Sharing longevity risk:
Why Governments should issue longevity bonds

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(Joint work with Tom Boardman & Andrew Cairns)

http://pensions-institute.org/workingpapers/wp1002.pdf

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Agenda

- Background
- The role of the private sector in hedging longevity risk and creating a market in longevity-linked transfers
- The role of the public sector in hedging longevity risk and creating a market in longevity-linked transfers
- Longevity bond structures
- Demand for longevity bonds
- Pricing of longevity bonds
- Political economy issues
- Summary and next steps
- Appendix: Support for Government issuance of longevity bonds

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Background

Four factors driving increased annuitization in UK

- The overall growth in both the number and size of defined contribution (DC) pension funds:
  - including in time Personal Accounts (NEST) from 2010
- The associated growth in the number of pensioners with DC funds reaching retirement
- The increasing demand from defined benefit (DB) plans to use annuities to back their pensions in payment
- The growing demand from DB plans for bulk buy-outs.

Annuity demand scenarios: Annual flows

	£bn		
	2002	2007	2008
Individual annuities	7.2	10.3	11.6
Drawdown	2.3	4.0	3.2
Bulk buyout	1.4	4.0	6.2

Sources: Association of British Insurers

Watson Wyatt predicts the UK 'at retirement' market for financial products to grow by 60% within five years to £24 billion a year.

Source: Watson Wyatt Press Release 2009

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Consequences and risks

- Insurance companies will see significant growth in annuities from DC plans in coming years
- Insurance companies will also play a big role in aggregation of longevity risk and providing DB pension plans with basis-risk-free indemnity solutions
- However, insufficient capital in insurance/reinsurance industry to deal with UK longevity risk:
  - £1trn+ with DB plans; £125bn with insurance companies
  - Solvency II could require insurance companies to hold significantly more capital to back annuities
- Capital markets more efficient than insurance industry in:
  - reducing concentration risk
  - facilitating price discovery

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At the same time…

- Government has to raise £703bn over next 5 years
  - and reabsorb £175bn Quantitative Easing
- It cannot do this selling only short- and medium-term bonds
- This would only delay and compound Government's problem rather than solve it:
  - wants to avoid having to refinance these loans at the same time as trying to raise new money

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So…

- Government MUST become more innovative at the long end of the yield curve
  - in order to raise debt and help pensions industry
- Government MUST issue long-term bonds in a form that the private sector would buy
- Critical role for the Government in facilitating the development of the longevity-linked capital market

Decomposition of longevity risk

Total longevity risk

=

Aggregate longevity risk

[Trend risk]

+

Specific longevity risk

[Random variation risk]

Government shares risk by issuing longevity bonds

Private sector hedges with longevity swaps

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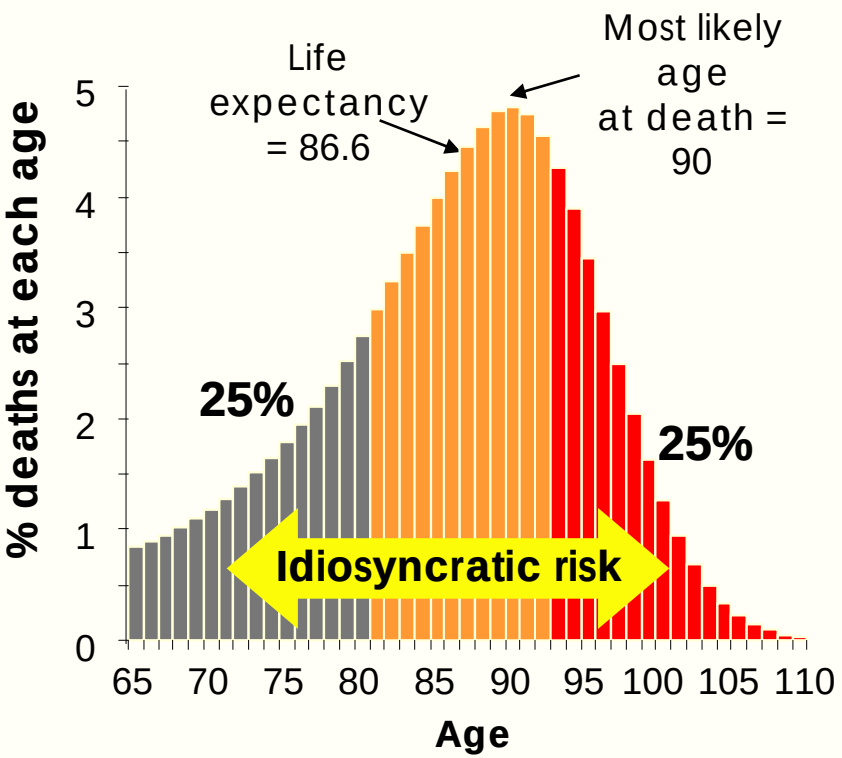
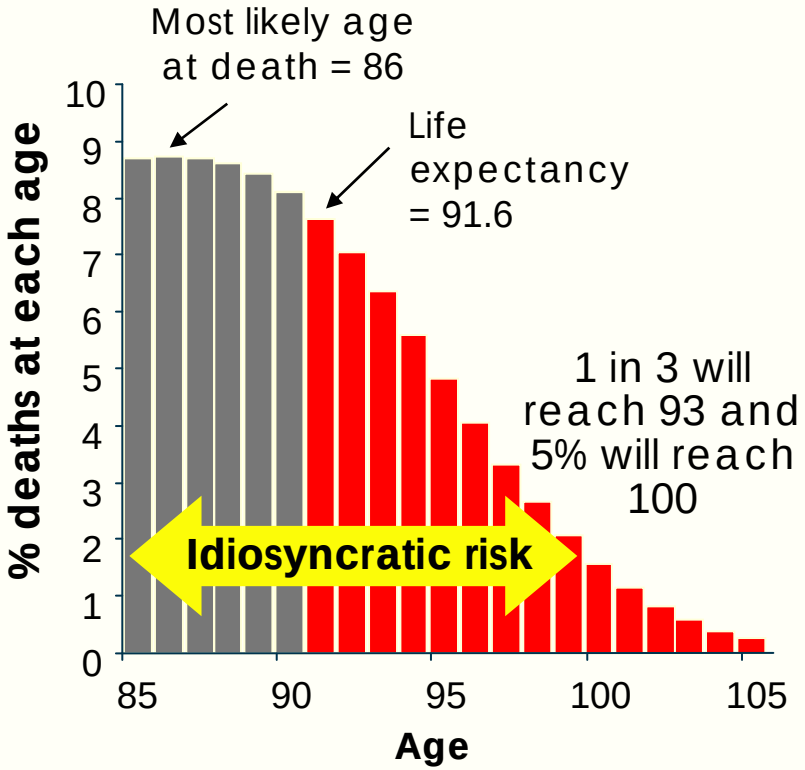
Random variation in life times

Expected distribution of deaths: male 65



1 in 1000 chance of living twice life expectancy at age 65

Expected distribution of deaths: male 85



1 in 10 chance of living twice life expectancy at age 85

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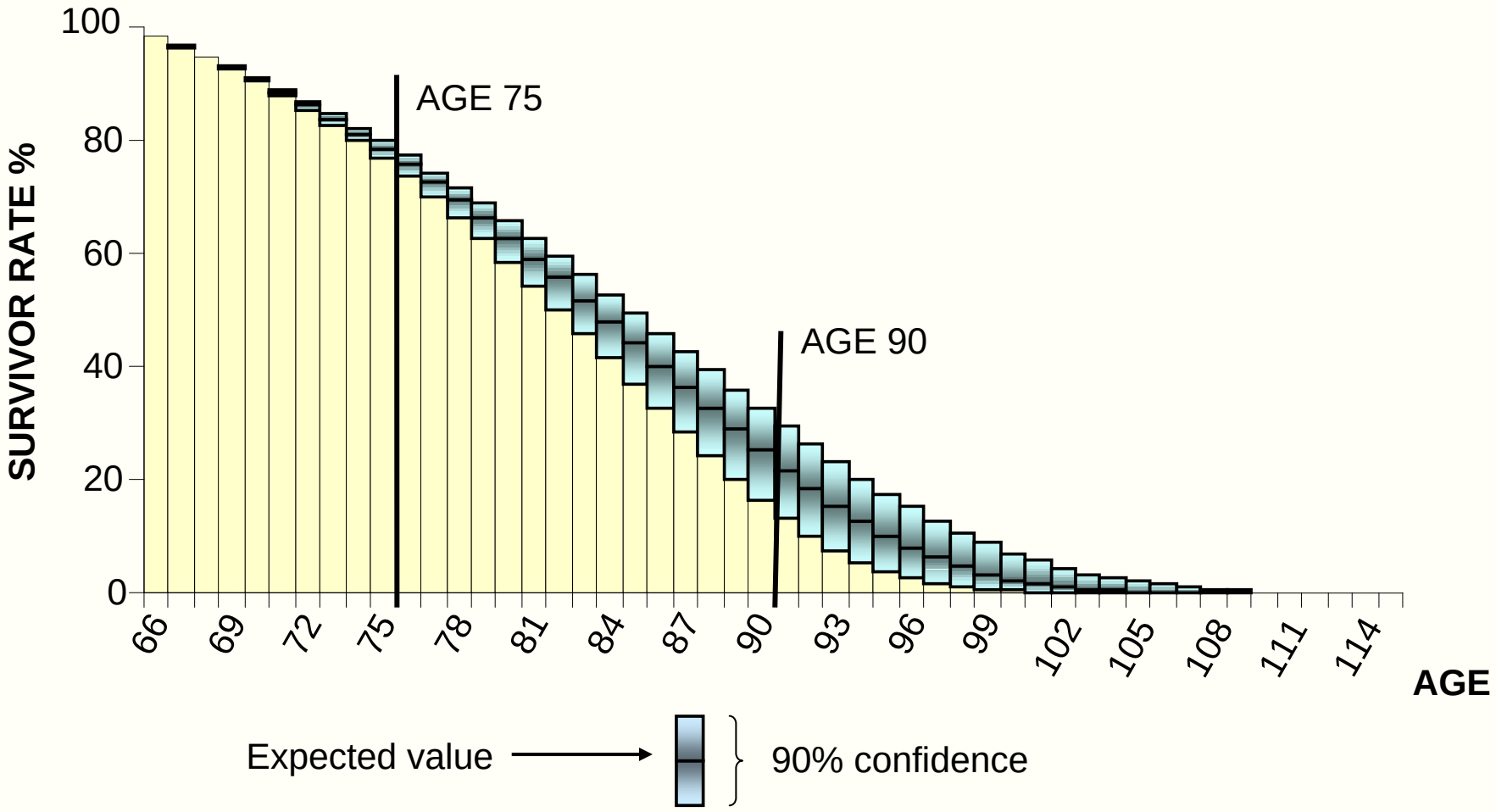
Source: 100% PNMA00 medium cohort 2007

Survivor fan chart

(Cairns-Blake-Dowd model)



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The role of the private sector in hedging longevity risk and creating a market in longevity-linked transfers

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Private sector role

- Insurers
  - annuities, aggregators, indemnifiers etc
- Investment banks:
  - act as intermediaries
  - establish indices (e.g. LifeMetrics Index)
- General investors seeking uncorrelated securities for diversified portfolios:
  - hedge funds
  - ILS investors
  - sovereign wealth funds
  - endowment and family funds
- Traders and market makers:
  - essential for providing liquidity
- Life and Longevity Markets Association (LLMA) launched in London (1/2/2010):
  - to promote the development of a liquid traded market in longevity risks
    - AXA, Deutsche Bank, J.P. Morgan, Legal & General, Pension Corporation, Prudential, RBS and Swiss Re.

The role of the public sector in hedging longevity risk and creating a market in longevity-linked transfers

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Public sector role

- There is a critical role for the Government in facilitating the development of the longevity-linked market
- Given Government's encouragement of DC pensions, it has a duty to ensure that there is an efficient annuity market
- It should also be advantageous for the Gov't to help facilitate an orderly transfer of DB pension promises to the insurance and capital markets
- Solvency II has onerous capital requirements for unhedgeable risks
- Issuance of longevity bonds would help establish longevity pricing information in the public domain
- This is important for regulators, insurers, corporate pension plan sponsors and actuaries in helping to create transparency over the price of longevity-linked liabilities
- This is analogous to the development of the inflation-linked bond market and the Government's leading role in that development

Longevity bond structures

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What is a longevity bond?

- Longevity bonds pay declining coupons linked to the survivorship of a cohort of the population, say 65-year-old males
- The coupons payable at age 75 will depend on the proportion of 65-year-old males who survive to age 75
- The coupon payments continue until the maturity date of the bond:
  - e.g., when the cohort of males reaches age 105
- A longevity bond pays coupons only and has no principal repayment

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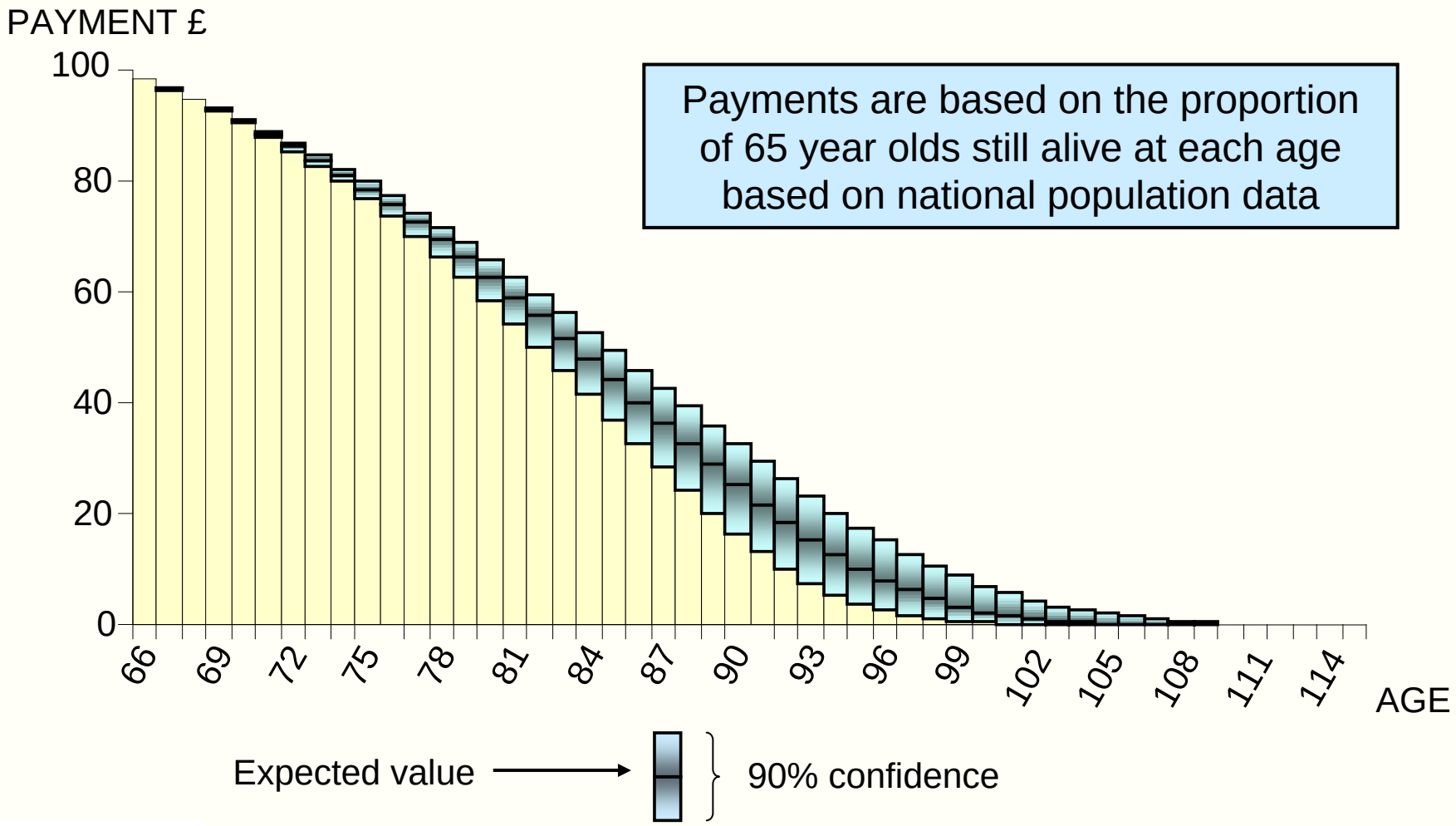
Original survivor bond



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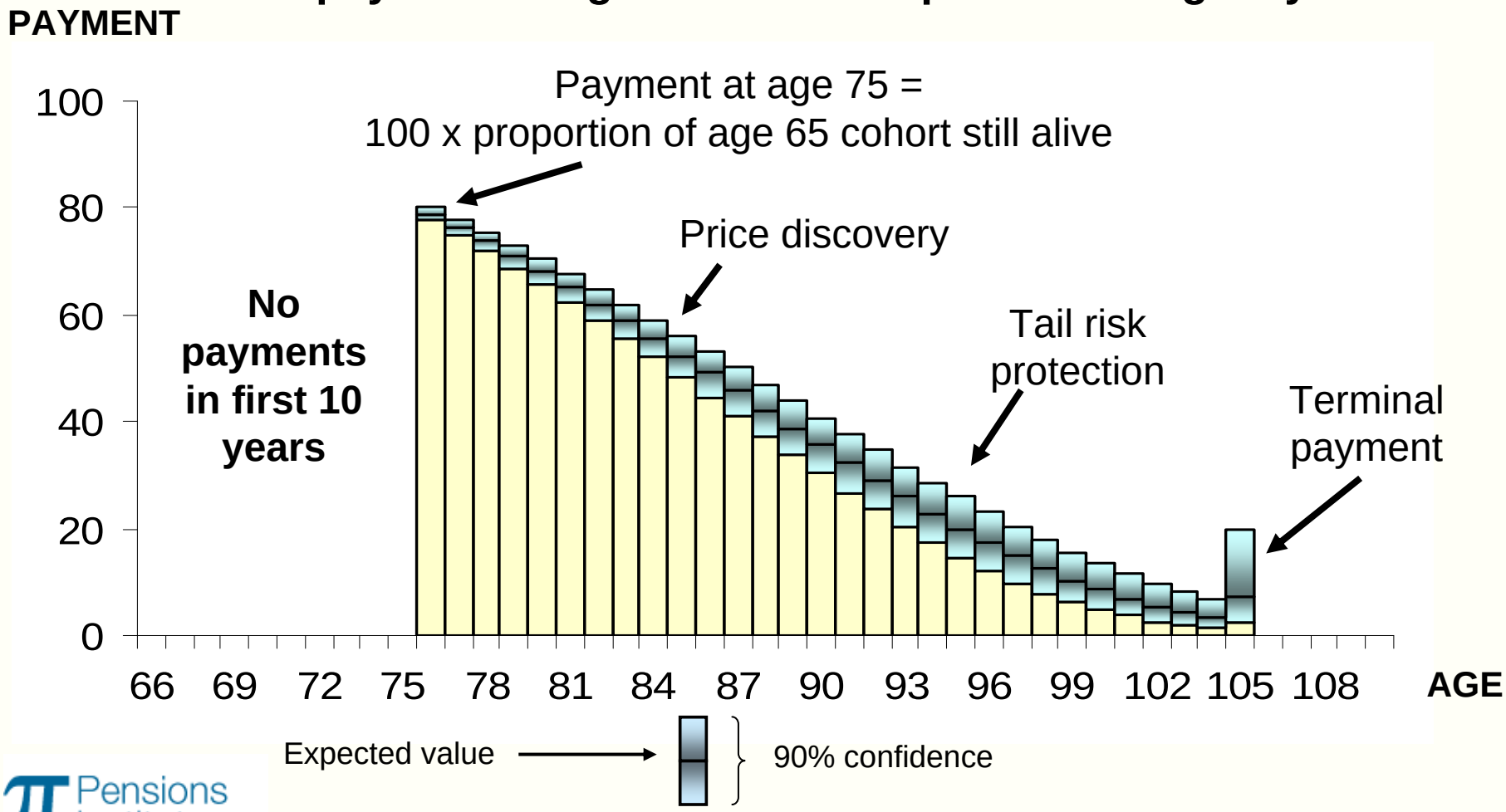
Initial longevity bonds based on experience of age 65 cohort

Longevity bond payable from age 75 with terminal payment at age 105 to cover post-105 longevity risk



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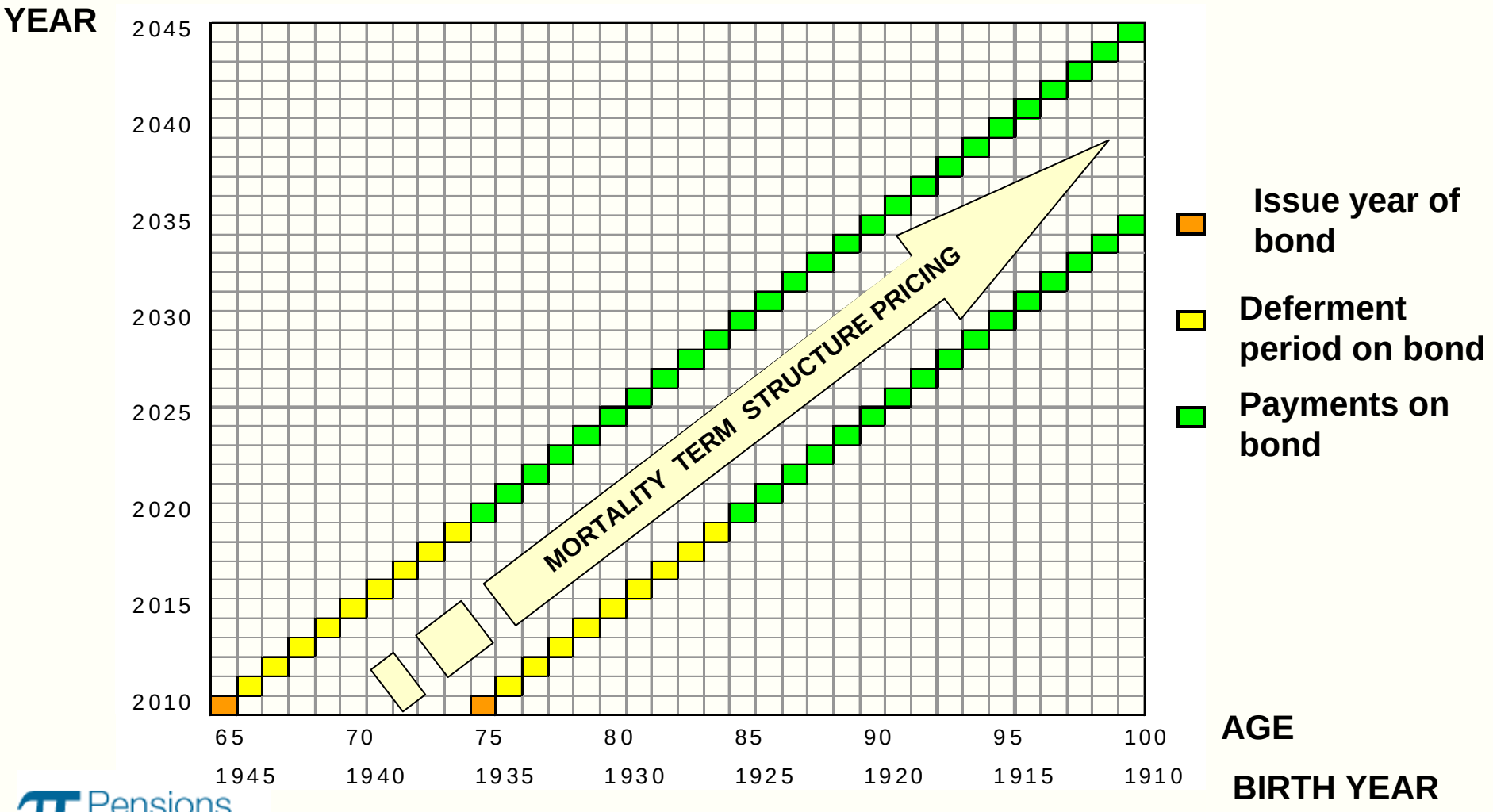
Source: Cairns Blake Dowd model

Longevity bond cash flows across ages and time will help to define mortality pricing points and encourage capital market development



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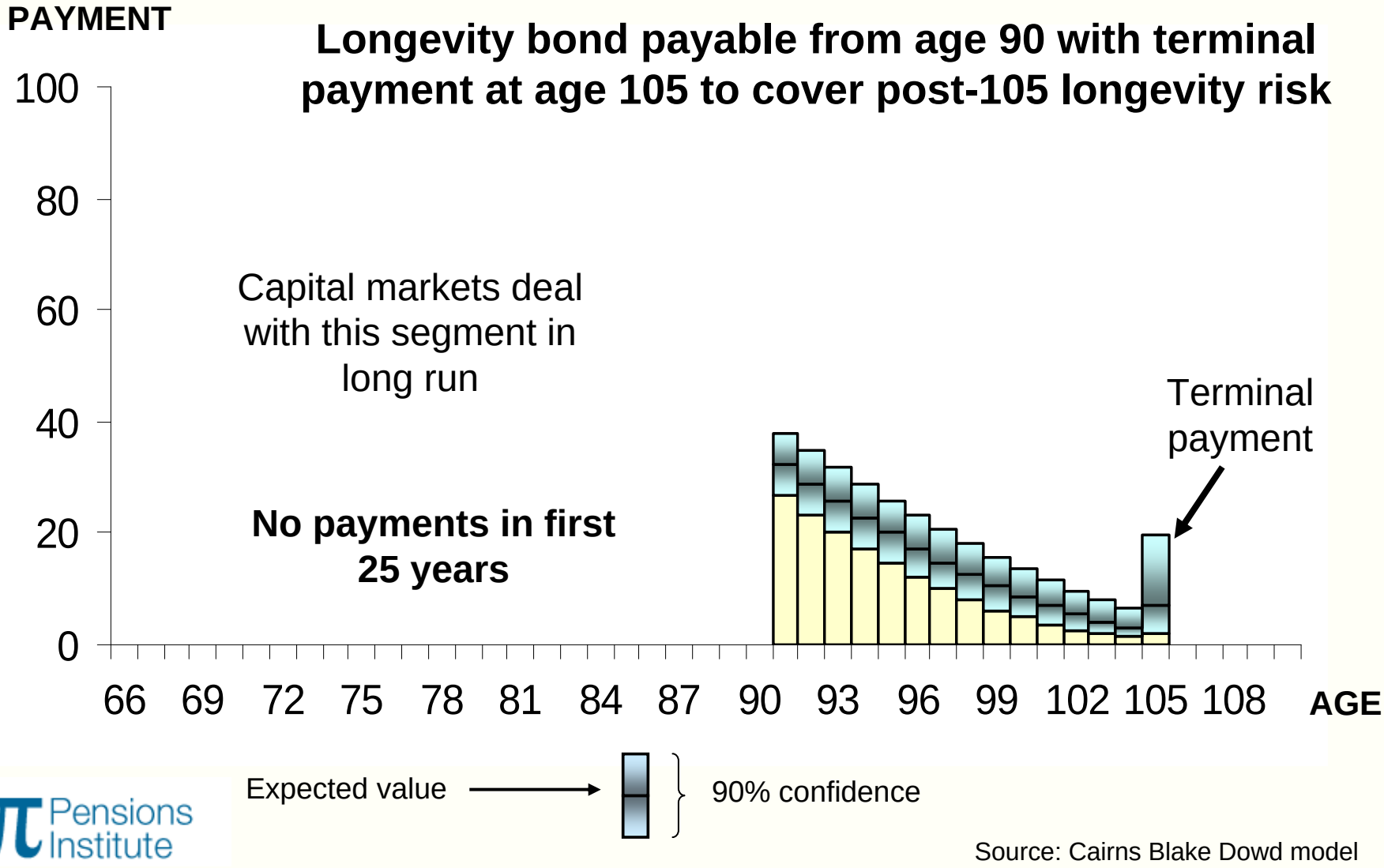
Only deferred tail longevity bonds needed from Government in long run



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Source: Cairns Blake Dowd model

Demand for longevity bonds

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Potential sources of demand for longevity bonds in UK

- DB plans
  - total pension liabilities = c.£1000bn
    - of which pensions in payment = c.£500bn
  - demand from pension plans likely to come from the largest plans
- Annuity providers
  - £125bn
- DC plans
  - total assets = c.£450bn
    - of which over age 55 = c. £150bn
  - longevity bond fund would be a useful to reduce income volatility at retirement
- Initial issuance of longevity bonds:
  - 4 bonds with 10 year deferment M65, F65, M75, F75
  - issuance small in relation to overall size of Government bond market

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Pricing of longevity bonds

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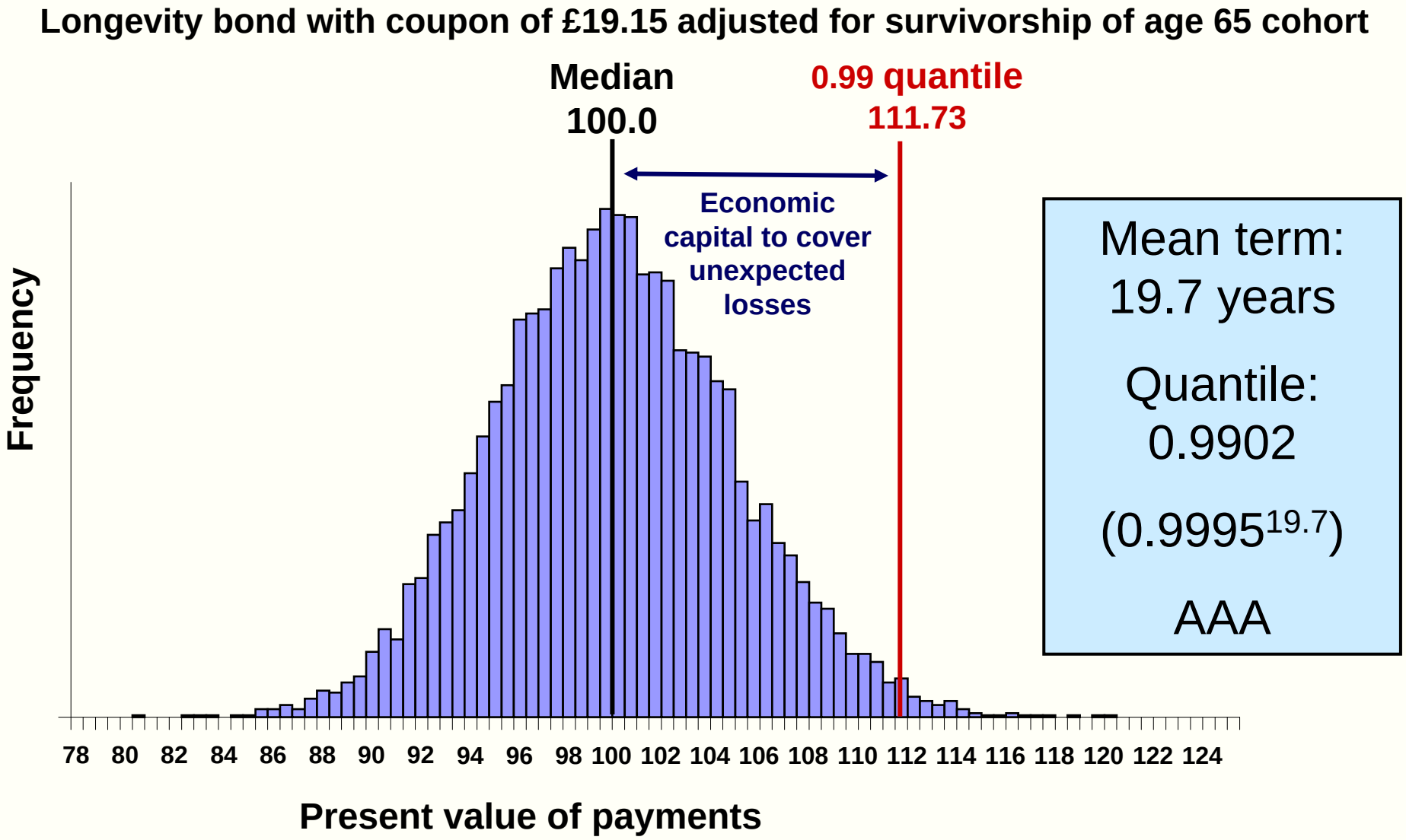
Pricing

- Aim should be to determine a fair economic price
  - intergenerational fairness
  - attract wide range of buyers
- Intention to indicate a possible approach and identify issues
- Approach builds on insurance industry cost-of-capital method
  - determine the required credit rating
  - project the longevity risk capital required for each year to maintain the required credit rating
  - multiply each annual capital requirement by a percentage cost of capital to give the cost of capital
  - calculate the present value to give the present value of the overall capital requirement.

Distribution of 10,000 scenarios of the present values of 10-year deferred longevity bond payments for males aged 65



Source: Cairns Blake Dowd model

CBD model and an insurance industry cost-of-capital method to provide some indicative risk premiums

Risk premiums and basis points reduction in yield on longevity bonds				
Bond	**2% cost of capital**		**3% cost of capital**	
	Risk premium	**Bps reduction**	**Risk premium**	**Bps reduction**
LBM(65,65)	**1.4%**	**13.4 bps**	**2.0%**	**20.0 bps**
LBM(65,75)	**3.2%**	**17.9 bps**	**4.7%**	**26.5 bps**
LBM(65,90)	**15.1%**	**48.7 bps**	**22.6%**	**70.8 bps**
LB(75,75)	**1.2%**	**16.5 bps**	**1.8%**	**24.7 bps**
LB(75,85)	**4.1%**	**27.6 bps**	**6.2%**	**40.8 bps**
LB(75,90)	**8.2%**	**42.6 bps**	**12.4%**	**62.2 bps**
Notes: The risk premium is the total for each bond. The basis points reduction shows the annual reduction from the assumed risk-free yield of 4%.				

Political economy issues

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Political economy issues

- Does Government issuance of longevity bonds just mean the nationalisation of pension plans?
- **No**
- It recognizes the role of risk sharing in society, especially intergenerational risk sharing
- It recognizes the role of Government in setting benchmarks:
  - eg, risk-free term structures for inflation and longevity
- The private sector can build on this foundation with derivative products:
  - eg, longevity swaps *cf* inflation swaps

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Objections to Government issuance of longevity bonds

- Common objection is that longevity bonds are perceived to be a one-way bet against the Government
- BUT there is no reason to suppose that the Government will continually make systematic errors in its mortality forecasts
- In equilibrium, the Government will earn the market longevity risk premium sufficient to compensate for the aggregate longevity risk it bears

Objections to Government issuance of longevity bonds

- Another objection is that the Government is not a natural issuer of longevity bonds because of its existing heavy exposure to longevity risk
- BUT Government's exposure to longevity improvements is partly hedged as it:
  - can reduce Government's pension spend and increase pre-retirement tax take by raising State pension age
  - will receive more taxation from the higher number of pensioners
  - will pay lower means-tested benefits
- ONCE Government is only issuing tail risk longevity bonds, it could become fully hedged

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Objections to Government issuance of new types of bonds

- A further objection is that longevity bonds will fragment the bond market
- But that means there can be no innovation in the bond market
- The same objection was made prior to the introduction of index bonds
- Instead the Government should try out longevity bonds
  - cost will not be high
  - total volume required is small scale relative to the size of total issuance

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Summary and next steps

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Summary:
Three key reasons why should Government issue longevity bonds

- Interest in ensuring an efficient annuity market
- Interest in ensuring an efficient capital market for longevity risk transfers
- Best placed to engage in intergenerational risk sharing:
  - will earn longevity risk premium

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Next steps

- Government recommended to establish a working party to:
  - undertake a cost-benefit analysis of the Government issuance of longevity bonds
  - determine scale of longevity risk that Governments would be assuming
  - consider actions Government can take to mitigate this risk
  - work through the practicalities of Government issuing longevity bonds:
    - reference indices; demand; pricing; liquidity and tax

Thank you!

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Appendix: Support for Government issuance of longevity bonds

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UK Pension Commission

- Pensions Commission suggested the Government should consider the use of longevity bonds to absorb tail risk for those over 90 or 95 - provided it exits from other forms of longevity risk pre-retirement:
  - which it has done by raising state retirement age to 68

"One possible limited role for Government may, however, be worth consideration: the absorption of the "extreme tail" of longevity risk post-retirement, i.e., uncertainty about the mortality experience of the minority of people who live to very old ages, say, beyond 90 or beyond 95.“

Pension Commission 2nd report, 2005, page 229

UK Insurance Industry Working Group

"Against this background, the Government could issue longevity bonds to help pension fund and annuity providers hedge the aggregate longevity risks they face, particularly for the long-tail risks associated with people living beyond age 90."

"By kick-starting this market, the Government would help provide a market-determined price for longevity risk, which could be used to help establish the optimal level of capital for the Solvency II regime of prudential regulation."

Vision for the insurance industry in 2020

a report from the insurance industry working group

July 2009

UK Confederation of British Industry (CBI)

“Government should press ahead with changes that make it more possible for schemes to adapt to changing circumstances – for instance … seeding a market for products that help firms manage their liabilities, like longevity bonds.”

“Government should drive development of a market in longevity bonds, a similar instrument to annuities, by which the payments on the bonds depend on the proportion of a reference population that is still surviving at the date of payment of each coupon. This should be done through limited seed capital and supporting policy work on the topic. Government could also consider how best to match government bond issues to pension scheme needs, including the provision of more long-dated bonds and whether government should issue mortality bonds itself.”

Redressing the balance - Boosting the economy and protecting pensions

CBI Brief May 2009

UK National Association of Pensions Funds (NAPF)

"In the current economic environment, the government must take all steps necessary to help pension scheme sponsors and pension savers. This includes ensuring the right assets are available to back schemes.“

NAPF chairman, Chris Hitchen - 25th November 2008

IMF

"With regard to longevity risk, which most insurers and pension fund managers describe as unhedgeable, some authorities have considered assuming a limited (but important) portion of longevity exposure, such as extreme longevity risk (e.g., persons over age 90).

"In this way, by assuming the tail risk, governments may also increase the capacity of the pension and insurance industries to supply annuity protection to sponsor companies, pension beneficiaries and households, and facilitate the broader development of longevity risk markets."

The limits of market-based risk transfer and implications for managing systemic risks. IMF 2006

OECD

“Governments could improve the market for annuities by issuing longevity indexed bonds and by producing a longevity index**.**”

Antolin, P. and H. Blommestein (2007), "Governments and the Market for Longevity-Indexed Bonds", *OECD Working Papers on Insurance and Private Pensions*, No. 4, OECD Publishing.

World Bank

- Proposal to underwrite longevity bond issued by Chilean government

Source: OECD seminar, Paris, 12 November 2008

World Economic Forum

"Given the ongoing shift towards defined contribution pension arrangements, there will be a growing need for annuities to enhance the security of retirement income.

Longevity-Indexed Bonds and markets for hedging longevity risk would therefore play a critical role in ensuring an adequate provision of annuities."

World Economic Forum: Financing Demographic Shifts Project - June 2009

Professor Willem Buiter, ex-Monetary Policy Committee

- "Longevity bonds index-linked to the CPI or to average earnings would be especially useful for pension funds and other institutional investors that are short longevity risk."

- "The [Treasury] can issue long-term index linkers and longevity bonds to my heart's content without crowding out any other existing or planned issuance of public debt instruments if they are willing to invest the proceeds of the additional debt issues in other securities, domestic or foreign private instruments or foreign government securities. They have to think as a portfolio manager, not just a manager of the liabilities of the government."

Source: http://blogs.ft.com/maverecon/2008/04/a-sovereign-portfolio-management-office-for-britain/, April 14, 2008

Thank you!

Longevity 6:

Sixth International Longevity Risk and Capital Markets Solutions Conference

9-10 September 2010

Sydney, Australia

http://www.longevity-risk.org/index.html

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