Solvency II: Quantitative Impact Study II

Naren Persad
# Solvency II - 3 Pillar Approach

## Measurement of Assets, Liabilities and Capital
- Eligible capital
- Technical provisions
- Capital requirements
- Asset valuation
- Risks to be included
- Risk measures and assumptions
- Risk dependencies
- Calculation formula
- Internal model approach

## Supervisory Review Process
- Internal control
- Risk management
- Corporate governance
- Stress testing
- Continuity testing

## Disclosure Requirements
- Current disclosure requirement
- National GAAP
- National regulatory reporting
- Basel II
- IAIS
- IFRS 4
- ED 7
- Future disclosure requirements
- IFRS Phase 2
- Great Unifying Theory
- Private disclosure to the regulator

---

**Align risk, capital and value**

*The Actuarial Profession*

making financial sense of the future
Solvency II - structure of project

EU Commission (Internal Market's Division) / EIOPC
Insurance Solvency Committee

Calls for advice

CEIOPS

Consultation

CRO Forum
CEA

Consultation

Groupe Consultatif
Where do we stand in the project?

2005 2006 2007 2008 2009 2010 2011

- Directive Development (Commission)
- Directive Adoption? (Council & Parliament)
- Implementation? (Member States)

- CEIOPS work on Pillar I
- CEIOPS work on Pillars II and III
- CEIOPS work on Implementing Measures

- QIS 1
- QIS 2
- QIS 3
- Further QIS

- Model Calibration
Solvency II – future timetable

QIS 2 – May to July 2006 Consultation Papers
QIS 3 – April to June 2007


Target date for completion of detailed regulations 2008

Regime fully operative by 2010
A risk based solvency framework

True risk profile
SCR – internal models
SCR – standard approach
Standard rating agency models
Current Solvency I

Range of solvency measures

Increasing link to true risk profile

Future

Current situation
The major components of the framework...

- **Technical Provisions** – amounts set aside in order for an insurer to fulfil its obligations towards policyholders and other beneficiaries; includes a risk margin
- **Solvency Capital Requirement (SCR)** – level of capital that enables an institution to absorb significant unforeseen losses and gives reasonable assurance to policyholders and beneficiaries
- **Minimum Capital Requirement (MCR)** – a safety net that reflects a level of capital below which ultimate supervisory action would be triggered
- **SCR** is the first potential trigger point for supervisory intervention. The industry advocates a ladder of intervention as available capital falls from SCR towards MCR
What is a Quantitative Impact Study?

- The Framework Directive must be accompanied by an Impact Assessment
  - Quantitative Impact Studies form part of the Impact Assessment
- QIS 2 is the second QIS that ran from May to July 2006
  - Allows supervisors to understand the practicality of the calculations, potential impact on firms and suitability of the approaches suggested
  - It covers the main elements of the Solvency II framework including technical provisions, asset values, other liabilities, SCR and MCR

QIS is also an opportunity for companies to respond to emerging ideas
Challenges in designing a Standard Approach:

- Differences in products and company structures
- Differences in management discretion and policyholder expectations for participating business
- Technical challenges
  - Differences in quality and availability of data
  - How to adhere to the economic fundamentals?
  - Pragmatic but not overly complicated
- Systems / expertise challenges
  - Actuarial techniques / systems may not be as embedded in companies across Europe as it is in the UK
- Political challenges
  - Balance the requirements of the various stakeholders
## Participation UK market

<table>
<thead>
<tr>
<th></th>
<th>Life</th>
<th>Non-life</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of companies</td>
<td>Market share</td>
</tr>
<tr>
<td>QIS1</td>
<td>9</td>
<td>35%</td>
</tr>
<tr>
<td>QIS2</td>
<td>19</td>
<td>65%</td>
</tr>
</tbody>
</table>

- QIS2 participation included 6 London market insurers, 4 reinsurers, 6 mutuals
- Only 2 small companies participated
## QIS 2 - Structure

### TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Valuation Assumptions</th>
<th>Eligible Elements of Capital</th>
<th>Solvency Capital Requirement</th>
<th>Minimum Capital Requirement</th>
</tr>
</thead>
</table>

### QIS 2 Covered the Following

- Focus is on DESIGN and STRUCTURE
- Tentative calibration used
- Based on the legal entity level
- Employed both scenarios and factors
- QIS 2 spreadsheet plus additional information request

### QIS 2 Did Not Address

- Group level issues
- Fund structure and fungibility of capital
- Internal models
- Innovative forms of capital

---

*The Actuarial Profession*

*making financial sense of the future*
# QIS 2 - Structure

## Technical Specifications

<table>
<thead>
<tr>
<th>Valuation Assumptions</th>
<th>Eligible Elements of Capital</th>
<th>Solvency Capital Requirement</th>
<th>Minimum Capital Requirement</th>
</tr>
</thead>
</table>

### Description

**Assets**
- Market value or market-consistent techniques

**Technical Provisions**
- Market-consistent value for hedgeable risks (i.e. financial risks) including value of O&G
- Best estimate + risk margin using risk neutral discount rate
- Other liabilities on regulatory or GAAP basis

### Issues Arising

**Risk Margin**
- Percentile approach
- Cost of capital approach

**Other Liabilities**
- Treatment of occupational pension schemes
Percentile or cost of capital approach?

- Best estimate liability
- Transfer liabilities to a willing well diversified rational third party
- Cost of capital
- Prudence 75th percentile
- Prudence 90th percentile
- QIS 2
- QIS1
- CRO/CEA Commission original position (now modified)

The Actuarial Profession
making financial sense of the future
How to apply the cost of capital approach?

<table>
<thead>
<tr>
<th>Quantum of capital</th>
<th>Amount for non-hedgeable risks only</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exclude market and certain items of credit risk</td>
</tr>
<tr>
<td></td>
<td>Allowance for diversifiable risk</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length of time for which capital is required</th>
<th>Various options</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Run-off of the liabilities</td>
</tr>
<tr>
<td></td>
<td>Run-off of the underlying risk drivers</td>
</tr>
<tr>
<td></td>
<td>Run-off based on internal models</td>
</tr>
</tbody>
</table>

| Cost | Swiss solvency test = 6% per annum before tax |
### QIS 2 - Structure

#### TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>VALUATION ASSUMPTIONS</th>
<th>ELIGIBLE ELEMENTS OF CAPITAL</th>
<th>SOLVENCY CAPITAL REQUIREMENT</th>
<th>MINIMUM CAPITAL REQUIREMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Available capital is equal to Solvency I requirements with the following adjustments:</strong></td>
<td><strong>Issues arising</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Difference between QIS 2 value of assets and Solvency I assessment</td>
<td>- Fund structure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Difference between QIS 2 value of liabilities and Solvency I assessment</td>
<td>- Treatment of discretionary participating feature</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Available capital or liability?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- No allowance for innovative forms of capital</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
QIS 2 implies a different presentation of the Realistic Balance Sheet for participating business

<table>
<thead>
<tr>
<th>Asset</th>
<th>Shares</th>
<th>Options</th>
<th>Free assets</th>
<th>Guaranteed benefits</th>
<th>Future profit sharing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>500</td>
<td>50</td>
<td>100</td>
<td>300</td>
<td>250</td>
</tr>
</tbody>
</table>

---

The Actuarial Profession
making financial sense of the future
### QIS 2 - Structure

#### Technical Specifications

<table>
<thead>
<tr>
<th>Valuation Assumptions</th>
<th>Eligible Elements of Capital</th>
<th>Solvency Capital Requirement</th>
<th>Minimum Capital Requirement</th>
</tr>
</thead>
</table>

#### Description

- Divided into modules by risk type
- Factors and scenarios
- Full recognition for risk mitigation
- Capital requirements aggregated through correlation matrix
- The ability of future discretionary bonuses to absorb risk recognised through reduction in the SCR

#### Issues Arising

- Scenarios / Factors and the possibility of partial models
- Market stress as applied to the free assets and Unit linked business
- How to calculate the "K factor" ?

*The Actuarial Profession*

Making financial sense of the future
Structure of the SCR

In many cases both factor and scenario approaches are outlined but placeholders are generally factor approach.
Fund structure for UK life companies can be complex

Need to consider the ability to move capital and absorb risk across the various funds
Factor and scenario approaches

**Factor Approach**
- A model is factor based if the risk capital calculation uses a formula which applies fixed factors or ratios to pre-defined size drivers which act as a proxy to risk exposure.

**Scenario Approach**
- Company specific risk profile is taken into account as the impact of the scenario is measured on the company’s own balance sheet.

Why the debate?
# Market Risk – Factors and Scenario

<table>
<thead>
<tr>
<th>Factor</th>
<th>Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity Risk</td>
<td>Change in NAV following 40% equity shock</td>
</tr>
<tr>
<td>-40% * Non linked Equities</td>
<td></td>
</tr>
<tr>
<td>Property Risk</td>
<td>Change in NAV following 20% property shock</td>
</tr>
<tr>
<td>-20% * Property</td>
<td></td>
</tr>
<tr>
<td>Interest Rate Risk</td>
<td>Change in NAV for up and down scenarios</td>
</tr>
<tr>
<td>Bucket approach up and down</td>
<td></td>
</tr>
<tr>
<td>Currency Risk</td>
<td>Change in NAV following 25% foreign exchange shock</td>
</tr>
<tr>
<td>0.25 * net foreign exchange position</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Equity</th>
<th>Property</th>
<th>Interest Rate</th>
<th>Currency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Property</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest Rate</td>
<td>0.75</td>
<td>0.75</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Currency</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>1</td>
</tr>
</tbody>
</table>

**CORRELATIONS**
Market risk - issues arising

- Stressing the free assets
  - Factors and stress tests are applied to all free assets
  - Very different from ICA, RCM and Resilience test (although consistent with ECR)
  - Tends to overstate capital requirements particularly if the company has significant free assets
  - A higher SCR may result in supervisory action earlier than necessary

- Treatment of unit linked business
  - Market-consistent liability takes credit for future charges
  - Equity factors exclude the unit linked business
  - Tend to understate capital requirements for unit linked companies
# Credit Risk – Factor approach

SCR Credit Risk = MV of Exposure * Duration * Factor

<table>
<thead>
<tr>
<th>Rating</th>
<th>CEIOPS rating bucket</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA</td>
<td>I – Extremely Strong</td>
<td>0.008%</td>
</tr>
<tr>
<td>AA</td>
<td>II – Very Strong</td>
<td>0.056%</td>
</tr>
<tr>
<td>A</td>
<td>III - Strong</td>
<td>0.66%</td>
</tr>
<tr>
<td>BBB</td>
<td>IV - Adequate</td>
<td>1.312%</td>
</tr>
<tr>
<td>BB</td>
<td>V - Speculative</td>
<td>2.032%</td>
</tr>
<tr>
<td>B</td>
<td>VI – Very speculative</td>
<td>4.446%</td>
</tr>
<tr>
<td>CCC or lower</td>
<td>VII – Extremely speculative</td>
<td>6.95%</td>
</tr>
<tr>
<td>Unrated</td>
<td>VIII - Unrated</td>
<td>1.6%</td>
</tr>
</tbody>
</table>
Life underwriting risk – Factor approach

- Lapse risk
  - \(0.005 \times \text{technical provisions} + 0.1 \times \text{clawback claims}\)
- Expense Risk
  - \(0.1 \times \text{fixed expenses}\)
- Aggregation
  - Individual underwriting components are combined using a correlation matrix

<table>
<thead>
<tr>
<th></th>
<th>Volatility</th>
<th>Trend</th>
<th>Catastrophe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Longevity</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Morbidity</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Disability</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Operational Risk

- Operational risk component = \( \text{max} (A, B) \) where
  - \( A = 0.06 \times \text{Life earned premium} + 0.03 \times \text{non-life earned premium} + 0.03 \times \text{health earned premium} \)
  - \( B = 0.006 \times \text{Life technical provisions} + 0.03 \times \text{non-life technical provisions} + 0.003 \times \text{health technical provisions} \)
  - Where factors are reduced to one tenth for linked business
- Problem areas include large one off premiums
Combining the individual components

- Correlation Matrix
- Fully independent
- Fully correlated
Risk absorbing elements...

$$\text{SCR} = \text{Basic SCR} - \text{Reduction for profit sharing} - \text{Profit/loss on next year’s non life business}$$

- Reduction for profit sharing = $K \times$ provision relating to future discretionary benefits
- Expected profit/loss from next year’s non life business comprises profit/loss on premiums and surplus/deficit on run-off result
Realistic Balance Sheets and stress tests

Before Stress

Assets: 650
- Shares: 500
- Options: 50
- Free Assets: 100

After Stress

Assets: 500
- Shares: 370
- Options: 60
- Free Assets: 70

RCM = 30
Realistic Balance Sheet – Alternative presentation

**Before Stress**
- **Assets**: 650
- **Future Profit Sharing**: 250
- **Guaranteed Benefits**: 300
- **Free Assets**: 100

**After Stress**
- **Assets**: 500
- **Future Profit Sharing**: 110
- **Guaranteed Benefits**: 320
- **Free Assets**: 70
Realistic Balance Sheet – Alternative presentation

<table>
<thead>
<tr>
<th></th>
<th>Before Stress</th>
<th>After Stress</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td>650</td>
<td>500</td>
<td>(150)</td>
</tr>
<tr>
<td>Guaranteed liabilities</td>
<td>300</td>
<td>320</td>
<td>20</td>
</tr>
<tr>
<td>Future profit sharing</td>
<td>250</td>
<td>110</td>
<td>(140)</td>
</tr>
<tr>
<td>Free assets</td>
<td>100</td>
<td>70</td>
<td>(30)</td>
</tr>
</tbody>
</table>

In this scenario $K = \frac{140}{250} = 56\%$

How to calculate $k$ in the absence of agreed scenarios?
### Technical Specifications

<table>
<thead>
<tr>
<th>Valuation Assumptions</th>
<th>Eligible Elements of Capital</th>
<th>Solvency Capital Requirement</th>
<th>Minimum Capital Requirement</th>
</tr>
</thead>
</table>

### Description

- Transitional MCR based on a formula based on the Solvency I requirements is used to calculate the MCR:
  - A factor of 0.5 is applied to the result
- Post transitional MCR based on a simplification of the SCR standard formula using lower factors (around 50% of the SCR calculation for life)

### Issues Arising

- Does the formula meet the MCR requirements for
  - Simple
  - Robust
  - Objective
- Treatment of “K factor” in the MCR
- In some cases, the MCR exceeds the SCR so ladder of intervention is inverted
**QIS 2 – A step in the right direction?**

<table>
<thead>
<tr>
<th></th>
<th>Solvency I</th>
<th>QIS 2 specification</th>
<th>Risk based economic approach</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td>Book or market values</td>
<td>Market value</td>
<td>Market value</td>
</tr>
<tr>
<td><strong>Liabilities</strong></td>
<td>Prudent</td>
<td>Percentile/ COC</td>
<td>Market-consistent value</td>
</tr>
<tr>
<td><strong>Eligible elements</strong></td>
<td>Partial</td>
<td>Partial</td>
<td>Based on ability to absorb risk</td>
</tr>
<tr>
<td><strong>Risk analysis</strong></td>
<td>Basic</td>
<td>Comprehensive</td>
<td>Comprehensive</td>
</tr>
<tr>
<td><strong>Diversification</strong></td>
<td>Not addressed</td>
<td>Various options</td>
<td>Fully recognised</td>
</tr>
<tr>
<td><strong>Risk mitigation</strong></td>
<td>Partial</td>
<td>Recognised</td>
<td>Fully recognised</td>
</tr>
<tr>
<td><strong>Calibration</strong></td>
<td>Artificial</td>
<td>Further work required</td>
<td>Fully recognised</td>
</tr>
<tr>
<td><strong>Group issues</strong></td>
<td>Not addressed</td>
<td>Not addressed</td>
<td>Economic basis</td>
</tr>
</tbody>
</table>
Concern on the calibration…

- How to set k factor in absence of an agreed stress scenario?
- Relationship between factors and scenarios
- There is currently no justification or analysis behind the diversification assumptions provided
  - Perfect correlation between equity and property risk
  - High correlation between interest rate and equity risk
- Relationship between MCR and SCR unsatisfactory
- Allowance for operational risk unsatisfactory
QIS 2: What happens next?

- FSA to assimilate results from UK companies on QIS 2 and develop a country level report
- CEIOPS anticipates releasing a Consultation Paper on Design and Structure of the standard approach by late October / early November
- QIS 3 is planned for April to June 2007 which would pick up on issues identified within QIS 2 as well as Group Issues and eligible elements of capital
Conclusions

Solvency II regime could differ from current UK approach

Solvency II regime will likely be fully operative by 2010 but many key decisions will be taken in the next 12 months

QIS: Opportunity for individual companies to affect outcome and provide feedback to CEIOPS

Solvency II is a negotiation