The Actuarial Profession
making financial sense of the future

GIRO Conference and Exhibition 12th October 2011
Solvency II IMAP Working Party

Practical Issues in Solvency II Internal Model Approval Process (IMAP) for General Insurance Actuaries

© 2010 The Actuarial Profession • www.actuaries.org.uk

Our Brief

- The internal model approval process (IMAP) for Solvency II presents a number of practical issues for GI actuaries
- In particular, the Level 1 Framework specifies ‘six tests’ that any internal model must meet for the supervisor to give approval
- But how is the market approaching these requirements in practice?
- This update discusses this issue using evidence gathered from surveys and interviews conducted in 2010 and 2011.

Agenda

- Chair
- Introduction
- Areas of work this year
  - External Models
  - Model Validation
- Overview and Conclusions
- Next Steps
- Questions or Comments

Our focus - Bridging EIOPA requirements and business/ modelling reality

Key Questions

How are the requirements being interpreted by experienced modellers?

How is the industry approaching the tests?

Topics

Use Test

Validation

External Models

Calibration

Documentation

Risk Ranking

Profit & Loss Attribution

Expert Judgement

The Actuarial Profession
making financial sense of the future

External Models

Catastrophe Risk

© 2010 The Actuarial Profession • www.actuaries.org.uk

External Models

> “The use of a model or data obtained from a third party shall not be considered to be a justification for exemption from any of the requirements for the internal model set out in Articles 120 to 125.”

Article 126

How do you interpret the requirements?

- Detailed knowledge of methodology and basic construction of External CAT Models
- Perform detailed validation of External CAT model outputs
- Independent review (expert judgement)
- Documentation of data, validation, model selection, model blending…

External Models

> “Who is responsible for Solvency II approval of the use of the catastrophe model in your company?”

How do you interpret the requirements?

- Who is in charge of selecting the model?
- Who is in charge of testing the model?
- Who prepares the procedures to use the model?
- Who runs the model?
- Who documents the understanding of the model?

External Models

Exposure data	External Model used	Adjusted outputs	Use of results
Demonstrate quality of exposure data	Justification Show external model meet requirements	Justification Validation of results	Demonstrate understanding Governance

External Models

Vendor documentation

- Documentation
  - What will be available to licensees ?
  - Solvency II documentation – including model design, construction, validation
  - Strengths/limitations of models

Vendor Validation

- Leverage extensive validation
  - Testing of model coding
  - Back-testing of events and vulnerability modules
  - Geographical, meteorological, engineering studies

External Models

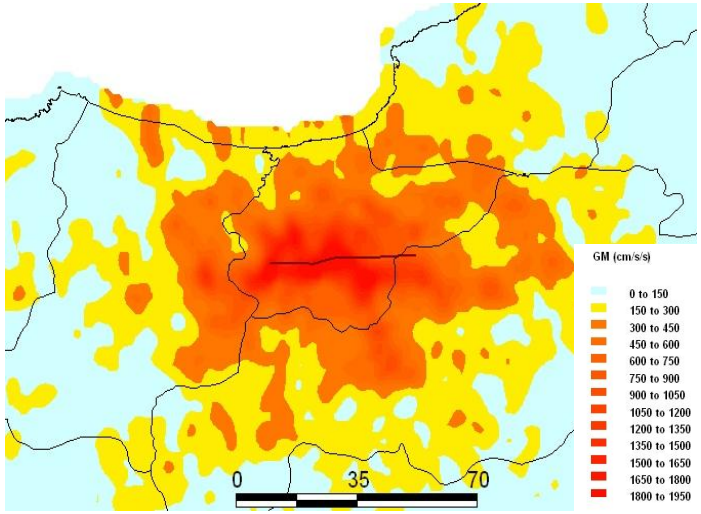
Company documentation

- Selection of vendor
  - Why RMS, AIR, EQECAT? Which models?
  - Understanding of model
- Use & Governance of models
  - Aggregation, Capital, Pricing
- Assumptions
  - Justifying switches e.g. demand surge
  - Justifying loading/blending factors applied
  - Roll-forward of exposure data to new business plan
- Limitations and how these are addressed
  - How to account for non-modelled regions and perils?
  - Dealing with non-modelled or low quality data
  - Incomplete capture of policy terms

External Models

Company validation

- Entity Validation
  - Validation of output with own losses
  - Reasonability of AAL loss cost maps
  - Catalogue density and size validation
  - Comparison to other models
  - Single event footprint validation
  - Diagnostics – AEP/OEP curves
  - Analysis of change – upgrades
  - Data Quality Audits
  - Sensitivity Testing
  - Replacement value uncertainty
  - Vulnerability uncertainty
  - Model uncertainty
  - Data uncertainty



The Actuarial Profession
making financial sense of the future

Model Validation

© 2010 The Actuarial Profession • www.actuaries.org.uk

Model Validation Objectives

> “The primary reason that supervisory authorities will require undertakings to take appropriate steps to validate that the internal model is appropriate for the calculation of regulatory capital is to ensure that the level of regulatory capital is not materially mis-stated so as to decrease the level of the policy holder protection provided.”

CEIOPS Advice - former CP56 8.10

Model Validation
Key Challenges

- What does ‘materially mis-stated’ mean?
- How to apply/formalise the validation?
- Materiality/ Proportionality
- How much evidence/ detail is needed to support assumptions?
- Where do you draw the line?

How to define governance/ roles/ responsibilities

How to maintain independence

Model Validation Scope

What we could talk about

- Data
- Methods & Assumptions
- Expert Judgements
- Systems/IT
- Governance & Use
- Documentation
- Validation Policy
- Validation Cycle
- Validation Tools
- Validation Report
- Management Information
- Outputs

Model Validation
Our point of view

What we will talk about

Article 121

> insurers shall have a regular cycle of model validation which includes monitoring the performance of the internal model, reviewing the ongoing appropriateness of its specification, and testing its results against experience
>
> an effective statistical process for validating the internal model ... to demonstrate ... that the capital requirements are appropriate

Model Validation
Our point of view

Key Objective: Demonstrate the model is ‘fit for use’

Core objectives

- Demonstrate that model process, methodology, assumptions and SCR result are “reasonable” (view of an independent ‘knowledgeable third-party’ based on all available information)
- Understand and communicate strengths/ limitations of model, results and sensitivities

Broader objectives

1) Compliance with Solvency II tests and standards
2) All aspects of internal model
3) Governance and control environment
4) Data Quality

Case Study – Banking
.... Gaussian Copula function (David X. Li)

This function enables the assessment of the future joint probability of default of members of a pool of credits. It uses data from historic CDS prices for those credits and a correlation parameter for the overall correlation within the pool. The function enables the pricing of CDS's.

$$\Pr[T_A<1, T_B<1] = \Phi_2(\Phi^{-1}(F_A(1)), \Phi^{-1}(F_B(1)), \gamma)$$

Probability –A joint default probability; the likelihood that any two members of a pool of credits (A and B) will both default.

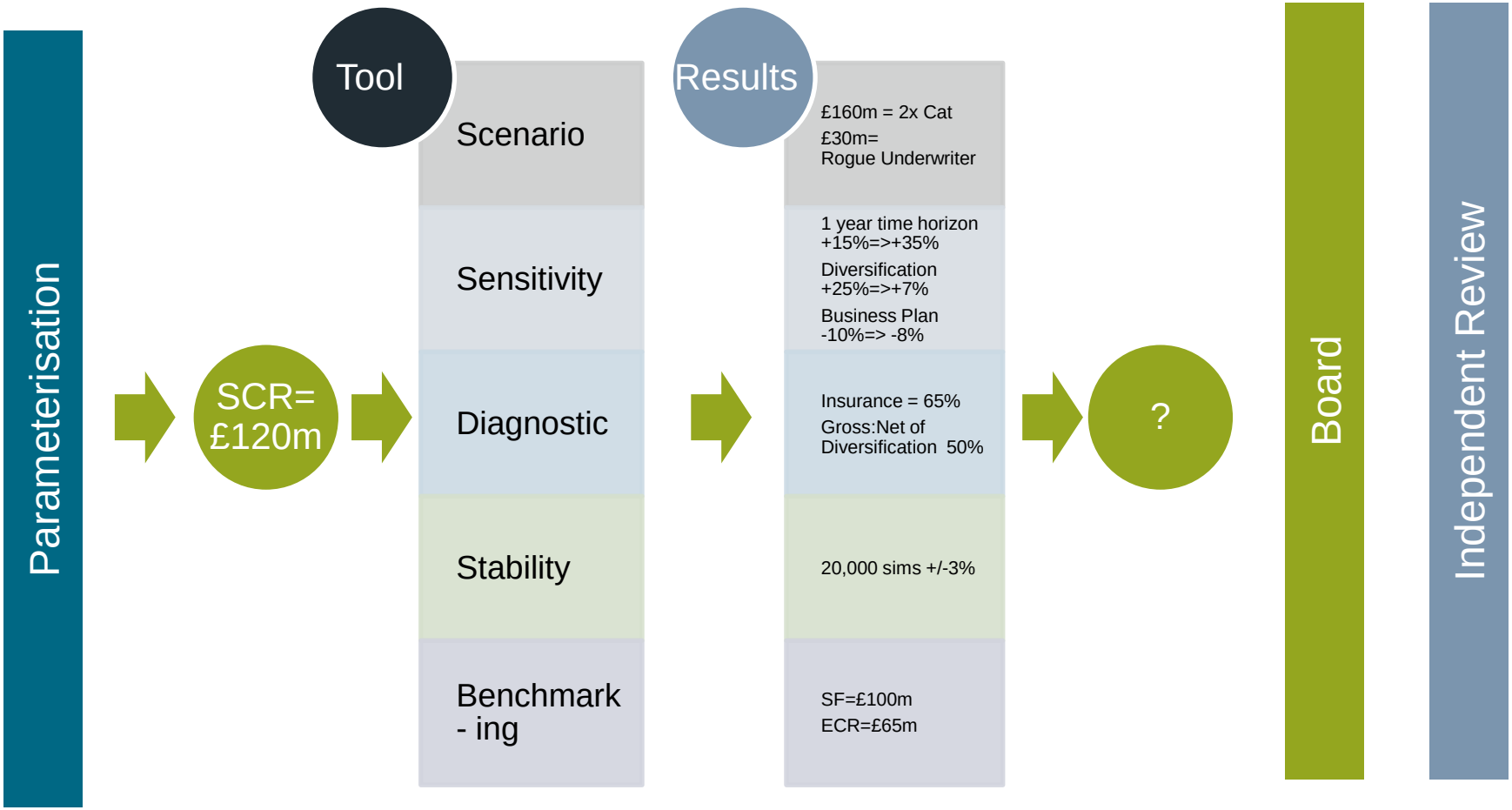
Survival times – The amount of time between now and when A and B can be expected to default (note - concept was adopted from life actuarial science for assessing the longevity of a surviving spouse in a joint life policy)

Copula – This couples (hence the Latinate term copula) the individual probabilities associated with A and B to come up with a single number.

Distribution functions – The probabilities of how long A and B are likely to survive.

Gamma – The correlation parameter, which reduces correlation to a single constant

Case Study – Insurance
.... validation of SCR of £120m



Model Validation
Discussion - What does ‘good’ look like?

“Top down”

- Selected SCR can be justified in view of diagnostics, benchmarking, analysis of change and management’s view of risk
- Key assumptions are understood and communicated to management
- Management understand key assumptions, results, and reliance they can place on the model

“Bottom up”

- Selected assumptions can be justified
- Sufficient independent, expert review

The Actuarial Profession
making financial sense of the future

Overview and Conclusions

© 2010 The Actuarial Profession • www.actuaries.org.uk

Overview and Conclusions

- Variety in level of preparedness of firms
- Variety in views on the benefits of Solvency II

Overview and Conclusions

- Interpreting legislation
- The importance of use
- Documentation
- Crossover of topics

The Actuarial Profession
making financial sense of the future

Next Steps

© 2010 The Actuarial Profession • www.actuaries.org.uk

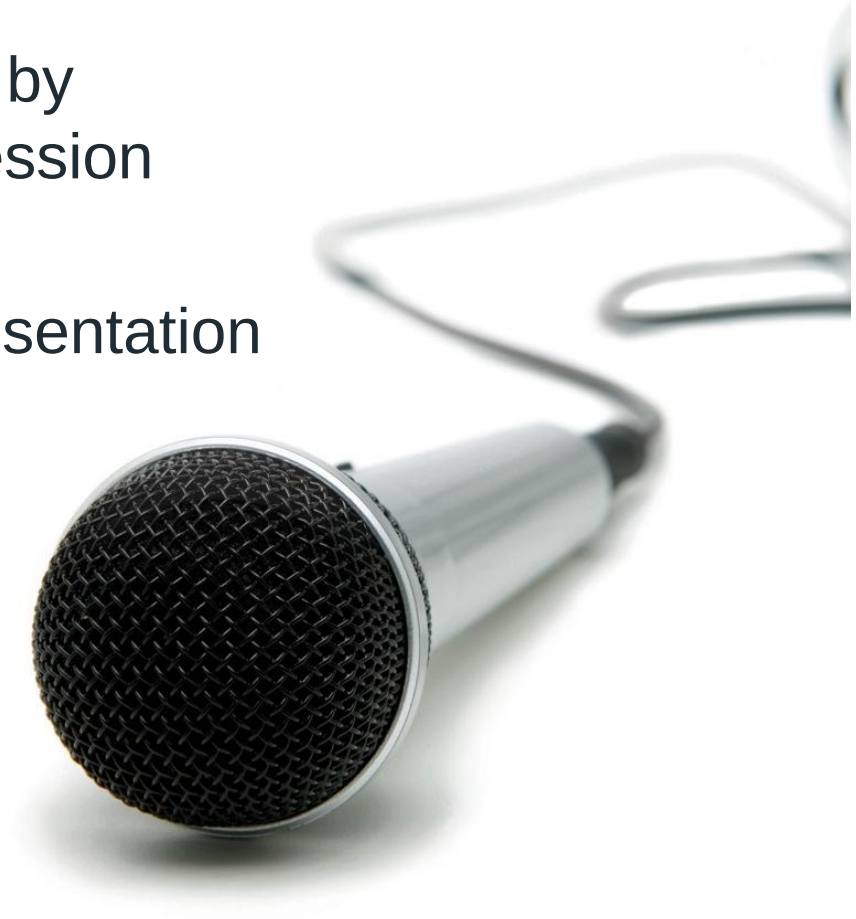
Next Steps

- Discussion paper – email us at giroimap@gmail.com
- Plans for 2012
- New members welcome

Questions or comments?

Expressions of individual views by members of The Actuarial Profession and its staff are encouraged.

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



© 2010 The Actuarial Profession • www.actuaries.org.uk