Life 2008 Spring Meeting
June 16-18, 2008

Session 14, Key Issues Arising from Solvency II

Moderator
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QIS4 balance sheet – basic structure

Some issues with each part of the balance sheet
**Liability calculation issues**

<table>
<thead>
<tr>
<th>Area</th>
<th>Point of debate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discount rate</td>
<td>Swap curve or Treasury curve?</td>
</tr>
<tr>
<td>Surplus funds</td>
<td>Liability or capital?</td>
</tr>
<tr>
<td>Ring-fenced funds</td>
<td>What contribution to capital?</td>
</tr>
<tr>
<td>Future premiums</td>
<td>Recurrent single premiums included or not?</td>
</tr>
<tr>
<td>Cost of capital</td>
<td>What should the annual CoC be? Vary by LoB?</td>
</tr>
<tr>
<td>Deferred taxes</td>
<td>How to calculate?</td>
</tr>
</tbody>
</table>

*Also likely future issues relating to definition of market consistent values*

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**Own funds issues**

<table>
<thead>
<tr>
<th>Basic own funds</th>
<th>Tier 1</th>
<th>Tier 2</th>
<th>Tier 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excess of assets over liabilities</td>
<td>Cumulative perpetual prefs</td>
<td>Cumulative fixed term prefs &lt;5yrs</td>
<td></td>
</tr>
<tr>
<td>Subordinated Member Accounts</td>
<td>Cumulative fixed term prefs &gt;5yrs</td>
<td>Other hybrid</td>
<td>&lt;5yrs</td>
</tr>
<tr>
<td>Non-cumulative fixed term prefs &gt;10yrs</td>
<td>Subordinated liabilities &gt;5yrs</td>
<td>Subordinated liabilities &lt;5yrs</td>
<td></td>
</tr>
</tbody>
</table>

Other hybrid
- Going concern loss absorbency
- >10yrs
- No step up before 10 yrs step u<100bp/ 50% spread

Other hybrid
- >5yrs
- No step up before 5 yrs spread u<100bp
Own funds issues (continued)

<table>
<thead>
<tr>
<th>Tier 1</th>
<th>Tier 2</th>
<th>Tier 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unpaid common shares and unpaid initial funds</td>
<td>Unpaid and callable hybrids eligible for T2</td>
<td></td>
</tr>
<tr>
<td>Unpaid non-cumulative prefs</td>
<td>Letters of credit and guarantees not eligible for T2</td>
<td></td>
</tr>
<tr>
<td>Unpaid and callable hybrids eligible for T1</td>
<td>60% mutuals’ unbudgeted supp. calls</td>
<td></td>
</tr>
<tr>
<td>Letters of credit and equivalent guarantees</td>
<td>Other commitments not eligible for T2</td>
<td></td>
</tr>
<tr>
<td>Supplementary calls</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ancillary own funds

Solvency Capital Requirement (SCR) issues

\[ \text{SCR} = \text{BSCR} + \text{SCR}_{\text{op}} \]

Calibrated to 99.5% 1 year VaR

Source: QIS4 draft technical specification
## SCR calculation issues

<table>
<thead>
<tr>
<th>Area</th>
<th>Point of debate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity shock</td>
<td>32%/45% for all or dependent on term of liabilities?</td>
</tr>
<tr>
<td>Equity shock</td>
<td>Dampener to shock?</td>
</tr>
<tr>
<td>Credit spread shock</td>
<td>Different treatment for CDOs and CDS?</td>
</tr>
<tr>
<td>Mass lapse shock</td>
<td>What size and applied to which LoB?</td>
</tr>
<tr>
<td>Counterparty risk</td>
<td>Exposure pre or post other shocks? Intra-group?</td>
</tr>
<tr>
<td>Operational risk</td>
<td>Simplistic formula appropriate?</td>
</tr>
</tbody>
</table>

## SCR aggregation issues

```
<table>
<thead>
<tr>
<th>CorrMkt</th>
<th>Mkt_int</th>
<th>Mkt_eq</th>
<th>Mkt_prop</th>
<th>Mkt_sp</th>
<th>Mkt_conc</th>
<th>Mkt_tax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mkt_int</td>
<td>1</td>
<td>0</td>
<td>0.5</td>
<td>0.25</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>Mkt_eq</td>
<td>0</td>
<td>1</td>
<td>0.75</td>
<td>0.25</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>Mkt_prop</td>
<td>0.5</td>
<td>0.75</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>Mkt_sp</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>1</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>Mkt_conc</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Mkt_tax</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
```

Source: QIS4 technical specification

**Major difficulties over allowance for risk absorption properties of discretionary benefits**
Minimum Capital Requirement issues

\[ MCR_{Life} = \max \left\{ \text{WP}_{\text{guaranteed}} \cdot TP_{\text{guaranteed}} + \alpha_{\text{WP}} \cdot TP_{\text{bonus}} + \gamma \cdot TP_{WP_{\text{guaranteed}}} \right\} \]

\[ + \sum_{i \in \{\text{non-WP}\}} \alpha_i \cdot TP_i + 0.25 \cdot \text{Exp} * \text{al} + \sum_{j} \beta_j \cdot \text{CAR}_j \]

Concerns over consistency with SCR led to cap and floor of 50% and 20% of SCR being introduced.

Group issues

<table>
<thead>
<tr>
<th>Area</th>
<th>Point of debate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group capital support</td>
<td>Restrictions, purpose</td>
</tr>
<tr>
<td>Non-EEA subsidiaries</td>
<td>Basis of inclusion</td>
</tr>
<tr>
<td>Geographical diversification</td>
<td>Should this be recognised in the standard SCR?</td>
</tr>
</tbody>
</table>
### Some possible implications

<table>
<thead>
<tr>
<th>Category</th>
<th>Impact</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPIAs</td>
<td>-ve</td>
<td>Discount rate, risk margin, credit shock</td>
</tr>
<tr>
<td>Par business</td>
<td>-ve</td>
<td>Recognition of discretionary benefits as a liability, ring fenced funds</td>
</tr>
<tr>
<td>VA business</td>
<td>+ve (if low g'tees)</td>
<td>Recognition of future profits</td>
</tr>
<tr>
<td>Protection business</td>
<td>+ve</td>
<td>Recognition of future profits</td>
</tr>
<tr>
<td>Multi-line groups</td>
<td>+ve</td>
<td>Diversification benefits</td>
</tr>
<tr>
<td>Non EEA reinsurers</td>
<td>-ve (if not rated)</td>
<td>Counterparty risk allowance penal, demand for traditional reinsurance down</td>
</tr>
</tbody>
</table>

### Questions

?
Solvency II

SOA Life Spring Meeting
Matthew Clark
June 16 - 18, 2008

Agenda

► Background and Overview

► Key Players and Timeline

► Solvency II Framework
  ► Pillar 1
  ► Pillar 2
  ► Pillar 3

► Potential Implications for Insurance Companies
Background and Overview

► Solvency II is the proposed new Europe-wide framework for prudential supervision of insurance

► Replaces Solvency I regulations

► Aims to address problems with Solvency I
  ► Outdated system (rules date from 1970s)
  ► Insufficiently risk-sensitive
  ► Did not reflect best practice
  ► Difficulties in supervising multinational, diversified groups
  ► Does not address risk management issues adequately
Overview of the key changes

► Fundamental change to Solvency requirements
  ► Principles based approach to supervision
  ► Capital linked to risks on a market consistent approach
  ► Convergence of economic capital and regulatory capital
  ► Recognizes diversification benefits – important for groups
  ► Lead supervisor for groups
  ► Major focus on risk management
  ► Significant disclosure requirements
  ► Capital add-ons for deficiencies
  ► Links to other reporting measures

► Contribution to the emergence of a world-wide standard?

Solvency II in a nutshell

► Defines a market consistent valuation framework and eligible forms of capital → Solvency II balance sheet
► Requires capital (the SCR) as a buffer for possible changes in own funds over a one year time horizon
► SCR is set such that a company can survive a 1 in 200 year event, i.e. 99.5th percentile
► Subject to approval from the supervisory authority, an internal model can be used to calculate SCR
► Embedded risk management processes are required
Key Players and Timeline

Who is involved?

- European Institutions: Commission, Parliament & Council
- Committee of European Insurance and Occupational Pensions Supervisors (CEIOPS)
- Local regulators (e.g. FSA in the UK)
- Chief Risk Officers (CRO) Forum
- Comité Européen des Assurances (CEA)
- Groupe Consultatif Actuariel Europeen
Solvency II timeline

- **2003**: Definition of the high level principles for consultation
- **2004**: 3 waves of calls for advice
- **2005**: Drafting of the Directive
- **2006**: Directive valuation process
- **2007**: Publication of Final Directive
- **2008**: Implementing measures
- **2009**: Adoption process of each member State
- **2010**: Solvency II in force

Solvency II Framework
Solvency II framework

Pillar 1
- Technical Provisions
- MCR Minimum Capital Requirement
- SCR Solvency Capital Requirement
- Model Approval

Pillar 2
- Risk Management
- Own Risk and Solvency Assessment (ORSA)
- Supervisory powers & processes

Pillar 3
- Disclosure-Solvency & Financial Condition Report
- Market Discipline

Solvency II framework: Pillar I

Pillar 1
- Technical Provisions
- MCR Minimum Capital Requirement
- SCR Solvency Capital Requirement
- Model Approval

Pillar 2
- Risk Management
- Own Risk and Solvency Assessment (ORSA)
- Supervisory powers & processes

Pillar 3
- Disclosure-Solvency & Financial Condition Report
- Market Discipline
Market value balance sheet

- Market value of assets
- Technical provisions
  - Hedgeable risks
  - Non-hedgeable risks
- Capital Requirement
  - Solvency Capital Requirement (SCR)
  - Minimum Capital Requirement (MCR)
- Free Surplus

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Technological provisions

- Realistic assumptions – no bias
- Prospective basis
- Probability-weighted expected present value
- Cash flows discounted at risk-free discount rate
- Reflect all cash in- and out-flows
- Similar to IFRS Phase 2 proposals
Capital requirements

- **2 requirements**
  - Minimum Capital Requirement (MCR)
  - Solvency Capital Requirement (SCR)

- **SCR**
  - Absorb significant unforeseen losses
  - Standard approach
  - Internal models

- **MCR**
  - Minimum regulatory capital
  - Breach triggers major regulatory intervention, possible withdrawal of authorization
  - MCR will be set at a level of approximately 33% to 50% of the SCR

Solvency Capital Requirement (SCR)

- **Framework**
  - VaR subject to ruin probability of 0.5% over 1 year (equivalent to default on a BBB-rated entity)
  - Option to use Internal Model - subject to approval
  - Total balance sheet approach

- **Standard Formula**
  - Modular and hierarchical approach with multiple aggregation levels using correlation matrices
  - Mostly based on change in net asset value
  - Combination of stress tests and factor based approximations

- **Simplifications introduced in QIS 4 for when:**
  - the types of contract are not complex and
  - the lines of business are simple by nature of risk and
  - the liability and/or risk margin is not material
Internal model approval

► Internal models require approval from the local regulator

► Proposed criteria for model approval includes:
  ► Statistical Test
  ► Calibration Test
  ► Use Test
  ► Profit and Loss attribution
  ► Validation standards
  ► Documentation standards

► Even if an internal model is used, the standard formula SCR must be calculated for 2 years

Solvency II framework: Pillar II

Pillar 1
- Technical Provisions
- MCR
- Minimum Capital Requirement
- SCR
- Solvency Capital Requirement
- Model Approval

Pillar 2
- Risk Management
- Own Risk and Solvency Assessment (ORSA)
- Supervisory powers & processes

Pillar 3
- Disclosure
- Solvency & Financial Condition Report
- Market Discipline
Summary of Pillar II requirements

► **Supervisory Review**: governance, ORSA, balance sheet components, internal models

► **Capital add-ons**: applied for weaknesses in calculations or inadequacies governance and risk management

► **Governance Requirements**: robust and documented system of governance

► **Risk Management Requirements**: covers processes to identify, assess, mitigate, monitor and report risks

► **Internal Control Requirements**: includes requirement for internal audit function

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Solvency II framework: Pillar III
Disclosure & Market Discipline

► 3 aspects:
  ► Information to submit to regulator
  ► Public disclosures
  ► Disclosures by regulators

► **Solvency and Financial Condition Report** – publicly disclosed subset of the ORSA and includes:
  ► Business overview, including performance
  ► Governance structure, especially for risk profile, and assessment of its suitability given the company’s exposure
  ► Valuation methodology and assumptions for assets and technical provisions
  ► Sensitivity and mitigation employed for each category of risk
  ► MCR, SCR, including capital add-ons and amount and quality of available capital
  ► Internal model – methodology, assumptions, validation process, differences with the standard formula

Potential Implications for Insurance Companies
Implications

There are many…here are some:

► Products
► Capital
► Risk management
► Transparency
► Organization
► Group structure

US considerations

Same as those for European insurers:

► Pricing (capital relief)
► Risk management and reporting pressures driven by European competitors
► Group structure
► Product development trends in Europe
Solvency II

Influence of Actuaries in developing
Solvency II
Group Consultatif
Group Issues

Henk van Broekhoven, Quebec June 16

Subjects

• Groupe Consultatif
• Organisation
• Solvency II issues at the moment regarding groups
• Some critiques regarding present model
Groupe Consultatif

- The Groupe was established in 1978 to bring together the actuarial associations in the European Union to represent the actuarial profession in discussion with the European Union institutions on existing and proposed EU legislation which has an impact on the profession.
- The groupe also now provides a forum for discussion amongst all actuarial associations throughout Europe.
- 34 actuarial associations from 31 European countries are represented in the Groupe. (16000-17000 actuaries)

Groupe Consultatif

- Committees
  - Education
  - Freedom and General Purposes
  - Insurance
  - Investment and Financial Risk
  - Pensions
Expected timeline Solvency II

- 2008: Directive Adoption
- 2009: Parliament & Council, CEIOPS
- 2010: CEIOPS advice on implementation measures
- 2012: Implementation (member states)

Overview of initiatives/working groups

- Parliament
- Council
- CEA
- CRO forum
- AMICE
- CEIOPS
- EU Commission
- Consultative panel
- Coor. Group proxies BE
- GROUPE CONSULTATIF
- Pillar I
- Pillar I Life
- Pillar I NL
- Pillar II+III
- Pillar II+III
- Internal models
- Internal models
- Groups etc.
- Groups etc.
Overview of initiatives/working groups

Groupe Consultatif

- The European Commission and CEIOPS request from Groupe Consultatif an independent technical advise.
Group diversification

• In the beginning not all countries/CEIOPS members were convinced that group diversification exist

• We succeeded to convince a majority using an actuarial technical explanation.

Diversification at group level

• The question is not:
  “Is there diversification at group level?”

• But more:
  “Can we use it?”
  • Can a group use the total amount?
  • How can they use it?
Diversification at group level

• Diversification is inherent to the insurance business
  – Law of large numbers
  – Unconnected risks
  – Compensation because of opposite risks (offsetting)

Bottom up approach NOT ...

[Diagram showing a breakdown of diversification at different levels, from ABCD to A, B, C, D]
Bottom up approach ... BUT

Some critiques

- The way it is set up now is not a pure bottom up approach and the grouping of the risks is not the most logical one and not in line with what most companies do
Bottom up approach

• Conclusion:
• Only correlation factors set at lowest level are unequivocal
• .. and stable over time

How to estimate the correlation matrix?

• Difficult to estimate correlation factors under for example 1 in 200 environment.
  – Historical data will not contain all possible events

• Possibility
  – Use of scientific evidence on dependencies
  – The use of expert opinion
  – Agreement needed in Industry/Regulators
How to estimate?

• Keep it simple:

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>No correlation (independent)</td>
</tr>
<tr>
<td>0.25</td>
<td>Some correlation</td>
</tr>
<tr>
<td>0.50</td>
<td>Significant</td>
</tr>
<tr>
<td>0.75</td>
<td>High</td>
</tr>
<tr>
<td>1.00</td>
<td>Full</td>
</tr>
</tbody>
</table>

We need three levels of correlation factors

• Levels:
  – between risk types within entity
  – between entities within risk type
    • often depends on geographic situation
  – between entities between risk types
    • last one can be derived from the other 2
Conclusion

• Using adjusted correlation factors is possible if only needed in one point of the distribution (1 confidence level)
• Result at confidence level close to the technical better Copula
• Tail correlation factors difficult to estimate
• So keep it simple using scenario analysis
  — expert opinion
  — agreement in market/industry/supervisory
• The importance of all the correlation factors is not the same:
  — The 10 most important factors, are often providing for more than 90% of the diversification result.

Further issues

• Group supervision
  — More political
• Impact non-EEA countries
  — Also political
  — QIS 4 used to derive impact
  — Communication EU – others needed
Further issues

• Fungibility
  – CEIOPS draft CP25 argue that the group diversification should be reduced because of a possible lack of transferability/fungibility

Fungibility, transferability

• Diversification, fungibility and transferability are separate things.
  – A lack of fungibility doesn’t impact the diversification itself but can impact the USE of diversification effects
  – A lack of fungibility can for example appear in case of blocked transfer possibilities in case of extreme circumstances.
Fungibility

- Guarantees given by the parent to the entities to provide for fungibility must comply with certain rules, but...
- ...because full fungibility can be a problem under extreme circumstances it is good to recognise the extreme event risks in the diversification system at group level.
- In that case fungibility can be controlled in the model, for example through scenario analysis (internal models) or (based on scenarios) by adjusting correlation factors in standard models.
- This is not possible in the standard model like it is now!
Actions GC regarding group issues

- CEIOPS asked GC to make a paper about fungibility, transferability, liquidity versus diversification
- Also request from CEIOPS to tell more about ways to allocate diversification effects
  - Marginal
  - Proportional
- Other work: QIS 4...; presentations/discussions in CEIOPS meetings; Consultative papers
End...

• The GC “diversification” paper can be found under:

  • http://www.gcactuaries.org/publications.html

  • Thanks!