

Annuities and Longevity Risk

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Are annuity products needed?

- Retirement income from Social Security and/or DB occupational pensions → People annuitized
- However, reduction benefits from Soc.Sec. and shift from DB to DC → People less annuitized
- Increase need for annuity products.
- However, annuity markets remain incomplete because of demand and supply constraints

Why annuity markets are incomplete?

- Supply factors.
 - Asymmetric information → adverse selection
 - Regulation (solvency and accounting)
 - Longevity risk
- Demand factors.
 - Product design: flexibility to address timing of annuitization, bequest motives
 - Financial education: lack of understanding
 - Regulation: taxation favours lump-sums

Longevity Risk

- Uncertainty about future mortality and life expectancy outcomes – Longevity Risk (LR).
- Individuals run the risk that they run out of resources, reducing standard of living.
- Providers of DB pensions and annuities run the risk NPV pension promises will turn out higher.

LR and the annuity market

- The impact of LR on annuity payments is non-negligible
- Affects the supply of annuities because annuity providers need to hedge against this risk.
- Unfortunately, lack of instruments to hedge against LR.
- Complicating risk management by pension funds and annuity providers and hindering the expansion of the annuity market.

Structure of the talk

1. What is the impact of un-expected increases in longevity (LR)?
2. How is LR taken on board?
3. Some solutions
4. The role of governments in supporting a market for longevity hedging instruments

Longevity Risk: Is it important?

- Projections of life expectancy have consistently under-represent improvements in life expectancy.
- Unexpected changes in life expectancy of only one year can increase the net present value of annuity payments by almost 9 percent.
- Funding regulations of pension funds suggest that a deviation in liabilities calculations of more than 5% is over the acceptable margin of risk.

Type of annuities

- According to the nature of pay-out commitment
 - Fixed period annuities pay an income for a specified period of time (e.g. 10 years).
 - Lifetime annuities provide income for the remaining life of the annuitant.
- According to primary purpose (i.e. accumulation or pay-out): immediate or deferred
- Longevity risk maximum effect on deferred life-time annuities.

The impact of unexpected gains in LEx

- Increase in the NPV of annuity payments to an individual aged 70, 65, 55 and 35 in 2005.
- The payment is 10.000€ in 2005. Wages grow at 1.75%, inflation 1.75% and the discount rate is 3.5%
- Base case: using current life tables.
- Case 1: using projections of improvements in life expectancy at birth of only 1.2 years per decade.
- Case 2: life expectancy at birth increases a 2.2 years per decade.

Increase in annuity payments (%)		
Age in 2005	Case 1	Case 2
70	2.3%	4.4%
65	2.4%	5.7%
55	3.7%	7.2%
35	12.3%	23.5%

A fund (membership structure
2.5, 10, 25 and 62.5%)

Case 1	Case 2
8.9%	17.2%

The impact of unexpected gains in LEX on pension funds

- Depends on the age structure of pension funds.
- Younger pension funds are more exposed to longevity risk.
- However, older pension funds have less room for manoeuvre to deal with the costs of unforeseen increases in life expectancy.

How important is LR in perspective?

- Put LR in context
- Compare the impact of LR with that of interest rate on annuity payments
- “Amplification” effect.

Impact of longevity improvements and changes in interest rates on annuity payments

Percentage change in the net present value of annuity payments, 2005- 2090

Improvements in life expectancy	Interest rates		
	3.5	4.5	5.5
No improvements, latest available mortality table used (2005)			
individual aged 65 in 2005	118.6	108.6	100.0
individual aged 25 in 2005	254.6	158.9	100.0
Life expectancy improves by 1.2 years per decade			
individual aged 65 in 2005	122.3	111.6	102.4
individual aged 25 in 2005	312.7	192.6	119.8

Source: OECD

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How different market players account for future improvements in longevity?

- A big problem with tracking longevity risk is the fact that there is not a standard methodology for producing longevity forecasts (mortality calculations can be arbitrary).
- Governmental agencies project mortality and longevity by a mix of expert advice and extending past trends. It is a deterministic approach.
- Actuaries and insurance companies tend to use the latest available mortality tables and update only after several year (e.g. every 10 years).

How pension funds account for future improvements in longevity?

- Some pension funds tend to use current mortality tables without adjusting for future improvements in longevity.
- Others partially adjust for improvements in longevity, but they use different approaches as there is not a standard approach to account for improvement in life expectancy.
- A study by Cass Business School (2005) shows that using Danish mortality assumptions, UK pension fund liabilities turn into surplus, but using French ones liabilities increase further.
- There is not legislation requiring to fully account for future improvements in life expectancy.

Summing up

- LR (uncertainty surrounding future life expectancy outcomes) has a non-negligible impact on the NPV of annuity payments.
- There is not a common methodology to take on board LR, let alone to assess it.
- There is a lack of longevity hedging instruments

A way forward (A)

- Produce projections on mortality and life expectancy using a common methodology.
- Use a stochastic approach.
 - The CMI suggests using LC and S-splines methodologies.
- Allows the use of probabilities to assess uncertainty surrounding improvements in life expectancy. Assess risks adequately.

A way forward (B)

- Governmental agencies (National statistical institutes) have technical capability to produce them.
 - However, assumptions about overall population rather than specific populations of a certain scheme.
- Produce them for the entire population and different subgroups. Pension funds can adjust them given their current membership structure wrt the overall population structure.
- Change the regulatory framework requiring market players to fully account for future improvements in life expectancy.

Longevity hedging products

● Is there a role for governments in encouraging or promoting a market for longevity hedging products (OECD WP)?:

1. Produce a reliable longevity index to be used as a benchmark for pricing hedging products
2. Provide pricing benchmarks and liquidity by issuing LIBs (Blake and Burns, 2001)
 - Problem: governments are already heavily exposed to LR through public pensions

Governments & sharing LR

- Idiosyncratic or individual LR: is associated to each individual and it can be easily offset by pooling risks. Therefore, efficient risk sharing via financial markets (annuity markets)
- Aggregate or cohort LR: more difficult to address or hedge against, it requires inter-generational contracts, positive correlation across individuals → private market not efficient.
- Aggregate or cohort risk may require governments to promote the capital market solution to share this risk.

But ...

- Governments already bear a lot of LR in their balance sheets.
- Using the latest report from the EC on the impact of ageing on public finances, we approximate the amount of LR already in the balance sheet of governments: 1.2% of GDP
- Therefore, Governments could support the development of longevity hedging products by producing a reliable longevity index.

Conclusions

- LR has a non-negligible impact on the NPV of annuity payments.
- Use stochastic models to forecasts future life expectancy outcomes.
- They permit to attach probabilities to assess the degree of uncertainty surrounding life expectancy forecasts.
- Governments could produce a reliable longevity index to support the development of longevity hedging products



THANK YOU!

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<http://www.oecd.org/daf/pensions>

The private sector experience

- The EIB/BNP longevity bond failed to attract enough demand.
- It was not over priced (Cairns at al. 2005)
- LR is an economic risk different from interest & inflation risk.
- It is a long-term risk with low volatility.
- Regulatory requirements do not encourage to use mortality table fully accounting for improvements in life expectancy.

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The increase in the net present value of annuity payments¹

(percentage increase)

Age in 2005					Hypothetical pension fund		
25	40	55	65	70	(1)	(2)	(3)
23.6	15.3	7.3	3.3	2.4	10.4	9.6	8.2

Source: OECD calculations.

Notes: 1. Increase resulting from comparing the net present value at 2005 of annuity payments from 2005 'till 2090 when life expectancy at birth improves by 1.2 years per decade and life expectancy at 65 by 0.8 years per decade, with the NPV at 2005 of annuity payments when the latest available mortality tables (2005) are used without allowing for improvements in mortality.

(1) Membership structure in 2005: 65% aged 25-49; 20% aged 50-59; 10% aged 60-69; and 5% aged 70 or more.

(2) Membership structure in 2005: 60% aged 25-49; 20% aged 50-59; 15% aged 60-69; and 5% aged 70 or more.

(3) Membership structure in 2005: 50% aged 25-49; 20% aged 50-59; 20% aged 60-69; and 10% aged 70 or more.