitigation
- Include all different types of capital
- Product group wide economic balance sheet, easily disaggregated
- Visible & easily understood results

UK Developments – A Summary

Realistic Balance Sheets ("RBS")	Individual Capital Assessments ("ICA")	Solvency II "Readiness"
• "Realistic" valuation of with-profits liabilities. • Not required for smaller companies (reserves less than £500 million). • Market consistent approach. • Stochastic valuation of options and guarantees. • "Cornerstone" of future developments.	• Assessment by UK firms of the adequacy of their capital resources. • Risk based approach. • Example of "principles-based" regulation. • All firms' ICA have been reviewed at least once by the Financial Services Authority ("FSA").	• Fundamental review of the capital adequacy regime for European insurers. • Aimed to be a consistent European standard. • Firms can use internal models if they meet the "use test" and if the model is credible / justified • Planned to take effect from 2012.

Realistic Balance Sheets – Challenges to date

ACTUARIAL SOCIETY OF SOUTH AFRICA

- Examples of challenges faced during implementation of RBS
  - Choice of “reference rate” – Gilts, Swaps or something else?
  - Projection of Realistic Balance Sheet.
  - Calibration of Economic Scenario Generators (“ESG”) to nature and term of liabilities.
  - Focus was on with-profits – hence non-profit / unit linked lagged behind.

The Business of Change: 2010 and Beyond

ICA – Challenges to date

- Examples of mistakes made as part of first ICA submissions
  - Modelling and Methodology
    - Missing out certain risks.
    - Not starting with a “realistic” balance sheet.
    - Unreasonable management actions that would not pass Treating Customers Fairly (“TCF”) principles.
    - Missing non-linear effects.
  - Embedding of ICA
    - No interim estimates of ICA available.
    - Everything done by actuaries in isolation.
    - Lack of senior management buy-in, and poor understanding.
    - Inadequately defined project processes and controls.
    - Not taking it seriously enough – one company submitted a 7-page ICA report.

Where is the UK market today?

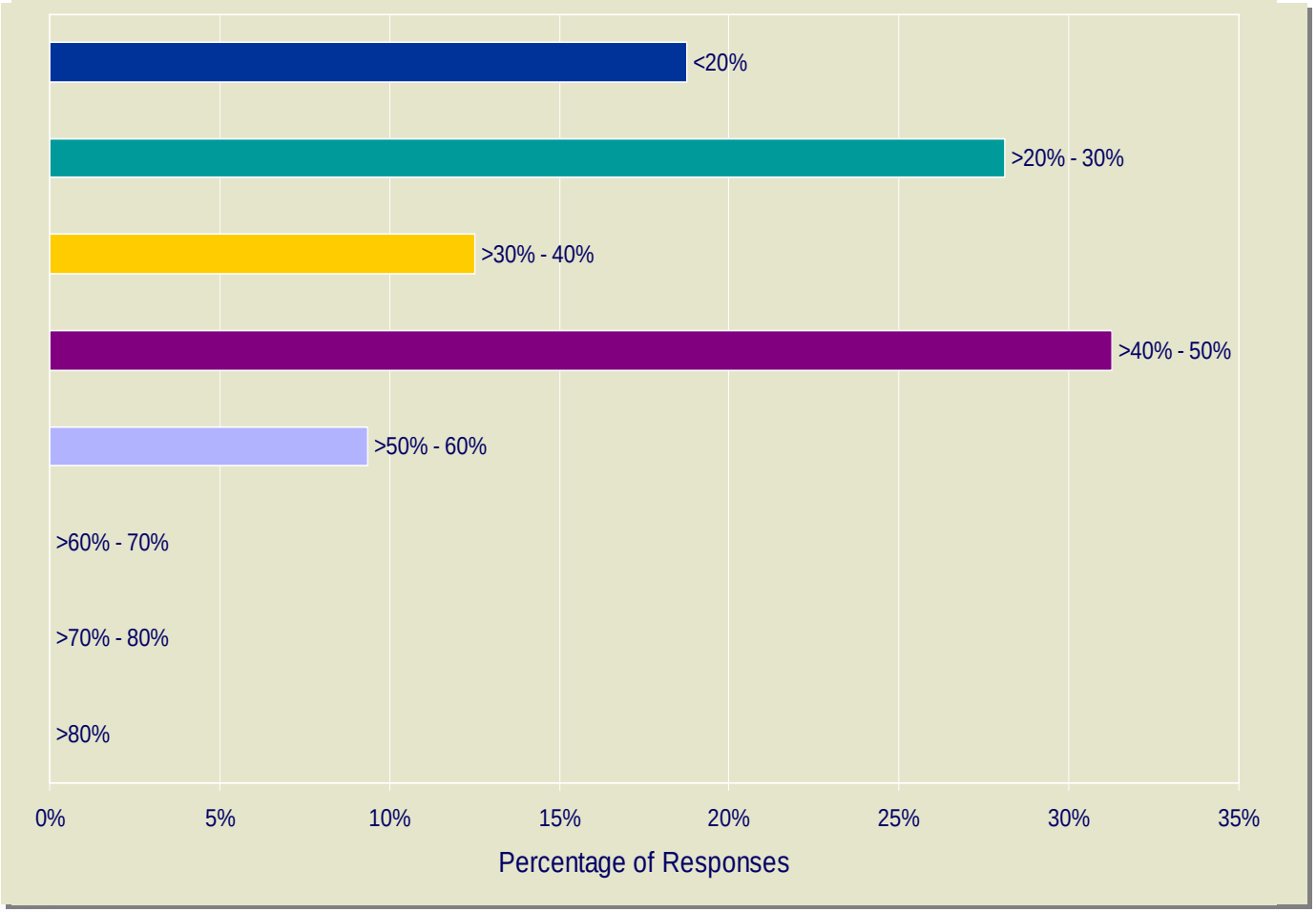
ACTUARIAL SOCIETY OF SOUTH AFRICA

- We now provide a high level summary of the UK market focusing on:
  - Models and Methodology
  - ICA Results
  - Embedding the ICA
  - Looking ahead to Solvency II

Results are based on a survey performed by Deloitte UK during 2007 in which 35 UK life insurance companies participated.

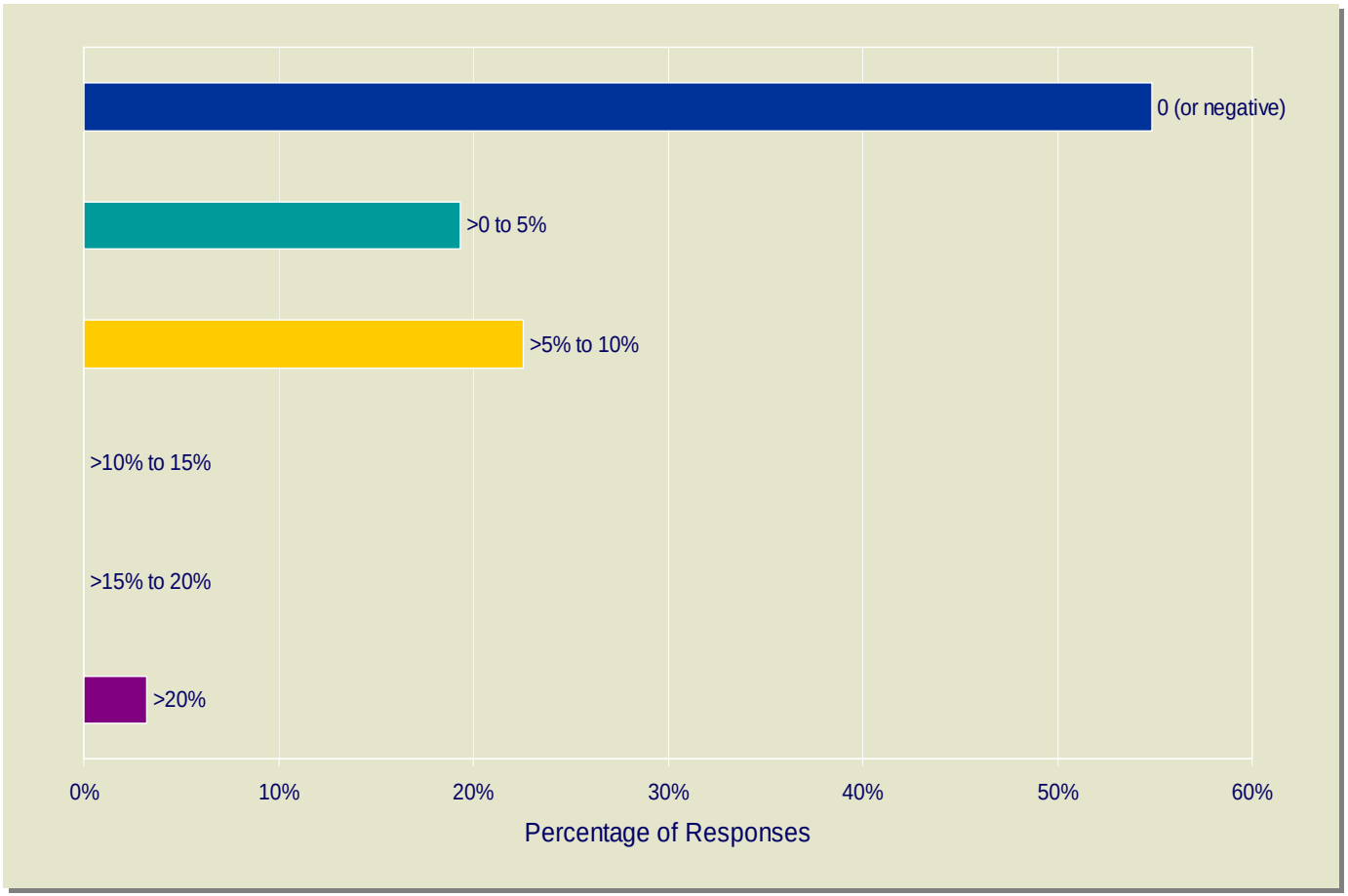
Models and methodology – Diversification

How much (percentage) credit do you take for diversification between risk categories?



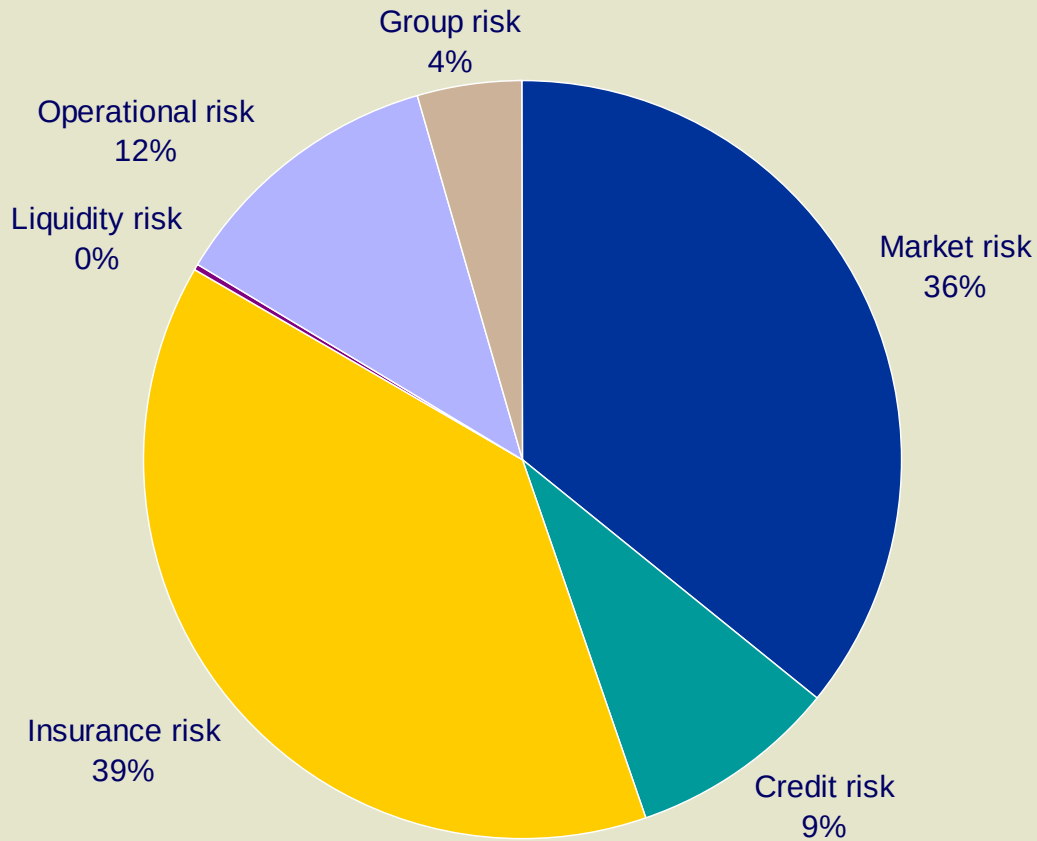
Models and methodology – Non-Linearity

What is the percentage uplift on the ICA for the effect of non-linearity?



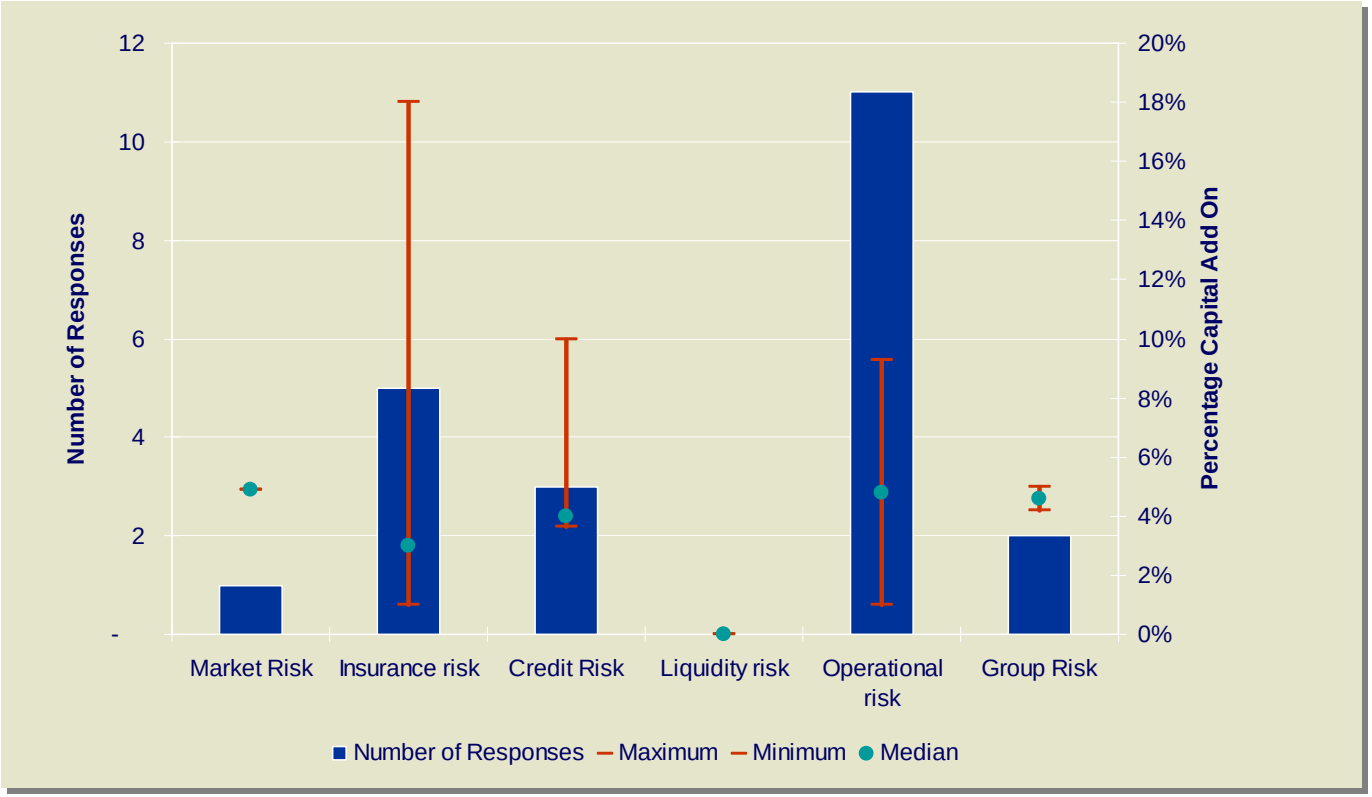
ICA Results – Undiversified capital requirements

Please indicate what percentage of undiversified capital requirements relate to each broad risk category:



ICA Results – Capital Add-Ons

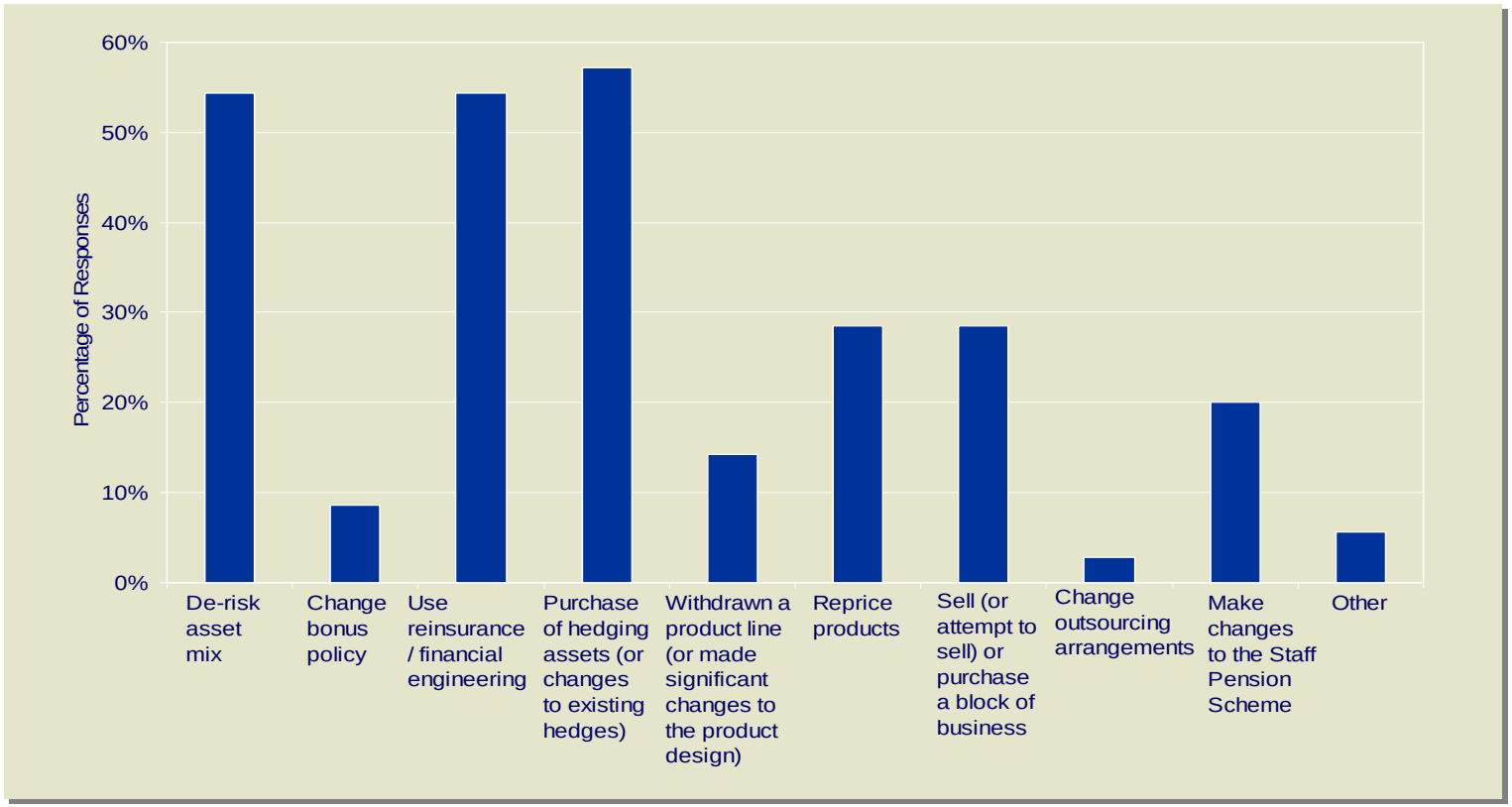
For which areas did the FSA require capital add-ons, as a percentage of the total ICA?



UK regulator also applied significant add-ons around aggregation, which is not reflected in the graph.

Embedding the ICA – Impact on Business Plans

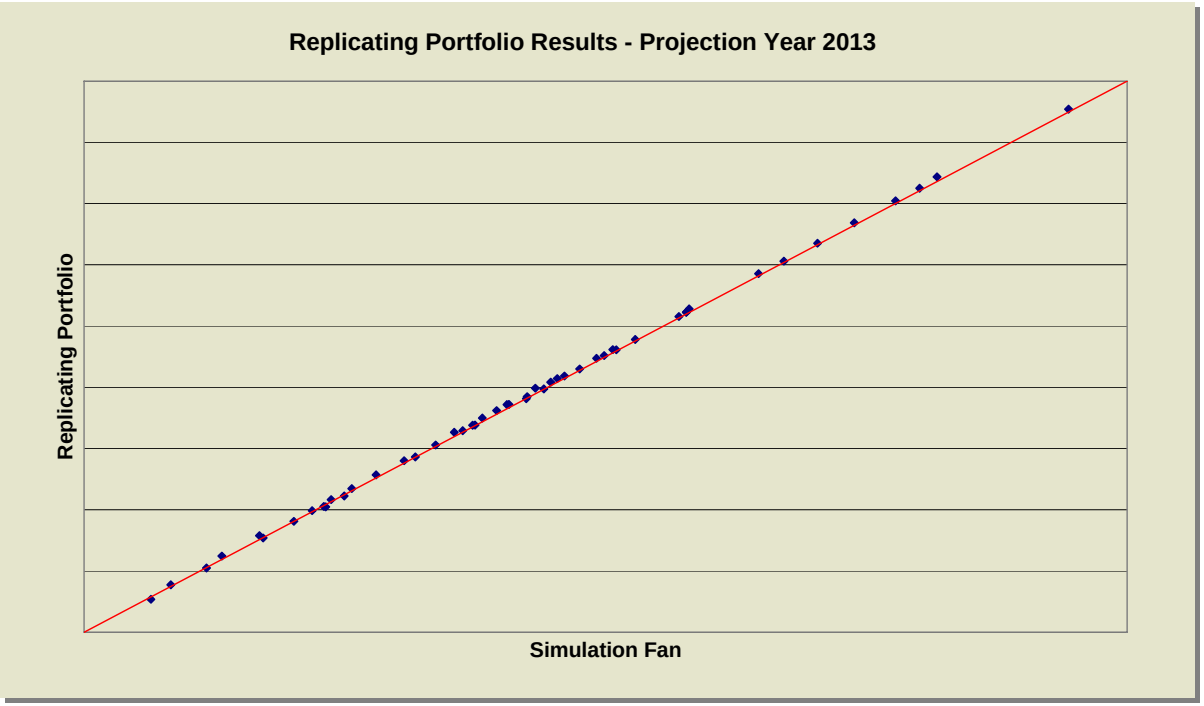
In what areas has, or do you expect, the ICA to affect the way you manage your business? (You may select more than one option)



One of the key challenges faced in further embedding the ICA is length of time it takes to produce.

Replicating Portfolios – A Potential Solution?

- Replicating portfolios are increasingly used to project the RBS – much quicker to run.
- The graph below shows results obtained for an actual with-profits fund – note that this focuses on market risk only.

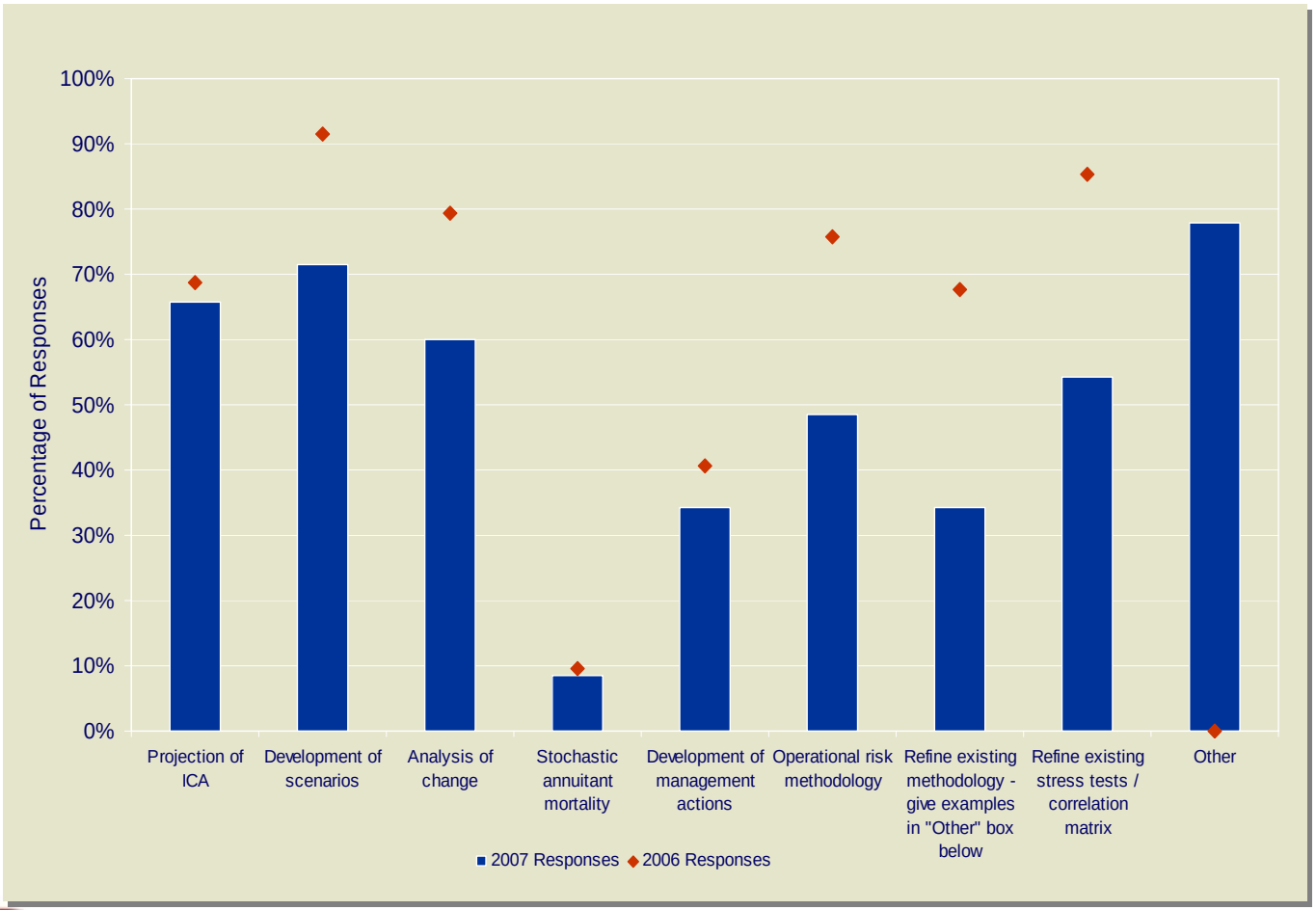


Likely to play a key role in embedding economic capital - it will enable companies to report their capital position more quickly (e.g. monthly).

Embedding the ICA – Future Developments

ACTUARIAL SOCIETY OF SOUTH AFRICA

Which areas of your ICA do you intend to develop or focus on over the next 12 months?

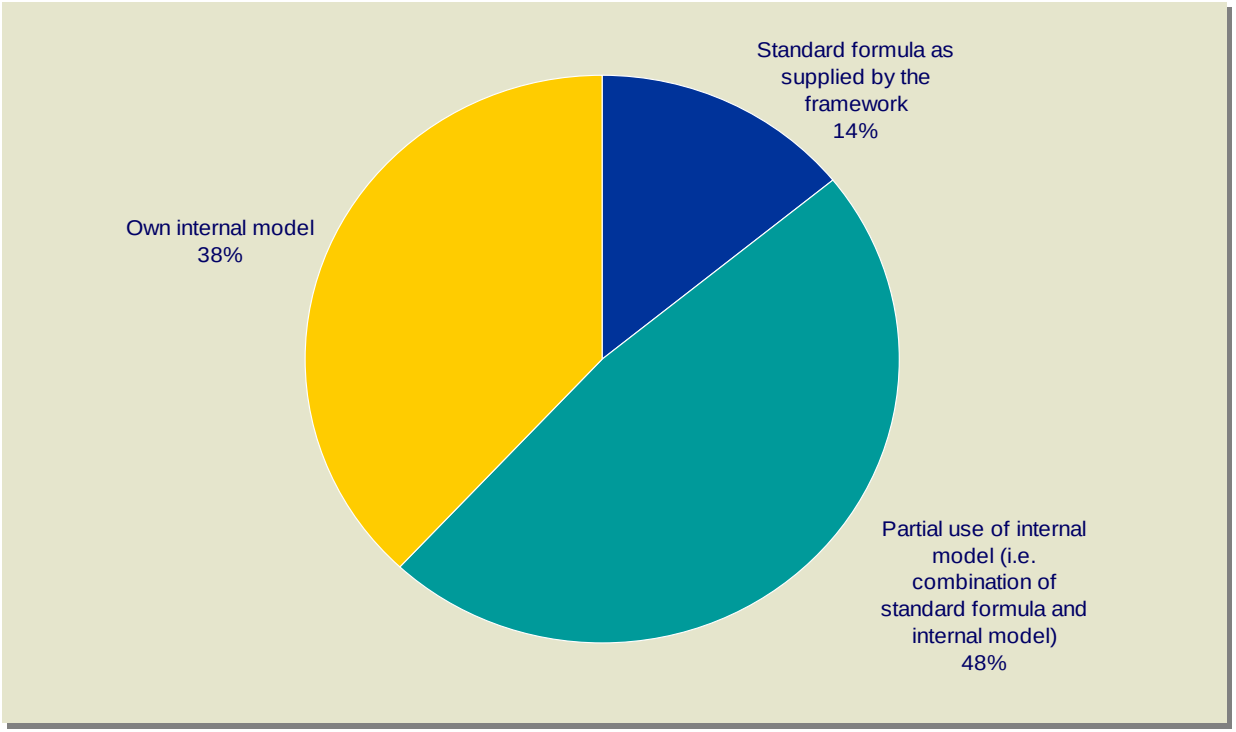


The Business of Change: 2010 and Beyond

Looking ahead to Solvency II – Internal models

ACTUARIAL SOCIETY OF SOUTH AFRICA

Do you expect to apply the standard formula or use an internal model to calculate capital requirements?



UK regulator is concerned that companies are leaving implementation too late. A lot of work required to obtain internal model approval.

The Business of Change: 2010 and Beyond

Looking ahead to Solvency II

- ICA has left UK firms relatively well placed.
- However, 50% of UK firms do not have a formal programme in place in 2007.
- Plan for internal model approval required by June 2009.
- Use test likely to require monthly calculation of capital position – replicating portfolios likely to be used by many firms.
- Significant additional documentation of models and processes expected - such that it could be run by an expert third party.
- Swaps-based valuation likely to be a problem for firms with large annuity portfolios.
- Onerous governance and reporting requirements.
- Embedding likely to be key challenge:

Recent FSA case study: Example of poor senior management oversight

"In reviewing an insurer's ICA we noted several anomalies. Following discussions with the firm we found that it had completed its calculations shortly before the submission deadline, which meant that its Board had not had the opportunity to meet to discuss the results. This gave us several concerns around the governance and oversight of the firm's ICA work and has led to action points on the firm's risk mitigation programme."

Recent Market Developments

- FSA has urged firms to consider whether their stress and scenario tests remain adequate:
  - Re-examining correlation assumptions, e.g. market and credit risk.
  - Taking into account "ripple effects".
  - Identifying scenarios that would lead to failure.
- FSA also recently provided more guidance on valuation of Asset Backed Securities and credit risk.

Example scenarios for "less benign" market conditions

- Increased inflation combined with increased interest rates and, falling equities and widening credit spreads.
- Counterparty failure with ripple effects of widening credit spreads, tightened liquidity and equity market falls.
- Combination of events leading to insufficient liquidity to meet outgoings.
- Situations in which collateral arrangements do not deliver.
- A "credit crunch" scenario but with weaker equity markets and operational risk leading to mass terminations.

A final thought…

ACTUARIAL SOCIETY OF SOUTH AFRICA

- Models are not enough. As professionals involved in risk management we need to learn to "think outside the box" more often.
- Below is a quote from AIG in their 2007 annual report, months before their spectacular failure:

"The implementation of our economic capital model provides us with a tool to help us allocate our capital efficiently. The tool provides one of the metrics we will use with increasing frequency to allocate capital to promising growth areas, judge performance on a consistent basis across our business segments and help us set compensation policy. AIG's capital position is excellent and we have the flexibility to take advantage of growth opportunities" – **AIG Annual Report, 2007 year-end**

Questions?