Solvency II and Technical Provisions
What Will UK Actuaries Do Differently?

ROC Working Party

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- Susan Dreksler
- Susie Frisby
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- Ayuk Akoh-Arrey
- Elizabeth Cabrera
- Vincent Robert

To reserve stochastically, or not to reserve stochastically…

Article 76, paragraph 2: “The best estimate shall be equal to the probability weighted average of future cashflows, taking into account of the time value of money (expected present value of future cash-flows), using the relevant risk-free interest rate term structure.”

What does this mean?
Where UK Actuaries will do things differently

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<th>Other</th>
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<td>• Bad debt</td>
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<td>experience</td>
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<td>• Documentation</td>
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</tbody>
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- **Deterministic Models**
  - Can still be used – but for how long?
  - Ref. CP 39
  - Use stochastic models for checking?

- **Expenses**
  - Should be included
  - Both allocated and unallocated claims management expenses (ALAE & ULAE)

- **Reinsurance**
  - Should be gross of reinsurance

- **Uncertainty**
  - Binary events (more on later)
  - Inflation
  - Other changes in demographic, legal, medical, technological, social or economic development
  - As cash flows, uncertainty as to timing included
  - Other – already included?
  - Documentation of actuarial judgement


- **What is included?**
  - Future premium payments
  - Cash-flows resulting from future claims events
  - Cash-flows arising from allocated and unallocated claims management expenses
  - Cash-flows arising from ongoing administration of the in-force policies

- **What is NOT included?**
  - Profit in the unearned premium

- **Future Premium Payments**
  - What are these exactly?

**These are not Unearned Premiums!**
1. Valuation - Premium Provisions: a simple cash-flow example (1)

- Assume 1st July 1-year policy with uniform risk
- Payments are paid in the month following the end of the quarter of occurrence
- No discounting / risk margins

<table>
<thead>
<tr>
<th></th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Total</th>
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<tbody>
<tr>
<td>Premiums</td>
<td>40</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>0</td>
<td>0</td>
<td>40</td>
<td>(100)</td>
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<tr>
<td>Paid claims</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>18</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>18</td>
<td>72</td>
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<tr>
<td>Cash-flow</td>
<td>36</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>12</td>
<td>28</td>
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<tr>
<td>Premium earning</td>
<td>25</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>25</td>
<td>100</td>
</tr>
</tbody>
</table>

Claim ratio = 72%
Total Premium = 100, payable by 40 on day 1 and 3 equal payments of 20 in the 1st month of the quarter

1. Valuation - Premium Provisions: a simple cash-flow example (2)

<table>
<thead>
<tr>
<th></th>
<th>Past</th>
<th>Future</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premiums</td>
<td>80</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Paid claims</td>
<td>18</td>
<td>54</td>
<td>72</td>
</tr>
<tr>
<td>Net cash-flow</td>
<td>(42)</td>
<td>14</td>
<td>(28)</td>
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<tr>
<td>Premium earning</td>
<td>(50)</td>
<td>(50)</td>
<td>(100)</td>
</tr>
</tbody>
</table>

UK GAAP Approach

Assets
Cash 82
Receivables 40

Liabilities
OS claims 68 (on earned)
UPR 50
Available Profit 14

Solvency II Approach

Assets
Cash 42

Liabilities
Claim reserve 14
Premium provision (4) = (40) + 36
Available Profit 28

Main observations
- Provisions reduce drastically
- All profit taken year 1
- Premium provision is negative
- No concept of non-monetary items

2. Binary Events

- What are they?
- How can we possibly measure them?
- How should we include them in our claims provisions?
2. Binary Events – What are they?

- **Health**
  - Nanotechnology
  - Aspartame
  - Electro magnetic fields
  - GM crops
  - Nuclear waste

- **Events**
  - Meteor strike
  - Mega Volcanoes

- **Social / Environmental**
  - Global warming
  - Polluters

- **Legislative / Political**
  - "Step change" in court rulings (e.g. Ogden)
  - "the greater good" e.g. asbestos, US Healthcare

- **Other**
  - Contract wording
  - etc.

2. Binary Events - Why Bother?

- Best estimate = Probability weighted average of all possible future cash flows
- Current methods probably underestimate a "true" mean
  - Data / parameterisation
  - Unknown unknowns
  - "Margin" used for binary events
- Binary events fill part of the gap between the current approach and the requirements

2. Binary Events – Possible Approach

- Recognise bias introduced by incomplete information
- Not new concept
  - For example, CAS working party "we are skewed"
- Relatively simple approach
  - Includes expert judgement
  - Is possible
- Assumption by line of business
  - Aggregate distribution
  - Most severe event included in estimates / data (e.g. a 1:200 year event)
2. Binary Events – What could you be missing for Latents?

- Health Warning – Illustrative numbers only – not S2 basis
- Not suggested factors

<table>
<thead>
<tr>
<th></th>
<th>Selected distribution</th>
<th>99.0%</th>
<th>99.5%</th>
<th>99.9%</th>
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<tbody>
<tr>
<td>Credit &amp; Suretyship</td>
<td>Lognormal</td>
<td>1.27</td>
<td>1.14</td>
<td>1.05</td>
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<tr>
<td>Fire &amp; other property damage</td>
<td>Lognormal</td>
<td>1.11</td>
<td>1.05</td>
<td>1.00</td>
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<tr>
<td>Health other</td>
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<td>1.15</td>
<td>1.08</td>
<td>1.00</td>
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<tr>
<td>Legal expenses</td>
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<td>1.54</td>
<td>1.37</td>
<td>1.14</td>
</tr>
<tr>
<td>MAT</td>
<td>Lognormal</td>
<td>1.11</td>
<td>1.08</td>
<td>1.00</td>
</tr>
<tr>
<td>Motor other</td>
<td>Lognormal</td>
<td>1.10</td>
<td>1.10</td>
<td>1.00</td>
</tr>
<tr>
<td>Motor TPL</td>
<td>Lognormal</td>
<td>1.32</td>
<td>1.16</td>
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<tr>
<td>Third-party liability</td>
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<td>1.12</td>
<td>1.07</td>
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<tr>
<td>NP reins casualty</td>
<td>Inverse Gaussian</td>
<td>1.36</td>
<td>1.22</td>
<td>1.05</td>
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<tr>
<td>NP reins MAT</td>
<td>Inverse Gaussian</td>
<td>1.18</td>
<td>1.10</td>
<td>1.03</td>
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<tr>
<td>NP reins property</td>
<td>Inverse Gaussian</td>
<td>1.22</td>
<td>1.13</td>
<td>1.04</td>
</tr>
</tbody>
</table>

2. Binary Events – How to allow for them?

- Be explicit
- Net vs Gross
- Premium provisions
  - Link with pricing – cat & latent loadings
  - Consistency
- Claims provisions
  - Latent loadings
  - Link with pricing?
  - Run-off over time → discounting reduces impact?
- Consistency
  - Between lines of business
  - Between claims and premium provisions
- Proportionality

2. Binary Events – Potential wider impact

- Increase links with pricing
- Profit recognition
  - Could involve initial strains
- Management awareness
  - What is the message
  - Should they care?
  - Does that make sense to worry about events that will break you
- Higher premiums?
3. Reserving Process

Data
- Quality and availability
- Higher level of data standards
- Sufficient?

Analysis
- Cultural change
- Best estimate – no margins either explicit or implicit

Validation
- Back testing
- Actuarial expected

Governance
- Greater control – peer review/external review
- Justify to regulators that Technical Provisions are adequate
- Board must demonstrate understanding and challenge of reserving process

Reporting
- External – different reserves may be reported for different purposes and jurisdictions
- Internal – may be more onerous re uncertainty and A v E

3. Reserving Process – cont’d

Documentation
- Higher standard will be required

Link to Internal Model
- Same assumptions, methodologies and final numbers
- Link to other solvency calculations

New Areas
- Expenses – ULAE and ALAE
- Lapses

Resourcing Requirements
- Solvency II reserves required from Oct 2012 – in addition to normal reporting requirements, e.g. UK GAAP
- How much extra work?

Standards
- BAS?
- What will the actuarial function sign off on?

4. Other Issues

Cash Flows
- For each line of business
- Scenarios needed for differences in timing, e.g. large claims
- For each item in the provisions (claims, expenses, reinsurance recoveries, premiums, etc.)
- Does Paid pattern ever reach Incurred pattern?
- Adjustments for changes
- Sensitivity testing

Reinsurance Recoverables
- Modelled and held separately
- Own cash flows
- Reduced for counterparty default risk

Expenses
- Allocated cash flows
- Unallocated expenses – both claims and overhead
- Going concern basis or run-off
- May have to do both
Going forward

- What sort of structure (e.g., for reporting) will emerge?
- IFRS?
- Improving stochastic methods, and consider for testing purposes
- CEIOPS advice to the Commission
- Timing of finalised Level 2
- Risk margins

Top 10 things YOU will be doing differently

10. Reporting and professional standards
9. Increased frequency of calculation
8. Linking pricing, reserving & capital
7. Actuarial function
6. Processes
5. Methodology
4. Documentation
3. Expenses
2. Latent claims
1. Payment patterns / Cashflows