Ultra long term financial instruments

Jens Thomsen
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Paris, 12 November 2008
Prologue

I have two messages for you today:

The positive news is that people today live longer than ever before

At the same time they may outlive their reserves and may at some point need to reduce their standard of living
Old-age dependency is rising sharply

Age distribution

Asia

Europe

North America

Source: United Nations
Longevity risk is the risk that individuals will live longer than statistically expected.

Advances in health care, nutrition and sanitation have increased life expectancy.
In particular, the increase in life expectancy at retirement age can be a challenge for carriers of longevity risk.

Source: OECD
The risk is the speed and magnitude of the change in life expectancy, not the direction.

Expected and unexpected development in life expectancy for women in Denmark:

- Uncertainty can be toxic for pension funds.
- Upward trend - challenging but manageable.
(In)accuracy of mortality assumptions

Actual and projected life expectancy at birth, UK males, 1966-2031

Source: Shaw, C., 2007: Fifty years of United Kingdom Population projection: How accurate we have been?, Population Trends, 128, Office of National Statistics
Individual’s point of view

- Live longer
  - How much longer?

- Work longer
  - How much longer?
  - Requires a labor market reform

- Save more
  - How to save?
  - Is there assets that are enough long-dated?
  - Do these assets give life-long income stream?
DK: Expected number of years with early retirement benefits and state pension for a 60-year-old, 1990-2035

Source: Labour Market Commission
Risks affecting retirement saving

- Longevity risk
- Macroeconomic risks
  - State pension
  - Occupational Pension
    - Defined benefit
    - Defined contribution
  - Private pension
    - Government budget deficit
    - Decline in corporate profits
    - Inflation risk
    - Investment risk
Types of pension plans

**Defined benefit plan**
- Benefit determined by a set formula
- Sponsor bears investment or longevity risk

**Defined contribution plan**
- Benefit depends on contributed amount and investment returns
- Retiree bears investment and longevity risk

No matter who bears the risks, instruments for investment and longevity risk bearing and hedging are needed
Government bonds with maturities over 30 years, OECD-countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Latest maturity</th>
<th>Nominal/Linker</th>
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</thead>
<tbody>
<tr>
<td>Austria</td>
<td>2037</td>
<td>Nominal</td>
</tr>
<tr>
<td>Belgium</td>
<td>2035</td>
<td>Nominal</td>
</tr>
<tr>
<td>Canada</td>
<td>2037</td>
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<tr>
<td>Canada</td>
<td>2041</td>
<td>Linker</td>
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<tr>
<td>Czech Republic</td>
<td>2057</td>
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<tr>
<td>Denmark</td>
<td>2039</td>
<td>Nominal</td>
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<tr>
<td>France</td>
<td>2055</td>
<td>Nominal</td>
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<tr>
<td>Germany</td>
<td>2040</td>
<td>Nominal</td>
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<tr>
<td>Greece</td>
<td>2040</td>
<td>Nominal</td>
</tr>
<tr>
<td>Italy</td>
<td>2035</td>
<td>Linker</td>
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<tr>
<td>Japan</td>
<td>2038</td>
<td>Nominal</td>
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<tr>
<td>Netherlands</td>
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<tr>
<td>USA</td>
<td>2038</td>
<td>Nominal</td>
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Source: German Finance Agency

Turnover rate of German federal securities 2006
Markets for long-dated bonds are small relative to the size of pension fund and insurance company portfolios

Issuance of ultra-long government bonds in UK

Yield at opening: 1,112%
Investors: 90% domestic, 66% fund managers, pension funds and insurance companies, 33% market makers
*UKDMO 22 Sep 2005*

High inflation and the regulatory demands placed on pension funds continue to create solid demand for UK inflation protection from liability-driven investors
*Risk Magazine 1 Jul 2008*

Due to pension regulations, UK pension funds are fighting for limited supply of long-dated index-linked bonds to match the duration of their liabilities
*Risk Magazine 1 Feb 2006*

Yield on 1.25% index-linked Treasury Gilt 2055
"The longest-dated sovereign index-linked bond in the world"

Source: Bloomberg
Other types of instruments for hedging longevity risk

- Longevity bonds (EIB project, withdrawn)
  - Based on survivor rates
- Mortality linked derivatives
  - Based on mortality rates
- Mortality linked securities
  - Swiss Re and Scottish Re
- Asset backed securities on basis of a pool of life insurance policies
Size mismatch

Holders of longevity risk

- Pension funds and insurance companies through provision of annuities
- Governments through state pensions
- Many companies through pension schemes

Buyers of longevity risk

- Pharmaceutical companies
- Care providers
- Asset managers
A dilemma

Life insurance and pension sector needs a very specific instrument to hedge specific risks (geographic and socio-economic diversification)

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Investors want a standardised and liquid product
## Hedging longevity

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Quality</th>
<th>Liquid</th>
<th>Hedge for basis risk*</th>
<th>Hedge for specific risk</th>
<th>Lack of correlation with other assets</th>
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</thead>
<tbody>
<tr>
<td>Ultra-long government bonds</td>
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<tr>
<td>Asset backed securities on basis of a pool of life insurance policies</td>
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<td>✔️</td>
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* i.e. imperfect hedging capacity
Role of the private sector

Advantages
- Life insurance companies are experts in longevity risks
- Why wouldn’t the natural hedgers for longevity risk issue longevity bonds?
- Lack of correlation between life expectancy and all other assets should appeal to a broad range of investors

Barriers
- Hard to find a package that appeals both sellers and buyers
- Pure longevity risk transfer is possible only when risk is fully priced
Private sector approaches in longevity hedging

- Self-insurance and implicit coverage
- Reinsurance
- Sale of external buyout funds
What could governments do?

- Issue ultra-long government bonds (taking place today)
- Produce a reliable and widely accepted longevity index to be used as a benchmark
- Issue longevity bonds (more questionable)
Government issuance of longevity bonds

Pros:
- Could provide an unbiased benchmark similar to government yield curve
- Could be a catalyst in market development

Cons:
- Governments are heavily exposed to longevity risk
Nothing is certain in life except death and taxes.
Franklin, 1789

Thank you for your attention