Actuarial Aspects of Internal Models under Solvency II
Internal Models Working Group
Preparation for February 2009 Sessional Paper

Agenda
- Introduction
  - Role of this working group and role of this session
  - The EU directive
  - Sources of Internal Model Advice
- Actuarial Issues-Overview
- Four Issues for Discussion
  - Time Horizon
  - Co-dependency/Correlation
  - Data
  - Extreme Events
- Next Steps
Purpose

- This working group is charged with writing an Institute sessional paper on “Actuarial Aspects Of Internal Models For Solvency II” to be presented at an Institute meeting in Feb 2009.
- The paper deals with life and GI, and has members representing both areas of practice.
- In this workshop we discuss some of our thinking and are looking for you thoughts. We will focus on GI.
- We want this to be very interactive—So speak up and feel free to interrupt!!

EU Directive

- Role of Internal Models
  - Pillar 1 – Capital
  - Pillar 2 – ORSA (Own Risk Solvency Assessment)
- Specifications in the Directive
  - Use, statistical quality, calibration, validation, documentation, data, subject to regulator approval…
- Supervisory Roles
  - CEIOPS, National supervisors

Sources of Internal Model Advice

- Actuaries
  - IAA, Group Consultatif, national actuarial organisations…
- Insurance Supervisors
  - IAIS, CEIOPS, FSA (Solvency II paper to be issued shortly), other national supervisors…
- Industry
  - CFO and CRO Forums…
- Others
  - Consultants, companies, individuals, working parties, …
(See Appendix E for sample web links)
Focus of this Working Party

- Implications for actuaries preparing internal models for application to companies supervised in the UK
  - UK business
  - Other business
- What is needed? What is available? What research is underway? What are the barriers to best possible practices?

Modelling Areas with Actuarial Aspects

- Balance Sheet – Initial and forecast
- Assessment of each risk and interrelationships among risks
- Model Structure
- "Use test"
- Testing and meeting specifications of the directive
- Other
- See Appendix A for the "Long List"

“SWOB” Analysis

<table>
<thead>
<tr>
<th>Strengths:</th>
<th>Weaknesses:</th>
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<tr>
<td>Models ‘R’ US</td>
<td>See Appendix B for a long list, but ‘nothing is perfect’, so how good is ‘good enough’?</td>
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<td>As actuaries</td>
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<td>As part of UK Supervision</td>
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<th>Open Issues:</th>
<th>Business Issues:</th>
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<td>Required quality</td>
<td>One year time horizon?</td>
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<td>M or SCR for Technical Provisions</td>
<td>Does ‘auto pilot’ work?</td>
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<td>(Appendix C)</td>
<td>Models for M or ‘just’ CIRSA</td>
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<td>(Appendix D)</td>
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One Year Time Horizon

- Risk after end of Year One included in risk margin. Slow-to-emerge risk (e.g., longevity, asbestos) may need little or no capital.
- Is this sufficient using Standard Formula capital and 6% cost?
- Are run-off costs properly allowed for?
- Is the lack of insurance cycle a flaw (e.g., SCR becomes volatile)?

Codependency/Correlation

- Industry studies suggest benefit of between 25-50% benefit for diversification relative to mono-line firms.
- Flipside, accumulation of risks also significant addition to capital.
- How do you get comfort around the correlation approach and results?
- How should the regulator validate the approach and results?

Data for internal models

- Has to be “complete, accurate and appropriate” — is this achievable? How would you measure it?
- Can be external or internal — where should it come from?
- How much scope for judgement?
Extreme Events

- Poorly represented in observed data, but
- Critical for estimation of tail of the risk distribution for capital and risk margins
- Possible sources: data, models, judgement, (other?)
- How is best source determined and validated
- Suggestion: Organised collection of expert opinions?

Next Steps

- This working party continues to develop its paper
- Your comments continue to be welcomed

Appendix A - The Issues

- **Balance Sheet** — assets, technical provisions and capital
- **Risks** — UIN, toll, reserving, future business, risks not in SCR, pricing cycles, market risk, credit risk, group risk, guarantees and options
- **Structure of model** — time horizon, stochastic/deterministic, stress & scenario testing, granularity, correlation, diversification & fungibility, management actions, parameter uncertainty, probability distributions, data quality, cash flow, use of assumptions, identifying limitations, applying the required experience, identifying exposures
- **Use** — use test, link to ORSA, IFRS and other reporting, AUM, reinsurance, pricing, ERM, capital allocation, P&L attribution
- **Testing** — back testing, statistical quality, validation standards, calibration standard, documentation, external review
- **Other** — control cycle, risk metrics, shortcomings, partial models, group models, valuation, alternative calibration, skills and experience, definition of exposure, application to run-off companies
Appendix B - Needs Improvement – Weakest Links

- Proper analysis of one-year time horizon
- Correlations, especially tail correlations
- Inflation, pricing, reserve development, market fluctuations, the economy
- Treatment of extreme events
- Probability-weighted best estimates
- Risk distributions
- Latent exposures
- Specifications within Directive – Data, Calibration, Validation, Use, Statistical quality, Documentation, and Standards for regulatory approval
- Reserve uncertainty – beyond bootstrapping
- Quality of reserving
- Run times or approximations (especially life and GI if increasing granularity)
- Risk distributions for new business (wider than renewals? But how much?)
- Group diversification – Analysis of longevity
- Use/limit - Given complexity that might be required, will be really be ‘used’

Appendix C – Open Issues

- Approval "bar"—How 'good' is 'good enough' for IM approval
- Risk margins — Are risk margins based on SCR or IM?
- Role of judgment in the model—selection of parameters, adjustments to the final results, other?
- Treatment of pricing cycle—future business, risk distribution of reserve development, expected reserve development
- Other?

Appendix D – Business Issues

- One year time horizon is quite different from ‘to ultimate’ analysis – does that effect business strategy or just the model?
- Can Internal model really operate on ‘auto pilot’?
- Models for IM or ‘just’ ORSA?
Appendix E – Sample Links

- Recent IAIS draft guidance (2008) can be found at the IAA website:
  
  http://www.actuaries.org/CTTEE_SOLV/Agendas/Quebec_EN.pdf

  
  http://www.actuaries.org/LIBRARY/Papers/Global_Framework_Insurer_Solvency
  Assessment_members.pdf

- CRO Forum Benchmarking Study of Internal Models (2005)
  
  http://www.croforum.org/publications.csp