Living longer: products, problems and possibilities

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Outline

- What do we know of life expectancy?
- How do we presently deal with it?
- Problems in the market
- Possible solutions
What do we know of life expectancy?

- Developed economies:
  - Male life expectancy over 75 in most OECD countries, an overall increase of 12% since 1960
  - Combined with a drop in fertility rates, aged dependency ratios set to increase from 23% today to 42% in 2030!

- Asia: Life Expectancy has moved from 41 (1950) to 61 (1980)

- China:
  - Male: 39 (1950) to 64 (1980)
  - Female: 42 (1950) to 67 (1980)
Increasing longevity

Statistics on survival probability

Survival Probability to age 90 for at least one member of couple: Male 65/Female 60

Source: Authors’ calculation based on mortality rates and 100-year improvement factors reported in Australian Life Table 2000-02.
Percent 65+, 2000

Toshiko Kaneda http://www.prb.org/images3/PercentElderly2050.gif
What we do not know: life-expectancy uncertainty

<table>
<thead>
<tr>
<th>Life expectancy (years)</th>
<th>Baseline</th>
<th>5%</th>
<th>25%</th>
<th>Median</th>
<th>75%</th>
<th>95%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>15.1</td>
<td>20.1</td>
<td>19.1</td>
<td>18.5</td>
<td>18.0</td>
<td>17.1</td>
</tr>
<tr>
<td>Women</td>
<td>18.7</td>
<td>23.7</td>
<td>22.8</td>
<td>22.2</td>
<td>21.7</td>
<td>20.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Change (years)</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>0.0</td>
<td>+5.0</td>
<td>+4.0</td>
<td>+3.4</td>
<td>+2.9</td>
<td>+2.0</td>
</tr>
<tr>
<td>Women</td>
<td>0.0</td>
<td>+5.0</td>
<td>+4.1</td>
<td>+3.5</td>
<td>+3.0</td>
<td>+2.2</td>
</tr>
</tbody>
</table>

Note: OECD average.
Source: Baseline mortality rates from UN/World Bank database, projections by OECD
Dealing with it: traditional response

- **Personal resources**: fail to save, early retirement, no insurance, most wealth locked in the *family home*.
- **Family resources**: the child as your pension.
- **Working longer**: a “natural” solution, but institutional and maybe health status constraints
- **Social security**: usually defined benefit schemes. Many are under-funded, implying fiscal stress.
- **Occupational pension plans**: Many are insolvent and sometimes lack the annuity payout.
Dealing with it: Government response: Switch to DC

- 1981 – Chile
- 1985 – Switzerland; Netherlands
- 1986-92 – Australia
- 1993 – Argentina; Columbia, Denmark, Peru
- 1996 – Uruguay
- 1998 – Hungary; Kazakhstan; Bolivia; Mexico
- 1999 – El Salvador; Poland
- 2000 – Hong Kong; Sweden
- 2001 – Latvia
- 2003 – Dominican Republic
But what after retirement: designing payouts

- Life annuities
- Health and aged care provision
- Phased withdrawals
- Other products:
  - LTC insurance
  - Reverse mortgages
Annuities

Reasons for annuities being a small market are standard

- Asymmetric information => adverse selection
- Bequests
- “Crowding out” by age pension/safety net
- Myopia
- Other supply side issues
Example of adverse selection

Annuity purchasers live LONGER → asymmetric information. Insurers price accordingly: Money’s worth

<table>
<thead>
<tr>
<th></th>
<th>UK</th>
<th>US</th>
<th>Australia</th>
<th>Italy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pop</td>
<td>.90</td>
<td>.81</td>
<td>.91</td>
<td>NA</td>
</tr>
<tr>
<td>Ann</td>
<td>.97</td>
<td>.93</td>
<td>.99</td>
<td>.96</td>
</tr>
</tbody>
</table>
Phased withdrawals

- Allow intermittent access to capital within preset maximum and minimum limits based on life expectancy at retirement
- However little or no flexibility when near the exhaustion of resources
- Half of the retiree cohort may live longer than that predicted by the life expectancy at retirement
- No *insurance* involved
Unlocking home wealth

What is a reverse mortgage?
- Non-recourse loan, repaid with interest when home surrendered (e.g., at death)
- Costs: Loan origination, inspection to set home equity value
- Lender needs liquidity
- Reinsurance: risks include:
  - House price risk
  - Interest rate risk
  - Mortality risk
Comparing conventional and RM annuities: RM like a “family” annuity

<table>
<thead>
<tr>
<th></th>
<th>Conventional Annuity</th>
<th>RM Annuity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Premium</strong></td>
<td>Premium due up front</td>
<td>Premium due on closure</td>
</tr>
<tr>
<td><strong>Bequest</strong></td>
<td>Once for all reduction</td>
<td>Gradual reduction</td>
</tr>
<tr>
<td><strong>Payment</strong></td>
<td>Higher</td>
<td>Lower</td>
</tr>
</tbody>
</table>
What is still missing?

- Most longevity insurance products under-produced
- Stronger longevity protection markets
- Opportunities for accessing home equity
- Evidence based regulation
Popn Ageing and Financial Integrity

- Financial integrity challenged by increasing longevity in several markets
  - Annuity, life insurance, reverse mortgage, health insurance, aged care insurance, liability, auto

- Popn Aging means more longevity risk around:
  - which eventually markets and new products will move to insure, increasing risk management issues
Global picture

- Intl awareness of longevity as a risk issue
  - But little adequate modeling
  - Not up to the task of providing input to calibrate solvency criteria
  - Not up to the intent and motivation behind Basel II
A major problem: projecting life expectancy risk

- Idiosyncratic life-expectancy risk
- The average length of life of a cohort is uncertain
Future mortality

- Two views
  - Continuous improvement: mortality will decline at all ages
  - Compression view: life expectancy, fundamentally biologically fixed at some very advanced age. Yet mortality will continue to decline over a wide range of ages.
Diversifying the mortality risk

- Reinsurance
  - Cost of reinsurance has been high
  - *Just too toxic and dangerous* (Wadsworth 2005)

- Immunization
  - Survivor bonds

- Securitization
  - Heavy information requirements
Bond market

- Current stock of government and corporate bonds too small and ill-suited to this market.
- However, long-dated corporate bond issuance has overtaken that of government long-dated bonds in the UK.
To summarise:

- Most products cover only a fixed number of years – tail risk still remains.
- Well specified, robust stochastic mortality models and well defined mortality indices still not available.
- Active market for appropriate hedges to longevity risk not yet developed.
- Cost of government guarantee on longevity insurance products unknown.

⇒ No real solution to longevity insurance provision yet.

⇒ But
Possibility 1: Reverse mortgages

- Programs like Home Equity Conversion Mortgage (HECM) in the US, could be encouraged elsewhere.
- Innovations by Bluestone (‘protected equity option’) and Xcapital (incorporates eventual accommodation in a retirement home and long term health care) in Australia.
- Securitisation of RMs. Two so far: Lehman Brothers (1999) and Citibank (2001)
Possibility 2: Risk sharing

- Assign idiosyncratic risk to the insurance company and leave the systematic risk with the annuitant.
- Example: TIAA-CREF
- New cohorts to be admitted into the insurance pool.
- Payout formula must guarantee that new entrants face an ex ante expectation of an actuarially fair payout
Possibility 3: Mortality based securities

- Swiss Re mortality bond issued in December 2003
- Based on a mortality index selected on the mortality experience of the US, UK, France, Italy and Switzerland.
What is the fundamental problem?

- Lack of knowledge on life expectancy
- If we could agree on longevity projections, then instruments and products allowing diversification could be marketed
- Ignorance generates over-regulation or bankruptcy
Modeling Challenges

- Current state of the art:
  - The Lee Carter approach
  - Scenario analysis
  
  → This is not adequate for an issue of this magnitude

- We see modeling in two stages:
  - Stochastic longevity risk modeling
  - Mapping these risks into sensible decisions about solvency criteria
Modeling Longevity Risks

- Modeling changes in longevity involves:
  - Coping with extreme value risk
  - Structural breaks

- Research on stochastic errors around forecasts of mortality
  - Longevity index construction to help price survivor bonds
  - Annuitant experience data to be published as a public good
A way forward?

- And then apply the outcomes:
  - Build consensus around methodology
  - Feed the modeling into affordable mortality based financial products to diversify institutional risk
  - Use these findings to generate more realistic regulatory reserve requirements
  - Provide more confidence around outcomes to encourage devt of mechanisms to spread systematic mortality risk
Thank you

Questions?