Longevity risk: new solutions for an age old problem

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Agenda

1. Longevity risk

2. Retirement landscape in SA

3. Enhanced annuities

4. Institutional longevity risk management

5. Conclusion
Longevity risk - complex interaction of various factors

“Something’s just not right—our air is clean, our water is pure, we all get plenty of exercise, everything we eat is organic and free-range, and yet nobody lives past thirty.”
Increasing life expectancy

Life expectancy at birth

Source: World Bank
Pensioner life expectancy

UK life expectancy at age 65

SA: PA(90) gives males ~16yrs, females ~20yrs

Source: Hannover Re
Longevity risk

- More than just the risk of “living too long”
  - Healthy life: Living longer than expected = risk of running out of savings
  - Sick life: risk of poor value for money in guaranteed annuity + risk of living too long if living off savings

- Compression and expansion of morbidity
  - future years that are going to be spent dependent on care

- Institutions’ existing liabilities potentially uncertain:
  - Uncertainty of level of future mortality & improvements
Longevity risk

Increase in PV of liabilities at various levels of mortality improvement

- 100% of PA(90)
- 0% improvements
- 2% real discount
Longevity risk in the news

‘Americans living longer and healthier lives’ (www.worldhealth.net 17/10/2013)

University pensions black hole ‘even worse than thought’ (www.bbc.co.uk 24/10/2013)

Pension scheme deficits up ‘at worst time’ (www.bbc.co.uk 9/4/2013)

Pension scheme deficits still widening at top UK companies – report (Reuters 6/8/2013)

BDP offloads ‘unaffordable’ £88.3m pension deficit (www.architectsjournal.co.uk 9/8/2013)

Cadbury blames scheme deficit for cutting pensioner hampers (www.professionalpensions.com 16/8/2013)

Deficit widens at BT Pension Scheme as liabilities grow (www.ipe.com 13/5/2013)

Warning over final salary schemes as combined pension fund deficit grows (www.theguardian.com 14/5/2013)

UK DB pension scheme deficits up to £257bn (www.theactuary.com 13/5/2013)

Serco pays £17m to fund deficit, close defined benefit pension fund (www.ipe.com 30/8/2013)

BP offloads ‘unaffordable’ £88.3m pension deficit (www.architectsjournal.co.uk 9/8/2013)
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SA landscape

- Typical 3 pillar system found in many countries

- Mandatory annuity purchase for pension funds and RAs
  - 2011: ~R31bn market (2003: R8bn)

- Options fairly simple:
  - Guaranteed/conventional annuity
  - Living annuity ("ILLAs")
  - % of single premiums used to buy guaranteed annuities:
    - 2003: 50% of single premiums
    - 2011: 14% of single premiums used to buy guaranteed annuities
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Introduction to enhanced annuities

• Underwriting for traditional life cover is well established
  • Medical history, education, income, occupation all used to categorise and rate risks.

• Traditionally different approach for prospective annuitants
  • Annuity rate will be a function of lump sum amount, age, gender, prevailing interest rate term structure
  • Puts individuals in poor health (relative to the annuitant basis) at a disadvantage
Introduction to enhanced annuities

• How big is the difference in mortality?

(Bob, aka Mr. Whisky) vs. (John & Joan the joggers)

• We can attempt to decompose the basis:
Components of the annuitant basis

All annuitant mortality - males

$q_x$ vs Age
Components of the annuitant basis

Annuitant mortality relative to basis- males

~25-30% of lives

% of original basis

Age

Healthy Non-Smoker  Unhealthy Non-Smoker  Healthy Smoker  Unhealthy Smoker
Potential for enhanced income

- What does this mean? Show me the money:

Annuity values at various levels of adjustment to PA(90)

- 100% of PA(90)
- 1% improvements
- 2% real discount
Development of EA market

**Impaired Annuities:**
- Initial target market were individuals with significantly reduced life expectancy
- Detailed and high underwriting costs

**Select Annuities:**
- Based on occupation and postcode
- No medical underwriting
- Yes / no decision

**ALSO Smoker and Health Indicator Annuities:**
- Limited number of simple questions + simplified underwriting
- Yes / no decision

**Level Concept Annuities:**
- Easy to answer medical questionnaire
- Automated underwriting systems
- Guaranteed quotes provided in short time
- Increase in annuity depend on impairment type and severity level

Progressed to almost full individual consideration now
- Common quotation form (www.commonquotation.co.uk)
Introduction to enhanced annuities

**Enhanced annuity volumes (UK)**

- **First automated u/w system**
- **Standard annuity providers entering EA space**

- 2012: EAs of 4.48bn GBP = 20% of annuity market

Source: Towers Watson
Underwriting of enhanced annuities

- Underwriting revolves around establishing:
  - the **severity** and **permanence** of current conditions

<table>
<thead>
<tr>
<th>Framework</th>
<th>Example 1</th>
<th>Example 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>What happened?</td>
<td>Heart Attack</td>
<td></td>
</tr>
<tr>
<td>When?</td>
<td>Twice: 1 year ago and 6 years ago</td>
<td>Once, 8 years ago</td>
</tr>
<tr>
<td>Any procedures?</td>
<td>Triple bypass</td>
<td>None</td>
</tr>
<tr>
<td>Recently hospitalised?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Current symptoms</td>
<td>Weekly chest pains</td>
<td>No pain</td>
</tr>
<tr>
<td>Related issues</td>
<td>Stroke (5 years ago) and high cholesterol</td>
<td>Normal cholesterol</td>
</tr>
<tr>
<td>Other info</td>
<td>Heart EF &lt; 30%</td>
<td>Heart EF &gt; 40%</td>
</tr>
</tbody>
</table>
Underwriting follow up

- Risk of misrepresentation
- Design allows for recalculation of annuity
- Experience has shown trend of understatement of health
- Underwriting follow-up may be random, e.g. 20% of cases
- Obtaining all the medical information can be challenging
Actuarial considerations

Derivation of disease specific survival curves

Survival probability

Age

ELE

MPLE

Healthy Life

2013 Convention 31 Oct & 1 Nov
Actuarial considerations

Derivation of disease specific survival curves

Survival probability vs Age

- Healthy Life
- Heart Attack

ELE
MPL
Actuarial considerations

Examples of different survival curves shapes

Survival probability

Age

Healthy Life  Diabetes  Cancer
Sample improvements (UK)

- Comparison of some recent enhancements in amounts, relative to a market (all lives) basis:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Healthy</th>
<th>Market Basis</th>
<th>25/day heavy smoker and overweight</th>
<th>Diabetes (15yrs), insulin dependent, retinopathy</th>
<th>Lung cancer, lymph node metastases, on chemo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase relative to base</td>
<td>-3%</td>
<td>--</td>
<td>5%</td>
<td>16%</td>
<td>71%</td>
</tr>
</tbody>
</table>
Future of enhanced annuities in SA

- South Africa already has an enhanced annuity provider
- Long-term interest rates in SA still much higher than UK
- Possible market fears to introducing product:
  - Effect on existing book
  - Complicated bases for valuation
- Will the default options referred to in the pension reform present an opportunity?
- Immediate needs annuities
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Holders of longevity risks

- Pension liabilities held by pension funds, corporates or insurance companies

- Substantial longevity risks can be held outside of the insurance industry

- Corporates and pension funds often seek to lay off parts of the risks inherent in the liabilities
Pension fund options

- **Buy-out**
  - Assets and liabilities are transferred to an insurer
  - Insurer responsible for transferred risks
  - Scheme wound up

- **Buy-in**
  - Assets are used to buy an insurance policy
  - Longevity risk is transferred to the insurer

- **Longevity swap**
  - Regular exchange of premium and claims
  - Pension fund retains the assets
Longevity swaps - the model

- Swaps often sit at the back end of another deal:

  - **Pension Scheme**
  - **Monthly payment for life**
  - **Pensioner**

  - **Transaction between Pension Scheme and Insurance Company**

  - **Insurance Company**
  - **“Floating Leg”, Claims Monthly Payment for life**
  - **Reassurer/Bank**

  - **Fixed monthly payment**
  - **“Fixed leg”, Premium + fee**
Swap mechanics

- The cost/spread is a % of the expected amount
Swap mechanics

- Swap provider will conduct an analysis of the mortality experience of the group of lives in question.

- Set a mortality basis with reference to:
  - Socio-economic class
  - Industry (blue vs white collar)
  - Anticipated mortality improvements

- Produce survival probabilities ($tP_x$) for each life in fund at each future duration.
Other considerations

- Historically only an option for the bigger funds, but recent deal sizes are decreasing
- Attractive for schemes that do not wish to hand over all their assets as with a full outsourcing/buy-out
- Deal durations can be long → security required
  - Often collateral is posted with expected net recipient of cash flow
Features of transactions

• Asset, inflation and deferred risks not covered

• Structure can deal with payments that are not level
  • e.g. CPI-linked or fixed benefit increases.
  • Both legs of the swap adjusted at the same time

• Profile of spouse/proportion married typically deemed a “biometric” risk that will be assumed

• Recapture at long durations

• Debates around mortality improvements
UK buy-in, buy-out and longevity swap volumes

- Buy-out, Buy-in
- Longevity swap
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Conclusion

- Increasing life expectancy presents both risk and opportunity
- We believe there are some products available to give better value and more certainty to policyholders and funds:
  - Enhanced annuities & Longevity swaps
- Expertise and capacity exist in SA to bring these solutions to market