Stress Testing and Scenario Analysis – Risk Assessment and Quantification and use in the determination of Capital

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- Philip Archer-Lock
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- Richard Shaw (Chair)
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Agenda
- When you would use Stress and Scenario Tests
- 3 Types of Model
- Risk Categories to be Stress Tested
- Aggregation
- Observations
- Key Design and Implementation Steps
- Correlation and Aggregation
- Risk measures and risk appetite
- Documentation of Individual Stress tests
When you would use Stress and Scenario Tests

- Focus is on a particular business question
  - Don’t require a full blown analysis of the company
  - Produce results quickly
  - Transparency – ease of communication of results
- ICA Calculation with no DFA Modelling
  - Don’t believe in or don’t have a DFA Model
  - Other Constraints – Business Model / Group Issues
- Fill in gaps not covered through the use of DFA Models
- Input to the design of DFA models
  - Causes / Effects
  - Correlations between risks
- Test DFA output and calibration of DFA models

3 Types of Model

- Individual Scenario Modelling (Ground-Up)
  - Specific Events e.g.:
  - Pharmaceutical Industry Loss
  - Specific named reinsurers become insolvent
  - Gross & Net Losses at a prescribed ruin probability
  - Distribution, Simulation or Point estimate
  - Individual in isolation or with ‘Ripple’ effects over time
  - 12-months → 5 years
- Risk Category Modelling (Top-down)
  - Distribution or Simulation
  - 12-month time horizon

DFA Model

Risk Categories to be Stress Tested

- Insurance risk – Underwriting / Reserving
- Market risk
- Credit risk
- Liquidity risk
- Operational risk
Risk Categories to be Stress Tested

- **Credit Risk**
  - RI Receivables / Recoveries modelled via simulation
  - Probability of Default by Rating / Loss Given Default
  - Correlation of Default between reinsurers
  - Value in considering default of specific reinsurers
  - Reflected unique features of certain reinsurers / Transparency
  - Debtor items less easy to model - Broker balances

- **Liquidity Risk**
  - Cash available when needed. If cash shortfall then consider asset sales or capital raising
  - Judgement of costs incurred (e.g. selling)

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Risk Categories to be Stress Tested

- **Operational Risk**
  - Ground-Up approach – Individual event types
  - Working through a scenario e.g. Fraud;
  - Causes, Risk drivers and Behavioural patterns
  - Controls and Risk mitigation practices in place

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Aggregation

<table>
<thead>
<tr>
<th>Capital by Risk Category</th>
<th>Diversification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LOB / Risk Type</strong></td>
<td>Gross</td>
</tr>
<tr>
<td>Credit Risk</td>
<td>38,129</td>
</tr>
<tr>
<td>Investments</td>
<td>36,143</td>
</tr>
<tr>
<td>Casualty Insurance</td>
<td>30,979</td>
</tr>
<tr>
<td>Marine Insurance</td>
<td>5,532</td>
</tr>
<tr>
<td>Other Insurance</td>
<td>9,580</td>
</tr>
<tr>
<td>Property Insurance</td>
<td>19,684</td>
</tr>
<tr>
<td>Property Cat Insurance</td>
<td>15,887</td>
</tr>
<tr>
<td>Operational Risk</td>
<td>12,363</td>
</tr>
<tr>
<td><strong>Liquidity Risk</strong></td>
<td>2,621</td>
</tr>
<tr>
<td><strong>Total Capital</strong></td>
<td>180,605</td>
</tr>
</tbody>
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- **Capital - 100% Dependence between risks**: 180,605
- **Capital - Independence between risks**: 75,971

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Observations

- Focus
  - Understanding of business drivers
  - Risk Quantification should reflect Risk Assessment
- > 12-month (3 – 5 years) View
  - Reflect future risk e.g. ‘Soft’ market (insurance risk)
  - Demonstration of continued Solvency
- Capital Considerations & Decisions
  - How much capital do you hold now – 12-month / 3 - 5 year view
  - Transparency and ease in rolling forward to future years
- Risks
  - Data / Parameter risk – 99.5%ile
  - Model risk – e.g. Management actions

Key Design and Implementation Steps

- Establish a base level (Business Plan)
- Identify Risk
- Select Key risks for analysis
- Consider causes / effects of risks
  - Ripple effects
  - Correlations & aggregation
- Risk measure / appetite
- Identify plausible adverse scenarios
- Calculated corresponding capital requirement
- Aggregate results across risks
- Documentation

Correlation and Aggregation

- Correlations
  - Within individual risk categories
  - Between risk categories
- Approaches:
  - Scenarios
  - Correlation matrices
  - Drivers - causes
  - Past experience
  - Judgemental
  - Aggregate distributions
  - DFA
Risk Measures & Risk Appetite

- ICA has a specified risk measure / tolerance level
- Modelling for other business purposes may require other risk measures / appetites
- Choosing realistic adverse scenarios

Documentation of Individual Stress Tests

- Entity being modelled
- As at date
- Risk reference
- Stress / scenario test owner
- Scope
- Causes
- Effects
- Related risks
- Methodology / Assumptions
- Financial Impact (capital requirement / risk measure)
- Conclusions