Workshop E07
Sizing-up the Non-Life Risk Modules in the current Solvency II proposals

Andy Hancock
David Paul

GIRO 2007
Cardiff Suite

15:45 – 16:45, Thursday 7 October 2007

EU Member States

Solvency II Quiz Question – delegates to CEIOPS

<table>
<thead>
<tr>
<th>Austria</th>
<th>Belgium</th>
<th>Bulgaria</th>
<th>Cyprus</th>
<th>Czech Republic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>Estonia</td>
<td>Finland</td>
<td>France</td>
<td>Germany</td>
</tr>
<tr>
<td>Greece</td>
<td>Hungary</td>
<td>Iceland</td>
<td>Ireland</td>
<td>Italy</td>
</tr>
<tr>
<td>Latvia</td>
<td>Liechtenstein</td>
<td>Lithuania</td>
<td>Luxembourg</td>
<td>Malta</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Norway</td>
<td>Poland</td>
<td>Portugal</td>
<td>Romania</td>
</tr>
<tr>
<td>Slovakia</td>
<td>Slovenia</td>
<td>Spain</td>
<td>Sweden</td>
<td>United Kingdom</td>
</tr>
</tbody>
</table>
Ambition (Spring 2007) versus reality (October 2007)

- **Ambition** – to seek out patterns
  - General trends
    - Higher / lower
  - Concentrate on non-life underwriting and catastrophe components

- **Reality**
  - Three-step analysis
    - Creating a Solvency II balance sheet >>> available capital
    - SCR (Solvency Capital Requirement) by ‘standard formula’
    - Comparison with ICA (what is relevant for standard formula SCR)?
  - Diversity at each of three steps
    - Pluses counter minuses
    - Multi-dimensional

**GIRO 2007 Objective**
- E&Y QIS3 Survey – experiences gained and shared
- Give insights: why this diversity?
- Discuss: some pointers for FSA / CEIOPS (QIS4)?

Experience gained through peer to peer comparisons

- **Ernst & Young General Insurance Solvency II Forum**
  - 15 participant firms / groups ….. and growing
  - Practitioner forum
  - Discussion
  - Debate
  - Comparison
  - Actuaries & Risk Officers

- **Solvency II General Insurance QIS3 Survey**
  - Converting to a ‘Solvency II’ restated balance sheet
    - For general insurers, degree of complexity tends to be understated
    - Life insurers are more advanced with ‘market consistent’ valuation
    - Computing the non-life underwriting and catastrophe components of ‘standard formula’ SCR

Converting to a ‘Solvency II’ restated balance sheet
The Solvency II restated balance sheet

Solvency II balance sheet: What was surveyed?

- 'pre-claims' <> unearned premium provision
- Restatement of claims outstanding ('post-claims' liability)
- Overall movement in available capital, comprised of:
  - 'pre-claims' change
  - Removal of DAC
  - 'post-claims' change
  - Introduction of risk margin
  - Valuation of assets changes

Solvency II balance sheet: What was learned? 'pre-claims liabilities'

- Theory
  - Intended to be a 'market consistent' valuation of unexpired period of risk
  - Should be abandoning the "n/12 x Pr" convention of UPR (existing GAAP)
  - Should incorporate assessment of current loss ratios on in-force business
  - Correct allowance for time value of money

- Practice
  - QIS3 Technical Specification was unclear and allowed 'opt out' from a 'market consistent' approach
  - Only a few in Survey had attempted full 'market consistency' inclusive of loss ratios etc.
  - Some had not introduced discounting and/or doubted the reliability of time-based run-off projection

- Diversity
  - Reductions: 0% / 5 to 10% / >20%
Solvency II balance sheet: What was learned? 'post-claims liabilities'

- **Theory**
  - Best estimate
  - Discounting
- **Practice**
  - Current booked estimates may be deemed to be 'best estimate'
  - Is QIS3 computation being done robustly – in a way that will satisfy IFRS Phase 2 requirement for best estimate and risk margin?
  - Again doubts over the reliability of time-based run-off projection
- **Diversity**
  - Reductions: 5% to 25%

Solvency II balance sheet: What was learned? 'available capital'

- **Expectation (theory?)**
  - New 'pre-claim' liability versus UPR less DAC – generally expect to increase 'available capital'?
  - Discounting – increase 'available capital'
  - Explicit risk margin – reduce 'available capital'
- **Practice**
  - In Survey – available capital increased in most cases
  - Large insurance liability reductions didn’t correspond to large risk margin additions
  - No instances of investments revaluations, however –
  - … further distortions by changing values of subsidiaries in balance sheet
- **Diversity**
  - Increase in available capital: 5% to 20%
  - Decrease in available capital: 0% to -10%

Solvency II balance sheet: What was learned? Qualitative issues

- **Risk margin:**
  - Most of Survey participants had used QIS3 'helper tabs' for Cost-of-Capital Risk Margin calculation
    - Done mechanically
    - Not validated in a conceptual way
    - Not validated against internal economic capital framework (either insurers didn’t have such a framework, or simply didn’t think the cross-comparison was relevant)
- **Actuarial, Risk or Finance?**
  - In Survey, mostly balance sheet was restated by actuaries without Finance team involvement
  - Some instances of QIS3 completed by Finance, without actuaries being involved
  - QIS3 completed by Group, without BU involvement
Computing the ‘standard formula’ SCR
Non-life underwriting and catastrophe risk modules

‘Standard Formula’
Solvency Capital Requirement SCR

The complete hierarchy

The risk modules for non-life insurers
Demonstration of Correlation - combinations

Risk A  Risk B  Risk C
Risk A  100%  100%  100%
Risk B  0%    100%  100%
Risk C  75%   8%    100%

Risk A and C are highly correlated
Risk B is independent of A and C

Aggregated risk = \sqrt{200^2 + 400^2 + 300^2 + (2 \cdot 0.75 \cdot 200 \cdot 300)} = 616
No correlation between A and C = \sqrt{200^2 + 400^2 + 300^2} = 539
Fully correlated = 200 + 400 + 300 = 900

Non-life underwriting risk

- separate calculations for premium risk and reserving risk
  - but now combined in a single 'non-life underwriting' risk module
  - this part of SCR has become less intuitive - difficult to comprehend and relate to 'real world'
- structurally built up on 15 categories of non-life LOB’s (lines of business)
- 'market' volatility factors and correlation matrices for premium and reserving risks are prescribed by CEIOPS
  - CEIOPS is seeking to set the factors and correlations to calibrate the Standard Formula at the 99.5% VaR risk measure over 1 year time period
- insurers may calculate their 'entity-specific' volatility factors for premium risk
  - using up to 15 years of historical loss ratios
  - credibility weighting is then applied to blend entity-specific factor with market (CEIOPS prescribed) factor
  - no such entity-specific factors permitted for reserving risk

Volatility Factors QIS3 vs QIS2
Correlations QIS3 vs QIS2

<table>
<thead>
<tr>
<th>QIS2</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Accident and health</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2: Motor, third party liability</td>
<td>25%</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3: Motor, other classes</td>
<td>0%</td>
<td>50%</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4: Marine, aviation and transport</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5: Fire and other damage of property</td>
<td>0%</td>
<td>0%</td>
<td>25%</td>
<td>25%</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6: Third-party liability</td>
<td>25%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7: Credit and suretyship</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>75%</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8: Legal expenses</td>
<td>50%</td>
<td>25%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td>75%</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9: Assistance</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10: Miscellaneous non-life insurance</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>11: Reinsurance</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Correlations QIS3 vs QIS2

<table>
<thead>
<tr>
<th>QIS3</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Accident and health</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2: Motor, third party liability</td>
<td>25%</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3: Motor, other classes</td>
<td>25%</td>
<td>50%</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4: Marine, aviation and transport</td>
<td>25%</td>
<td>50%</td>
<td>25%</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5: Fire and other damage of property</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6: Third-party liability</td>
<td>25%</td>
<td>50%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7: Credit and suretyship</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>50%</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8: Legal expenses</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>25%</td>
<td>25%</td>
<td>50%</td>
<td>50%</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9: Assistance</td>
<td>25%</td>
<td>25%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10: Miscellaneous non-life insurance</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>11: Reinsurance</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>50%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>50%</td>
<td>100%</td>
</tr>
</tbody>
</table>

'Standard formula' SCR: What was surveyed?

Premium & Reserve Risk Capital
- Survey was large enough to make comparisons for 5 or 6 lines of business where there were multiple data points (but other lines of business were absent from Survey or only one / two data point)
- Expressed relative to net written premiums and to technical provisions

Catastrophe Risk Capital
- Survey expressed catastrophe risk component relative to other major risk components in the upper level aggregation

'Standard formula' SCR: Premium & Reserve Risk

What was learned?
- Hard to discern pattern
  - Combination of premium and reserve risk modules means that different volume measures for premium risk and reserve risk combine – explains considerable variation in premium & reserve risk capital component for two companies in same LOB
- "Entity specific" factors for premium risk
  - Survey revealed spectrum: not attempted / data problems / results didn’t seem sensible / attempted and used
  - Most Survey participants did support that ‘entity specific’ factors should be allowed and made effective
  - On balance Survey participants also were ‘pro’ developing process of ‘entity specific’ factors for reserve risk
- CEIOPS ‘market’ parameters
  - Parameters are arbitrary and Survey suggests that there is a lack of buy-in by UK actuaries and their firms
Non-life catastrophe risk

- Regional CAT scenarios specified by local regulation, as was the case during QIS2
- QIS3 has also seen the addition of European Trans-regional CAT scenarios prescribed by CEIOPS
  - European windstorm corresponding to a 1 in 200 year event
  - Man-made scenario – two aircraft, level crossing, single largest property, terrorist attack at event
- QIS3 Technical Specification says that consideration of the transregional European windstorm can be ‘obsolete’ if local regulator has specified equivalent windstorm (dependent upon location of risks)

<table>
<thead>
<tr>
<th>UK QIS2</th>
<th>UK QIS3</th>
<th>France QIS3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region 1</td>
<td>Region 2</td>
<td>Region 3</td>
</tr>
<tr>
<td>Scenario 1</td>
<td>Scenario 2</td>
<td>Scenario 3</td>
</tr>
<tr>
<td>Insurance</td>
<td>Retail</td>
<td>Insurance</td>
</tr>
<tr>
<td>Covered Loss</td>
<td>Covered Loss</td>
<td>Covered Loss</td>
</tr>
<tr>
<td>Net Premium</td>
<td>Net Premium</td>
<td>Net Premium</td>
</tr>
<tr>
<td>Reinsurance Retention</td>
<td>Reinsurance Retention</td>
<td>Reinsurance Retention</td>
</tr>
<tr>
<td>Surplus</td>
<td>Surplus</td>
<td>Surplus</td>
</tr>
<tr>
<td>Available Capital</td>
<td>Available Capital</td>
<td>Available Capital</td>
</tr>
</tbody>
</table>

‘Standard formula’ SCR: Catastrophe Risk

What was learned?

- Regional & Trans-regional scenarios
  - Survey reveals lack of engagement by insurers / actuaries with the latest scenario suggestions
  - Practical difficulties
    - Major investment in time / money to change existing cat scenario tests
    - Not motivated to do that for ‘non-mandatory’ QIS3 (or indeed QIS4 !)
    - Why change from ‘bespoke’ to ‘standard’?
  - QIS3 cat scenario framework fails to contend with complexities of business of most of Survey participants

- Diversification / Reinsurance
  - Impractical to work ‘arbitrary’ scenarios through ‘real’ treaty arrangements
  - In Survey the Cat Risk capital was mostly ‘diversified away’ except for participants with very large cat risk capital, relative to attritional risk capital

Observations & Questions
Observations & Questions (1 of 2)

• General insurers have work to do on their ‘SII balance sheets’
  – Balance sheet needs focus – not just focus on internal models and standard formula SCR
  – Life insurers and life actuaries have been addressing issue of ‘market consistent’ valuation for longer period
  – But ‘market consistent’ valuation for GI raises different issues than in life
    – Introducing discounting is a large cultural change – not discounting has been a variable and unreliable proxy for prudent / risk margins

• Risk Margin - Cost of Capital Method
  – Mechanically done in QIS3 (by the majority)
  – ‘helper tab’ may be counter-productive in the longer term
  – Not understood and related to internal capital frameworks (tools for Use Test)
  – Needs joint development through co-working of actuarial and finance functions

Observations & Questions (2 of 2)

• Does ‘standard formula’ SCR matter for UK actuaries and insurers?
  – ‘2 year clause’ in the Directive
  – Role of the UK FSA
  – Will we transition directly from ICAS to approved internal model SCR?

• Are there unreasonable expectations of ‘standard formula’ SCR
  – Should it only be a back-stop?
  – More – or less – of entity-specific parameterization?
  – Can Cat Risk difficulties be solved in a credible way?

Questions & Discussion

for more information on the G.I. Solvency II Forum and to participate Surveys please contact:

Andy Hancock  ahancock@ey.uk.com
David Paul  dpaul@ey.uk.com
Solvency II Quiz Question – delegates to CEIOPS

<table>
<thead>
<tr>
<th>Austria</th>
<th>Belgium</th>
<th>Bulgaria</th>
<th>Cyprus</th>
<th>Czech Republic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>Estonia</td>
<td>Finland</td>
<td>France</td>
<td>Germany</td>
</tr>
<tr>
<td>Greece</td>
<td>Hungary</td>
<td>Iceland</td>
<td>Ireland</td>
<td>Italy</td>
</tr>
<tr>
<td>Latvia</td>
<td>Liechtenstein</td>
<td>Lithuania</td>
<td>Luxembourg</td>
<td>Malta</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Norway</td>
<td>Poland</td>
<td>Portugal</td>
<td>Romania</td>
</tr>
<tr>
<td>Slovakia</td>
<td>Slovenia</td>
<td>Spain</td>
<td>Sweden</td>
<td>United Kingdom</td>
</tr>
</tbody>
</table>

Solvency II Quiz Question – delegates to CEIOPS

<table>
<thead>
<tr>
<th>Austria</th>
<th>Belgium</th>
<th>Bulgaria</th>
<th>Cyprus</th>
<th>Czech Republic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>Estonia</td>
<td>Finland</td>
<td>France</td>
<td>Germany</td>
</tr>
<tr>
<td>Greece</td>
<td>Hungary</td>
<td>Iceland</td>
<td>Ireland</td>
<td>Italy</td>
</tr>
<tr>
<td>Latvia</td>
<td>Liechtenstein</td>
<td>Lithuania</td>
<td>Luxembourg</td>
<td>Malta</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Norway</td>
<td>Poland</td>
<td>Portugal</td>
<td>Romania</td>
</tr>
<tr>
<td>Slovakia</td>
<td>Slovenia</td>
<td>Spain</td>
<td>Sweden</td>
<td>United Kingdom</td>
</tr>
</tbody>
</table>