Annuity Provider Capital and Solvency II

World Bank, Washington D.C.

Philip Long
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Prudential plc

<table>
<thead>
<tr>
<th>Asia</th>
<th>Asset Management</th>
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<tr>
<td>PRUDENTIAL</td>
<td>PRUDENTIAL Asset Management</td>
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<td>JACKSON</td>
<td>PPM AMERICA</td>
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<td>PRUDENTIAL</td>
<td>M&amp;G INVESTMENTS</td>
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- Last year Prudential made $4.2 billion of payments on 1.5 million annuity policies in the UK
Agenda

• The retirement time bomb

• An objective and transparent approach to valuation and capital

• Developing annuity markets – how to make it work
Ageing populations…

Projection of population aged 55+

Source: Population projection: Global Demographics July 2007, Asia population data - estimates for Prudential's 12 markets
Increasing life expectancy…

Average Period Expectation of Life in the UK

Source: Interim Life Tables UK, Office for National Statistics.
Underfunding of company-sponsored pensions schemes...

Aggregate funding of S&P 500 Defined Benefit Pension Schemes 1999-2005

Sources: S&P 500, Cerulli Associates

AND PRESSURE ON GOVERNMENT-SPONSORED PAY-AS-YOU-GO SCHEMES
Positive correlation between equities and interest rates...

S&P 500 and 10 Year USD Swap Rate

Source: Bloomberg
But greater risk taking with asset-liability mismatch “bets”.

Private Defined Benefit Pension Schemes Asset Allocation 2005

- Equity, 60%
- Fixed income, 25%
- Cash, 1%
- Real estate equity, 3%
- Private equity, 4%
- Mortgages, 3%
- Other, 4%
- Mortgages, 3%

Sources: Pensions and Investments, Cerulli Associates
One approach for decision-making and allocating responsibility…

START

DON’T MESS ABOUT WITH IT

YES

DOES THIS THING WORK?

NO

YOU ARE AN IDIOT

YES

NO

DID YOU MESS ABOUT WITH IT?

DID ANYONE YOU’RE RESPONSIBLE FOR MESS ABOUT WITH IT?

WILL YOU GET A KICKING ANYWAY?

NO

YES

NAIL THE B******D

YES

DUMP IT IN THE SKIP

NO

NO

CAN IT BE FIXED BEFORE THE BOSS FINDS OUT?

NO

YOU’RE IN DEEP S**T

YES

NO

CAN YOU GET SICK LEAVE?

AWAIT BROWN ENVELOPE

YES

NO

VOMIT LOUDLY IN RECEPTION

CAN IT BE FIXED BEFORE THE BOSS FINDS OUT?

FILE IT

YES

NO

FIX IT, WHILST THE FORCE IS WITH YOU

CAN YOU GET SICK LEAVE?

WAIT BROWN ENVELOPE

END
A better approach: framework based on transparency and objectivity

JUDGEMENT, OBJECTIVE ANALYSIS AND TRANSPARENT MODELLING

BLACK BOX: “JUST TRUST ME, I’M CLEVER”
Market-consistent valuations take no credit upfront for investment returns not yet earned.
Value at Risk (VaR) economic capital for 1 year time horizon is held

### Value distribution

<table>
<thead>
<tr>
<th>Probability of Outcome</th>
<th>Value</th>
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<tbody>
<tr>
<td>TAIL PROBABILITIES</td>
<td></td>
</tr>
<tr>
<td>AA</td>
<td></td>
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<tr>
<td>BBB</td>
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- Capital required to achieve rating $K_{BBB}$
- Expected value $K_{AA}$

### Value at Risk (VaR) Economic Capital

<table>
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<th>Expected value</th>
<th>Capital required to achieve rating</th>
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<tr>
<td>$K_{BBB}$</td>
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<td>$K_{AA}$</td>
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### Risks Requiring Capital

#### Non-Market Risks

- **Non-hedgeable**
  - Mortality level, trend and cat
  - Longevity level, trend and discovery
  - Morbidity level and trend
  - Persistency (level shocks or changes to dynamic lapse curve)
  - Unit expense increases

- **Hedgeable**
  - Relatively uncommon

#### Market Risks

- **Non-hedgeable**
  - Unhedgeable interest rate risk (shocks to long end of curve)

- **Hedgeable**
  - Equity or property values
  - Credit risk
  - Market-related policyholder behaviour

### Using internal models or standard models

- Solvency II standard set at 99.5% VaR ~ BBB
Market-consistent valuation for immediate annuity cashflows… similar to valuing a bond!

Premium = Market Value of Assets (MVA)

Best Estimate Liability (BEL)

Projected payments on best estimate assumptions

Discounted at the swap curve

OPTIONS AND GUARANTEES EXPLICITLY MODELLED (E.G. USING STOCHASTIC MODELS) WHERE THEY EXIST
Market-consistent cost of VaR capital requirements: market value margin

- NO OTHER “PRUDENT MARGINS” IN THE LIABILITY, AS THIS IS THE ROLE OF CAPITAL
The market-consistent value of an immediate annuity – assets, liability and profit

- Market Value of Assets (MVA)
- Market Value of Liabilities (MVL)
- Best Estimate Liability (BEL)
- Market Value Margin (MVM)
The market-consistent balance sheet

Available for SCR/MCR

Market value of total assets (MVA)

Excess capital

Min. Capital Requirement (MCR)

Market value margin (MVM)

Best estimate liability (BEL)

Solvency Capital Requirement (SCR) - 99.5% VAR capital

Market Value of Liabilities (MVL)

Capital requirements reduced through Risk Management and Mitigation

Source: CEA and CRO Forum joint submission: “Solutions to 5 Major Issues for Solvency II”
Solvency II proposals

**Pillar 1**
Valuations and capital requirements

Harmonised standards for the valuation of assets and liabilities and the calculation of capital requirements

**Pillar 2**
Supervisory review process

To help ensure institutions have good processes to monitor and manage risks and have adequate capital

**Pillar 3**
Market Discipline and disclosure

Requirements to allow capital adequacy to be compared across institutions

**PRINCIPLES**

- **Market consistent** treatment of assets and liabilities (incl. embedded options)
- Risk-based capital requirements, including allowance for **diversification** (99.5% VaR over 1 year horizon)
- Reliance on **internal models and risk management**
- **Ladder of supervisory intervention** – MCR/SCR,
- Economic treatment of groups – group test, group support, diversification and capital mobility
Policymakers and regulators need to help make it work

• **Solvency II principles** a good starting point ✓
• Regulators must have the **necessary skills**… and pay ✓
• National collection of data to build **credible life mortality tables** ✓
• **Compulsory annuitisation** to avoid moral hazard and introduce scale of provision ✓

• Resist (natural) tendency to gravitate to more and more regulatory rules ×
• Resist arbitrary, non-economic regulatory add-ons or restrictions that can result in perverse incentives ×
• Resist diluting regulatory intervention and enforcement powers and “too-big to fail mentality” that encourages moral hazard ×
Need longer duration instruments in the capital markets

Daily trading volumes for 1, 5 and 10 year swaps in Asia

Source: JP Morgan Local Markets Guide, October 2007. According to the report, China and Malaysia have even smaller swap markets (total daily volumes USD 100m and USD 25m respectively)
Need greater liquidity in capital markets

Total daily trading volumes for swaps – Euro, US, UK, Japan, Asia

* Includes other 11 Asian markets where Prudential invests (estimated).


- Euro: $528 bn
- US: $322 bn
- UK: $124 bn
- Japan: $110 bn
- Asia (other): $10 bn

Daily Volumes, USD bn
Significant VaR capital implications for non-developed capital markets

- With an incomplete yield curve, company is exposed to reinvestment risk after year 5
- Non-hedgeable VaR capital for incomplete capital markets determined by shocking the reinvestment assumptions after year 5 and recalculating the assets and liabilities on this basis
  - VaR capital is given as the difference between the best estimate and worst case
- The introduction of 10, 20 year etc instruments will reduce the reinvestment risk and therefore the non-hedgeable risk capital
Develop products addressing variation in mortality cross-subsidy

Mortality cross-subsidy by age for an Annuity

- Flexible retirement income account solutions giving income, investment and death benefit choice and flexibility
- Death benefit more valuable – so delay/phase full annuitisation
- (Compulsory) full annuitisation to secure guaranteed lifetime income
- Longevity risk absorbed by capital markets and insurers
- Further help with tail longevity risk from government

Source: Prudential analysis using 100% PNMA00 medium cohort, 2007. Male aged 65 purchasing an annuity with no death benefit of $7,773 per annum for $100,000
**Conclusion**

**Today’s Retirement Time bomb**
- Sbbbbbbbbbbbbbtick your head in the sand and hope for the best

**Framework for retirement provision and solvency**
- Transparent and objective approach to value, capital and risk
- Takes into account current state of capital markets but creates correct incentives for future development of such markets

**Who bears the retirement risk?**
- Corporations and governments
- Individuals / insurers
- Purchase reliable security (longevity and income) at an appropriate price – compulsory and optional elements
- Governments can take extreme tail risk

**Impact on individuals**
- Individuals delegate their retirement responsibility
- Open secret “My DB plans and/or social security won’t pay for my retirement”
- Enhances individual choice and responsibility towards risk and return
- Good Asset-Liability Management starts at home

**Our Vision… and how to make it work**
- MAKING EMPTY PROMISES WILL ULTIMATELY BE DETRIMENTAL TO SOCIAL BENEFIT