GIRO conference and exhibition 2010
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Equitas Part VII
Business Transfer
Overview

• The 2009 Part VII Transfer of Equitas presented numerous technical issues related to capital adequacy testing. Some of these have Solvency II implications.

• We address two such issue today:
  – Risk of reserve inadequacy over annual time horizons
  – Use of Expected Policyholder Deficit on fat tailed distributions
Our Agenda

• Background on Equitas Transfer
• Liability Modelling
• Use of Expected Policyholder Deficit
• Solvency II implications (covered along the way)
Lloyds’ s prior to 1992

Policyholders

Names

Claims handling by individual syndicates

Reinsurance to Close (RITC) arranged between Names in Closed Year Syndicates and Names in Open Year Syndicates (No joint or several responsibility)
Equitas - 1996

- Policyholders
- Names
- RITC among Names

Claims handling by EMSL

Equitas Group
Equitas - 2007: Phase I Reinsurance – Pre-Transfer

Claims handling by RMSL

Policyholders

Names

Equitas Group

NICO Reinsurance

↔ $5.7B XS liability at 31 March 2006;
Net of reinsurance;
Gross of discount
Equitas Position After Phase 1

- Probability of Equitas Adequacy 96%
- NICO limit $14.4B
- Plus Equitas Surplus = $14.6B
- Plus partial recovery from Names

Ultimate Claim Amount ($8.7B)
Equitas - 2009: Phase II NICO – Post Transfer

Policyholders

NewCo - Equitas Ins Ltd

Equitas Group

NICO Reinsurance

Names have no further responsibility under English law

$7.0B ($5.7B+$1.3B) XS liability at 31 March 2006; Net of reinsurance; Gross of discount

Claims handling by RMSL
Equitas Position After Phase 2

Cumulative Distribution of Claim Amount

Expected Ultimate Claims: $8.7B

No recovery from Names beyond NICO cover

$15.7B. Not quite 97.5%
IE Analysis

- Normally –
  - Strength of Transferee and Transferor
- This case is different as neither (arguably) meets normal solvency standards
- Therefore, assess the extent to which policyholder position is better or worse as a result of the transfer
  - Is it ‘better’ on average?
  - Extent to which any group is worse off?
## Winner and Losers – Key Variables

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
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<tbody>
<tr>
<td>Stochastic Model</td>
<td>Liability amount, timing of default, timing of payments</td>
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<tr>
<td>Coverage Model (Shortfall given default)</td>
<td>Equitas Surplus (timing)</td>
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<td>Recovery From Names</td>
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<td>Mortality (timing)</td>
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<td>Fragmentation (liability size, timing)</td>
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<td>Policyholder types</td>
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<td>Measurement Criteria</td>
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<tr>
<td>Stress Testing – Liability and Other Assumptions</td>
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Liability Model – General Issues

Equitas liabilities particularly difficult to work with:

• Extremely long tail
• Timing and inflation
• Data limitations
• Many sources of material uncertainty, including
  – Judicial and legislative risk
  – Asbestos
  – And not only asbestos…
• On the other hand, outwards recoveries and asset returns somewhat less problematic
Liability Model – Modelling Issues

• Choices about modelling complexity:
  – Needed reliable output, including (especially) in the tail
  – While sufficiently simple, easy and fast to modify and run
  – Proportionate and fit for purpose
  – Policyholders security affected by timing and DIR/RI category but not by class of business

• Decided to simulate claims at aggregate not class level

• First step modelling and calibration of aggregate distribution from individual classes

• Then model through simulation emergence of uncertainty over time
Ultimate Loss Distribution

- Calibration of ultimate loss distribution arrived at in steps
  - Lognormal distributions fitted to individual classes (mean, 75\textsuperscript{th} pct)
  - Aggregation using different correlation matrices
  - Compared to internal and external benchmarks
  - Also checked tail and probability of insolvency against risk analysis of potential drivers of extreme deterioration
- Inevitably, process heavily based on professional judgement
Liability Model – Stochastic Simulations

- Three sources of variability in the model:
  - Liability shocks (most important by far)
  - Inflation and
  - Randomly selected payment patterns
- Liability shocks as lognormal random walk (smoothed)
  - Annual shocks from constant lognormal, acting cumulatively on residual reserves and cashflows
  - Reflecting path dependence of impact of major drivers for long tail liability classes (e.g. legal and judicial change)
- Simple model, with residual reserves over time (essentially) unbiased estimate of future liabilities
Liability Model - Outcomes

• Model output – reserves and cashflows over 50 periods x 25,000 simulations
• Parameters chosen so that distribution of ultimate outcomes appropriately matched target distribution
  – Mean and coefficient of variation, but also checked other measures (higher percentiles, skewness, kurtosis)
• Ultimate (log) liabilities are weighted sums of annual shocks
• Difficult to study analytically
  – Checked actual best fit distribution (generalised extreme value, Frechet),
  – Looked at properties of excess shortfalls (E[X-x | X>x])
  – Found to be appropriately fat-tailed
Tail Liabilities – Excess Shortfalls

Tail Liabilities and Associated Expected Shortfalls - Actual vs Fitted Distributions

Selected liability values are the 90th, 92.5th, 95th, 96.5th, 97.5th, 98th, 99th and 99.5th percentiles of each distribution.

- Actual Simulated Liabilities
- Fitted Beta Distribution
- Calibrated Lognormal (method of moments)
- Fitted Inverse Gaussian Distribution
- Best Fit: Generalised Extreme Value

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Annual and Ultimate Variability

- Simple model structure, easy to compare annual and ultimate variability
- Influenced by pattern of future payments
  - One extreme, pay all in year 1 (equal variabilities)
  - Other extreme, pay all in year 50 (ultimate variability of log reserves about 7 times higher than annual)
- Realistic cases somewhere in between
- In our model, variability of ultimate reserves at end of year 1 is about 40% of ultimate variability in year 50
- Implies year 1 97.5\textsuperscript{th} percentile about 2/3 of year 50 ultimate, 99.5\textsuperscript{th} percentile just over 50% of ultimate
Solvency II Perspective

Variability in “normal’ case
• Bootstrapping driven by observed data
• Correlations at least in part based on actual data

Variability in Equitas Context
• Stochastically driven, rather than historical triangle driven
• Selected variabilities and correlations highly judgmental

Further aspects will be discussed in workshop
**Winner and Losers – Key Variables**

- **Stochastic Model**
  - Liability amount, timing of default, timing of payments

- **Coverage Model (Shortfall given default)**
  - Equitas Surplus (timing)
  - Recovery From Names
    - Mortality (timing)
    - Fragmentation (size, timing)

- **Policyholder types**
- **Measurement Criteria**
- **Stress Testing - Liability and Other Assumptions**
Policyholder Groups

- All Policyholders
- All Direct Policyholders
- All Reinsurance Policyholders
- Long-tail reinsurance Policyholders
- Long-tail direct policyholders
Measurement Techniques

- Probability that claims are paid in full

- If not paid in full, probability that policyholder is ‘better off’ vs. ‘worse off’

- Expected policyholder deficit
Evaluation Criteria

- “Not disadvantaged”
- Not materially disadvantaged
- Possibly materially disadvantaged
# Evaluation Standards

<table>
<thead>
<tr>
<th>PH Position</th>
<th>Better vs. Worse</th>
<th>Policyholder Deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better off</td>
<td>Prob {Better} &gt; Prob {Worse}</td>
<td>EPD \leq 0%</td>
</tr>
<tr>
<td>Not Materially Disadvantaged</td>
<td>Prob {Worse} – Prob {Better} &lt; 0.5%</td>
<td>Truncated EPD \leq 0% Excluding 0.5% of the worst scenarios</td>
</tr>
<tr>
<td></td>
<td>A “Solvency II standard”</td>
<td>A “modified Solvency II standard”</td>
</tr>
<tr>
<td>Possibly Materially Disadvantaged</td>
<td>Greater differences</td>
<td>Greater differences</td>
</tr>
</tbody>
</table>

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Variations in Assumptions

• Size of liability
  – Base mean vs. higher mean
  – Base variability vs. higher variability
  – Higher mean and higher variability
Distributions of Potential Shortfalls – Base Liability Assumptions

Sig Effect on EPD
Distributions of Potential Shortfalls – High Mean/High Variability Liability Assumptions

Sig Effect on EPD

Proportion of Simulations

Shortfall ($bn)

Current Structure  In the Event of the Transfer
Dividend Ratio in Event of Default

Most Problematic Scenarios
## Reverse Stress testing – All Policyholders

<table>
<thead>
<tr>
<th>Liability Assumption</th>
<th>Recovery Rate from Names</th>
<th>Change Prob Full Pay (1)</th>
<th>% better vs worse (2)</th>
<th>EPD (change) (3)</th>
<th>Truncated EPD (change) (4)</th>
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<tbody>
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<td><strong>Base</strong></td>
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<td>-0.70%</td>
<td>-0.40%</td>
<td>0.00%</td>
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<tr>
<td><strong>Higher Mean &amp; Variability</strong></td>
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<td>3.5%</td>
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<td>-1.60%</td>
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</table>
Reverse Stress testing – Long Duration Direct Policyholders

<table>
<thead>
<tr>
<th>Liability Assumption</th>
<th>Recovery Rate from Names</th>
<th>% better vs worse (1)</th>
<th>EPD (change) (2)</th>
<th>Truncated EPD (change) (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
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<td>4.00%</td>
<td>1.00%</td>
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Solvency 2 Implications

- Solvency 2 test is ‘confidence level’ 99.5% test.
- CTE(EPD) tests provide different information, but there is no agreed translation of EPD to confidence level.
- Test used for Equitas, EPD, excluding 0.5% of events, provides a possible translation.
Questions or comments?

The views expressed in this presentation are those of the presenters.

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Appendix 1 - Further Aspects of Transfer
1. Legal Issues

- Amendments to Part VII legislation
- Preserving Policyholder Security
  - Insolvency Priority – Direct vs. Reinsurance
  - Lloyd’s Obligations
  - US Trust Funds
  - US Credit for Reinsurance
- Notifying Policyholders
- Analysis of extent to which there are PH groups that are disadvantaged (IE Report)
2. IE Analysis

A. Assuming Equitas Assets are Sufficient the issues are:

• Claims handling
• Credit for reinsurance
• Regulation
• External outwards reinsurance
IE Analysis

B. Analysis considering risk of Equitas insolvency the issues also include:

- Lloyd’s obligations
- NICO security
- Trust funds
- Recoveries from Names