

Annuities:

Why they are so important and why they are so difficult to provide

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June 2011

Agenda

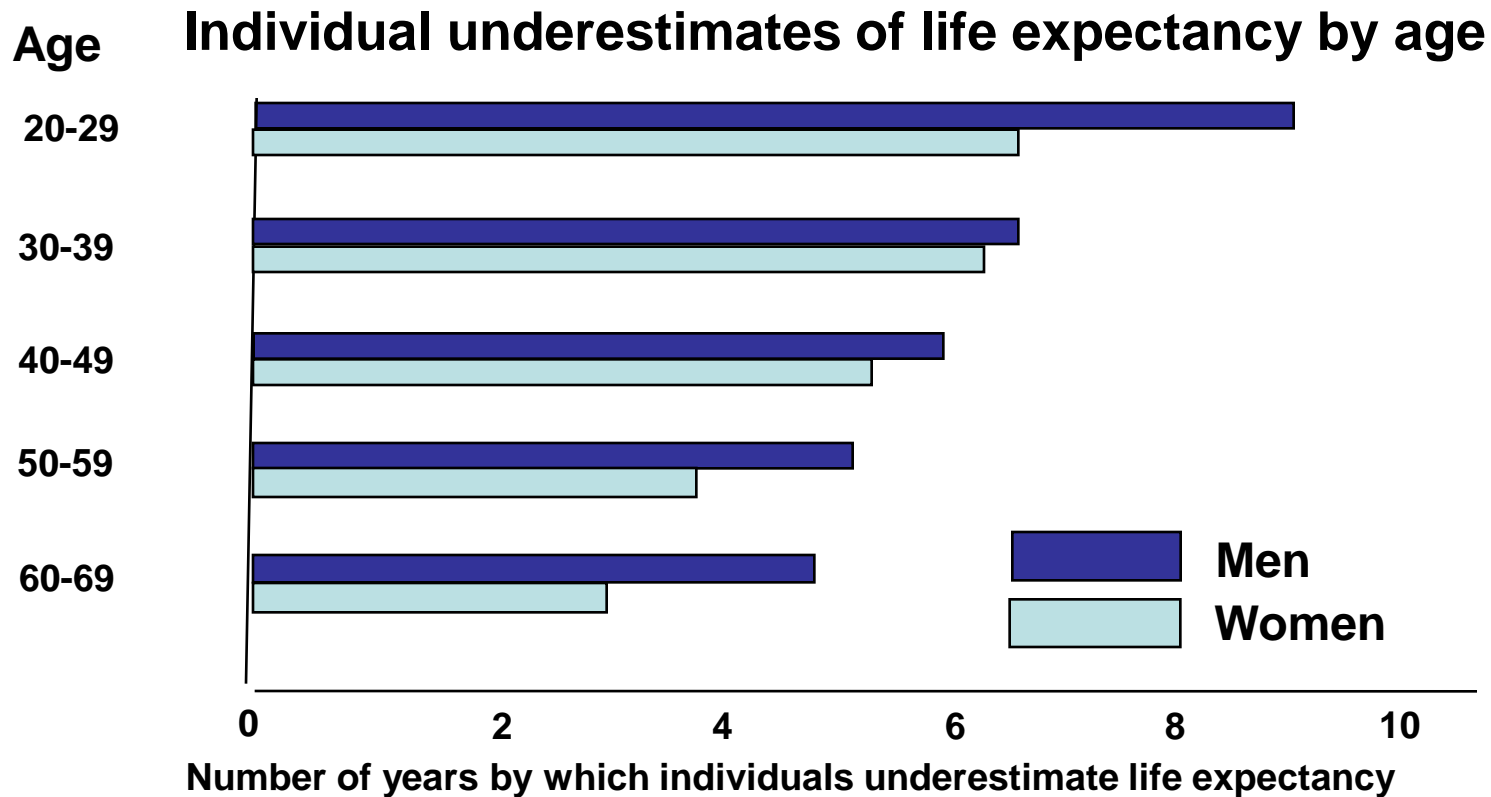
- The critical role of annuities in retirement income provision
- Why are annuities difficult to provide?
- Longevity risk
- Solutions for longevity risk
- Conclusions

The critical role of annuities in retirement income provision

Risks in retirement

- Interest rate risk (annuity risk)
- Inflation risk
- Investment risk
- Idiosyncratic longevity risk:
 - Outliving resources and failure to leave intended bequests
 - Underspending and leaving unintended bequests

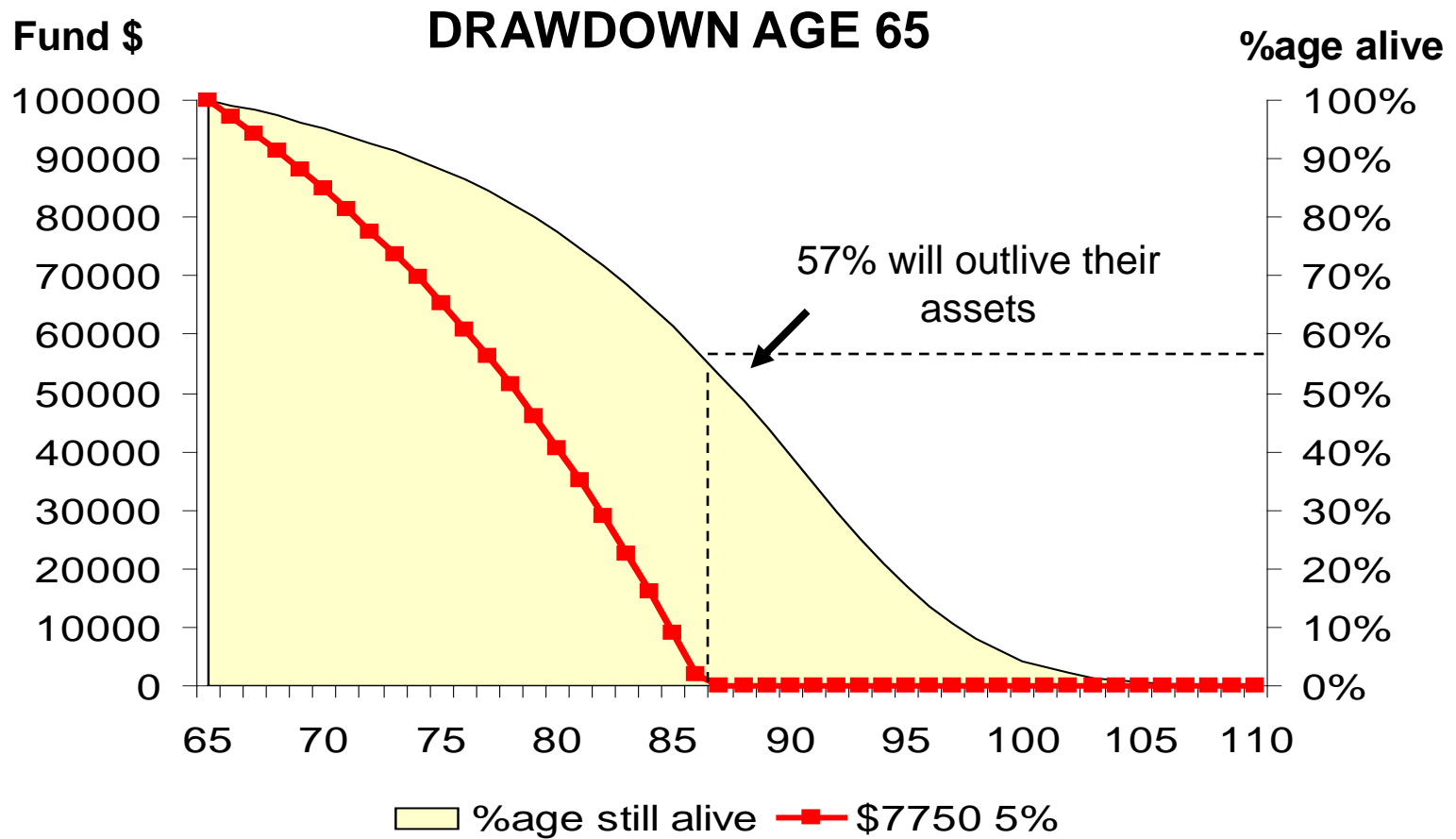
Individuals underestimate how long they are going to live



Principal retirement products

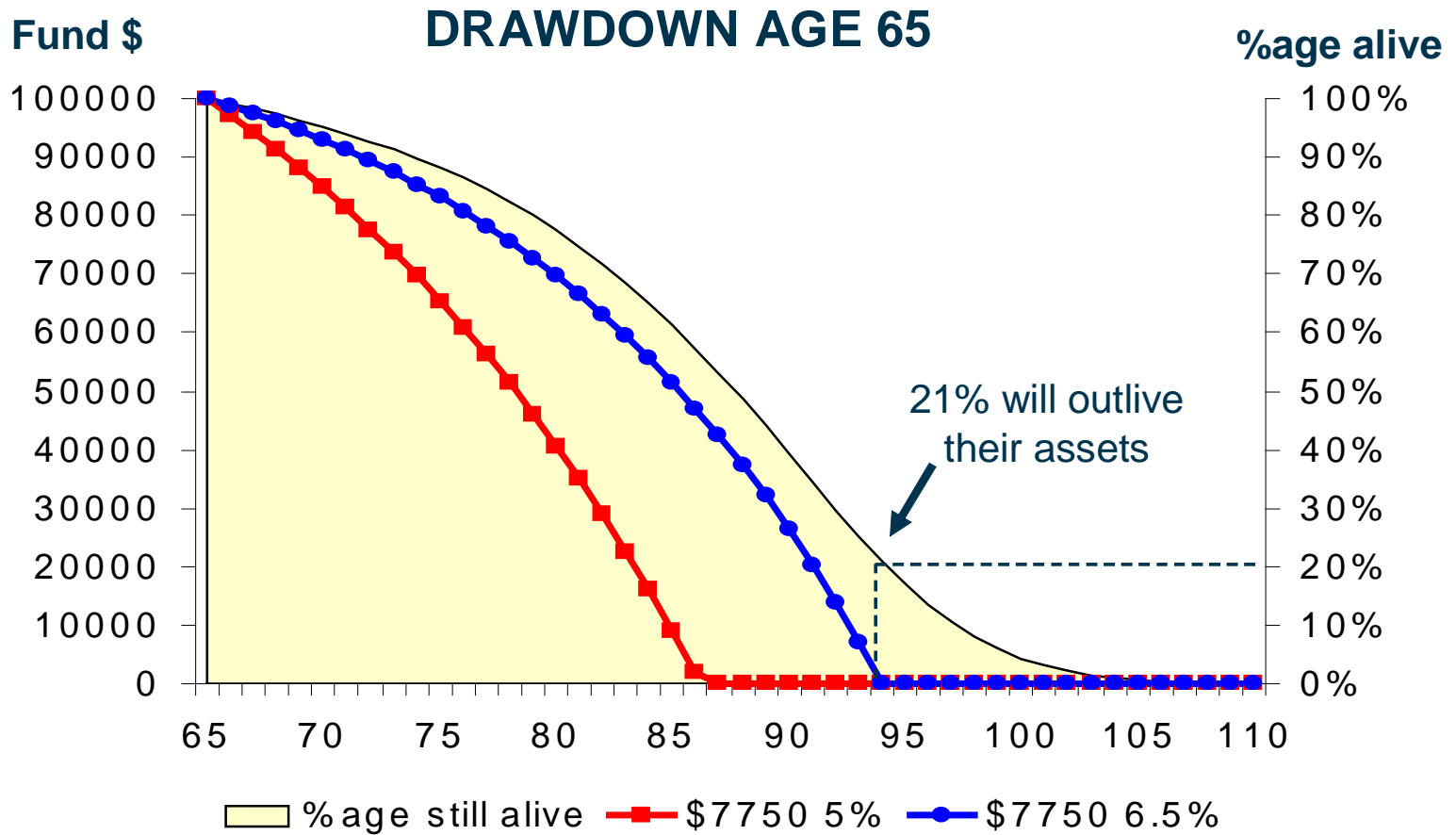
- Income drawdown (phased withdrawal)
- Lifetime annuities:
 - \$100,000 fund buys a 65-year-old male a \$7,750 p.a. annuity for life

Drawdown with income of \$7,750 and a 5% fund growth rate



Source: Own analysis using 100% PNMA00 medium cohort 2007

Drawdown with income of \$7,750 and a 6.5% fund growth rate

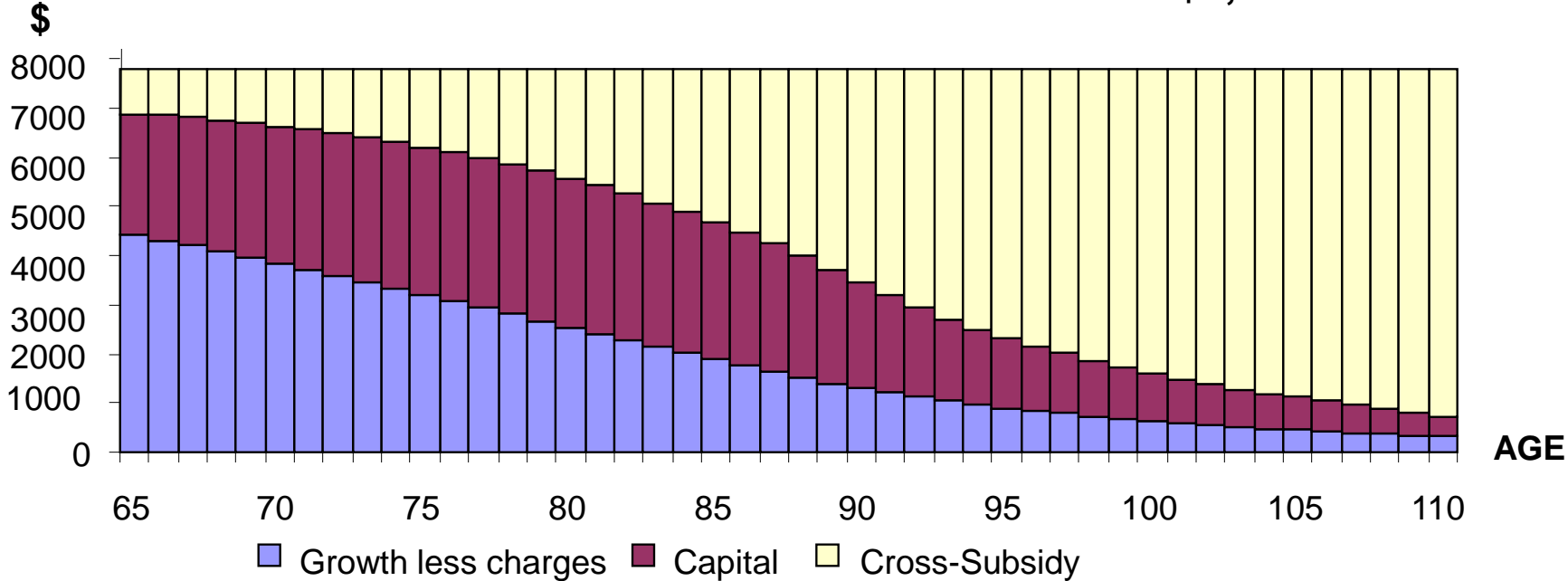


Source: Own analysis using 100% PNMA00 medium cohort 2007

The lifetime income guarantee provided by an annuity is funded by investment growth, the annuitant's own capital and the capital released by those dying early

Expected composition of each annuity payment for a male aged 65 purchasing an annuity for \$100,000 providing an income of \$7,750 payable at the end of each year to all annuitants still alive.

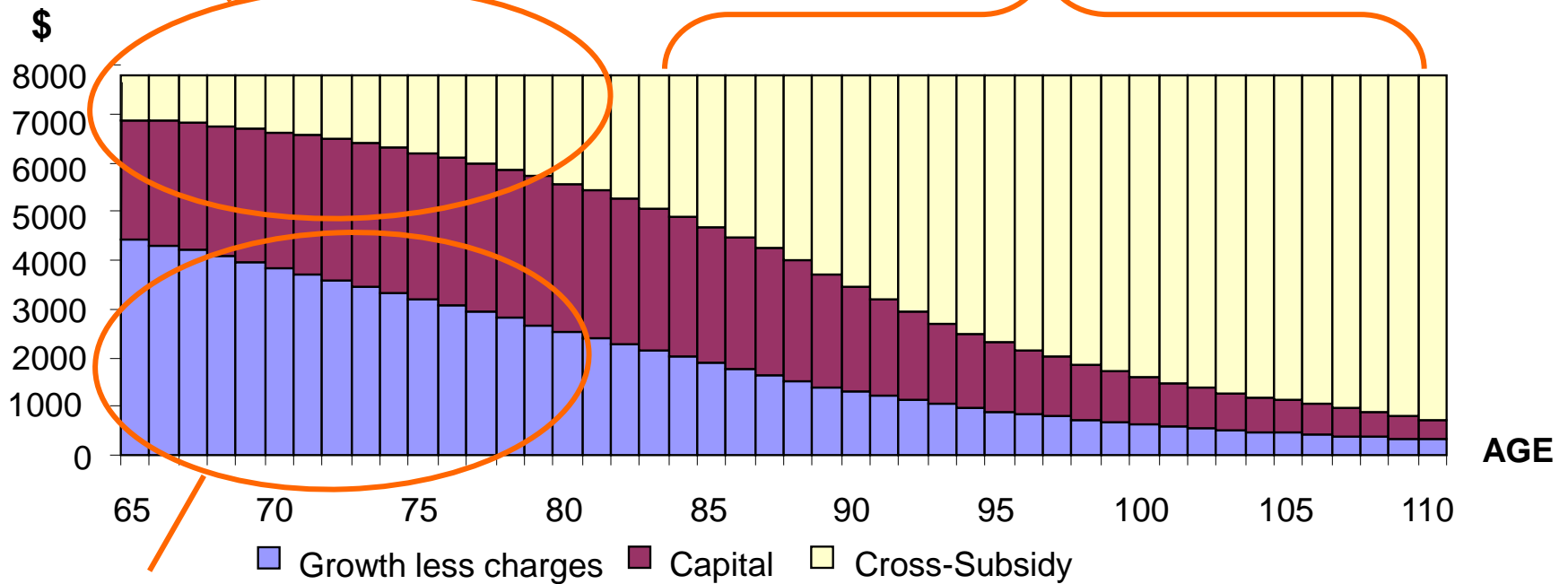
ANNUITY WITH NO DEATH BENEFIT MALE 65 - \$7,750



The lifetime income guarantee provided by an annuity is funded by the capital released by those dying early

Limited cross-subsidy

Significant cross-subsidy

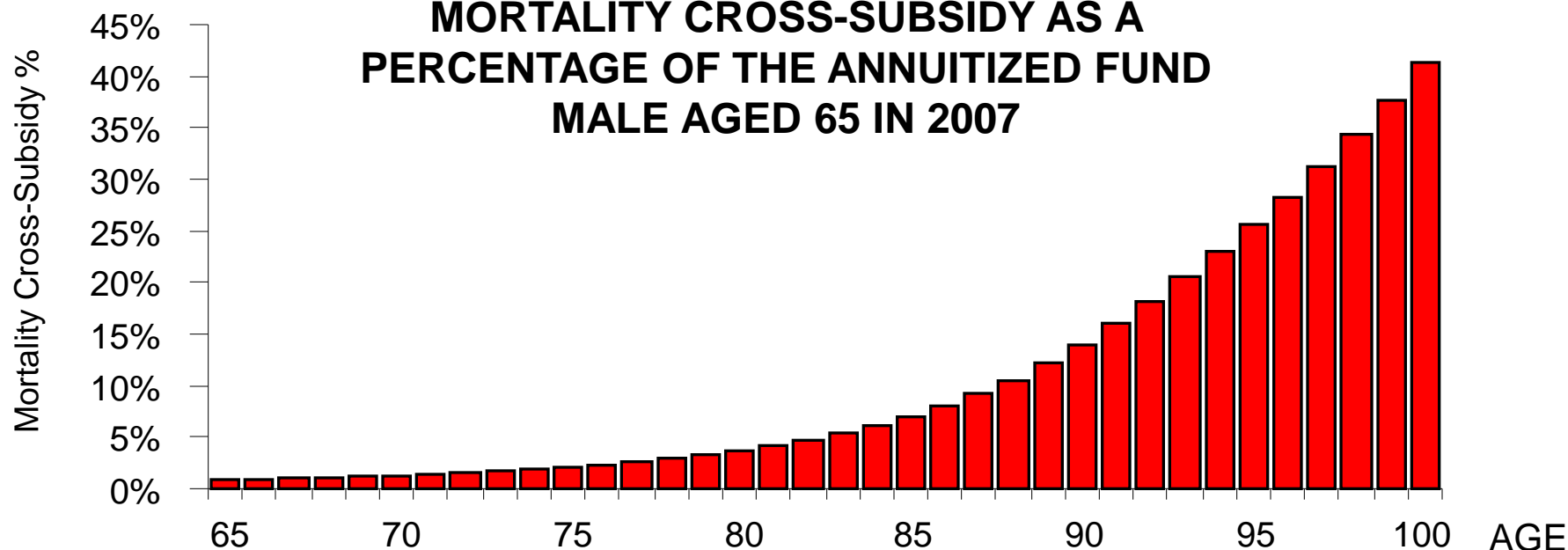


Investment growth significant

Source: Own analysis using 100% PNMA00 medium cohort 2007

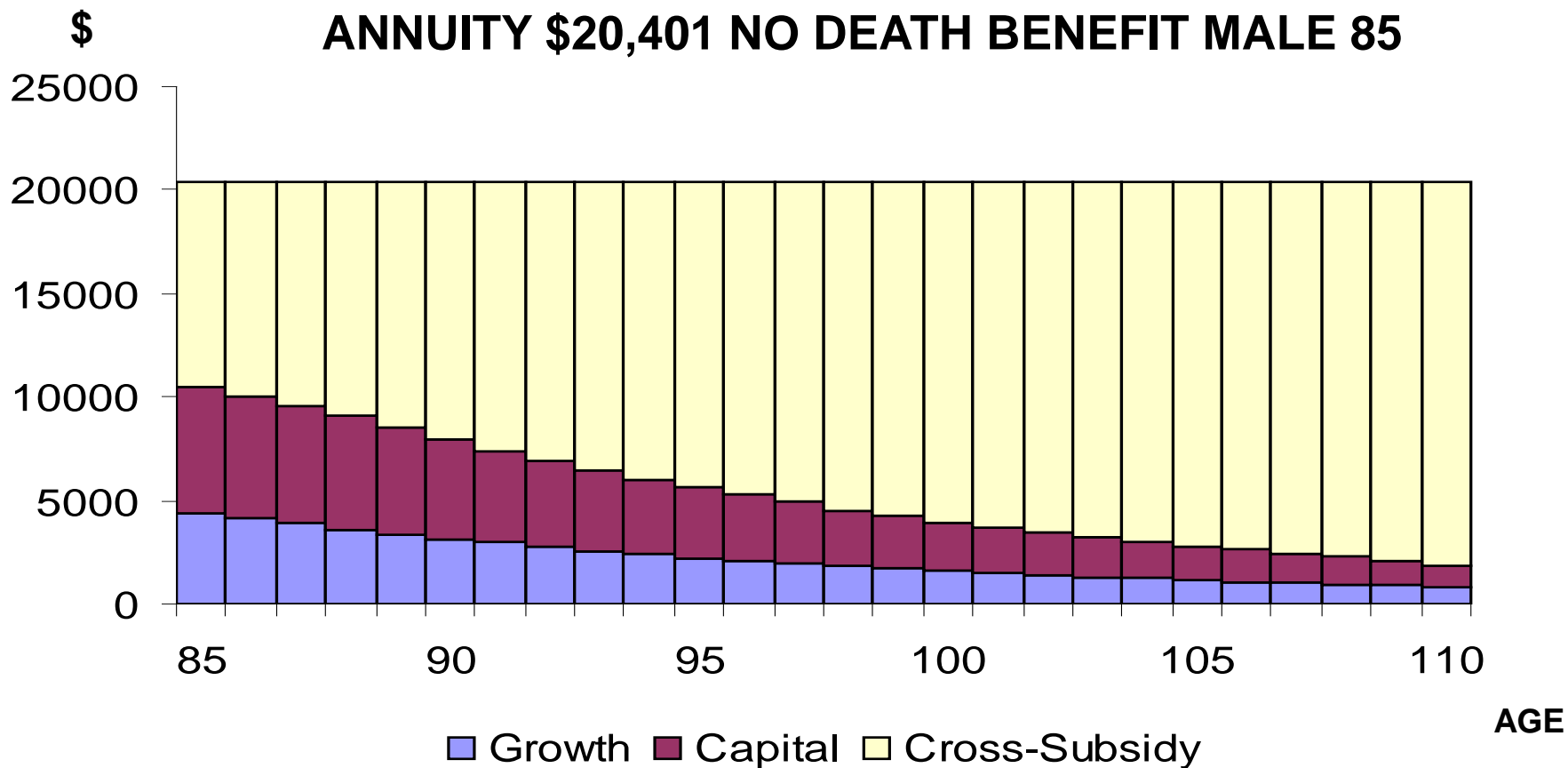
The scale of the mortality cross subsidy at older ages makes annuitisation essential for anyone without extensive alternative wealth

**MORTALITY CROSS-SUBSIDY AS A PERCENTAGE OF THE ANNUITIZED FUND
MALE AGED 65 IN 2007**



With recent mortality improvements the annuity mortality cross-subsidy gives limited benefits to people in their 60s

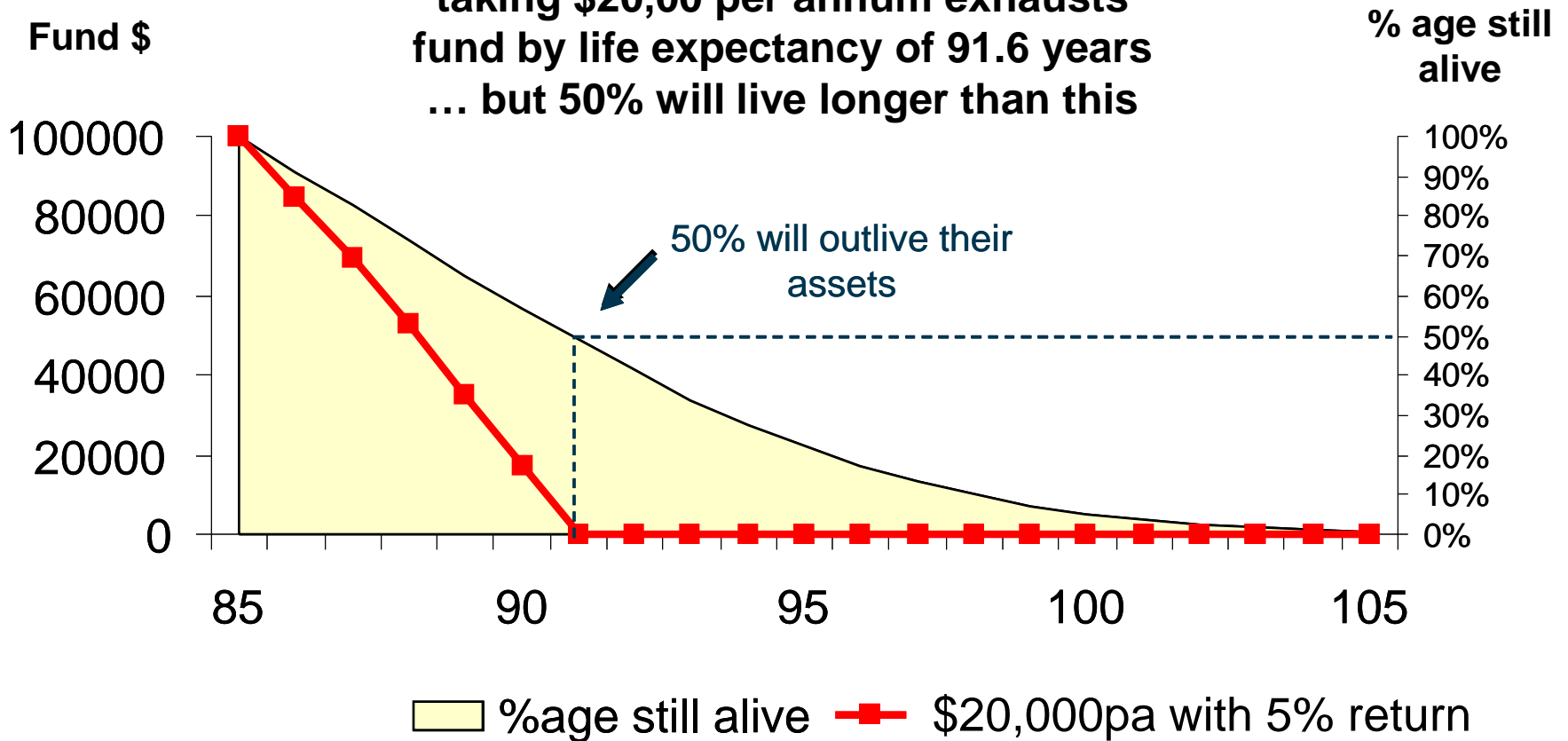
At age 85 the cross-subsidy provides half of the guaranteed income and continues to grow in significance



Source: Own analysis using 100% PNMA00 medium cohort 2007

If retirees try to manage their own funds from age 85, many will run out of money

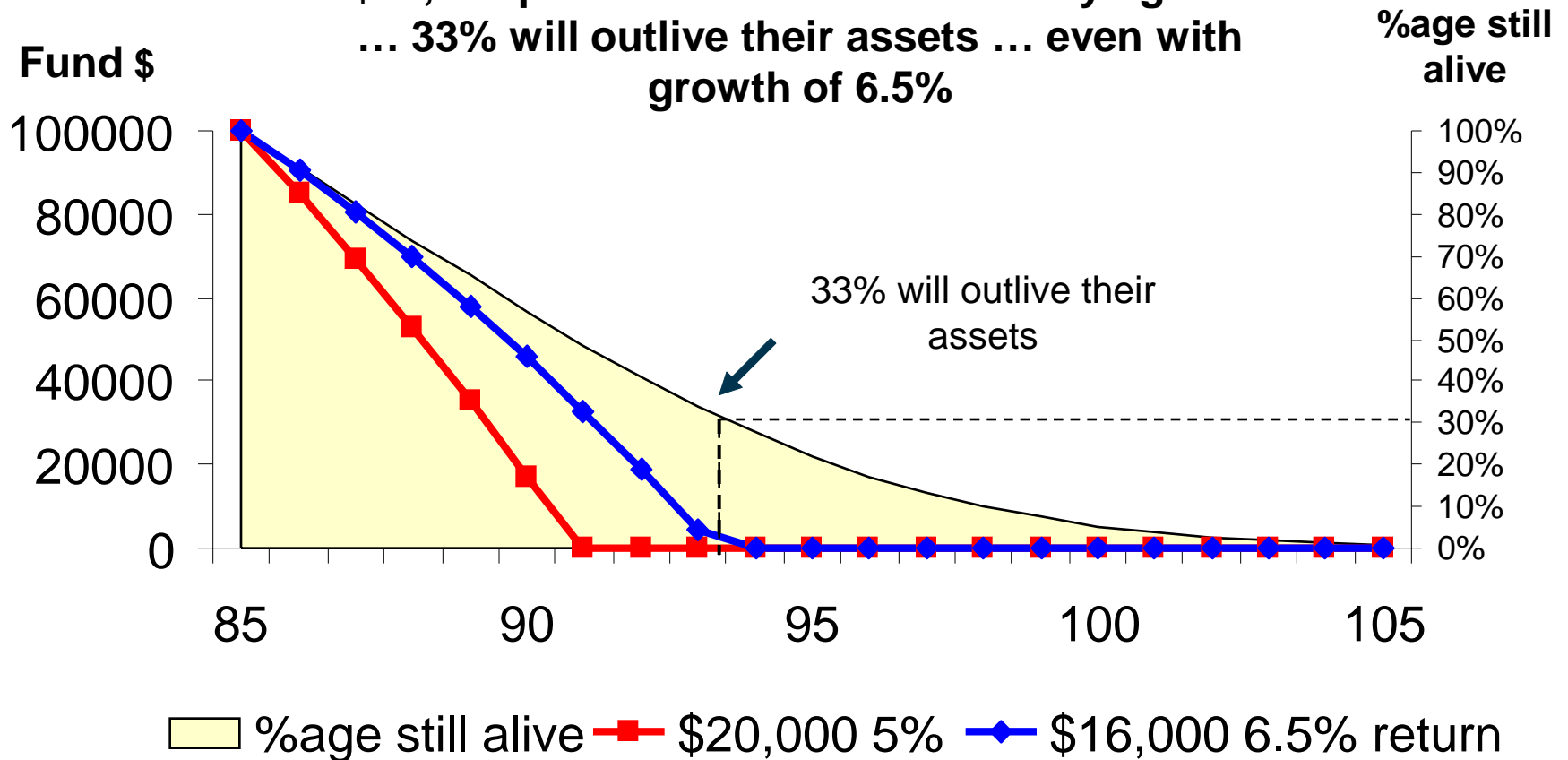
Male aged 85 with £100,000 fund taking \$20,000 per annum exhausts fund by life expectancy of 91.6 years ... but 50% will live longer than this



Source: Own analysis using 100% PNMA00 medium cohort 2007

Reducing income taken and increased investment returns have little impact on the erosion of the fund at older ages

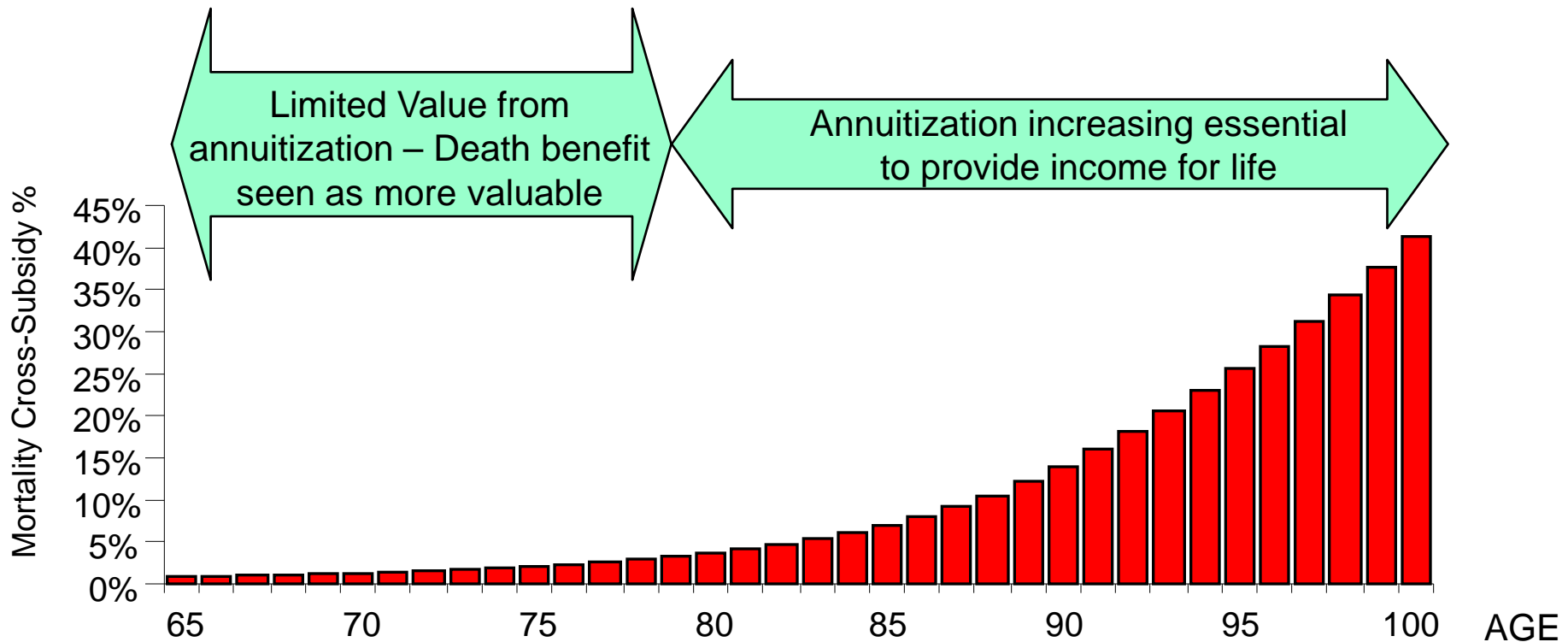
Male aged 85 with £100,000 fund taking \$16,000 per annum exhausts fund by age 94 ... 33% will outlive their assets ... even with growth of 6.5%



Source: Own analysis using 100% PNMA00 medium cohort 2007

So when should pensioners annuitize?

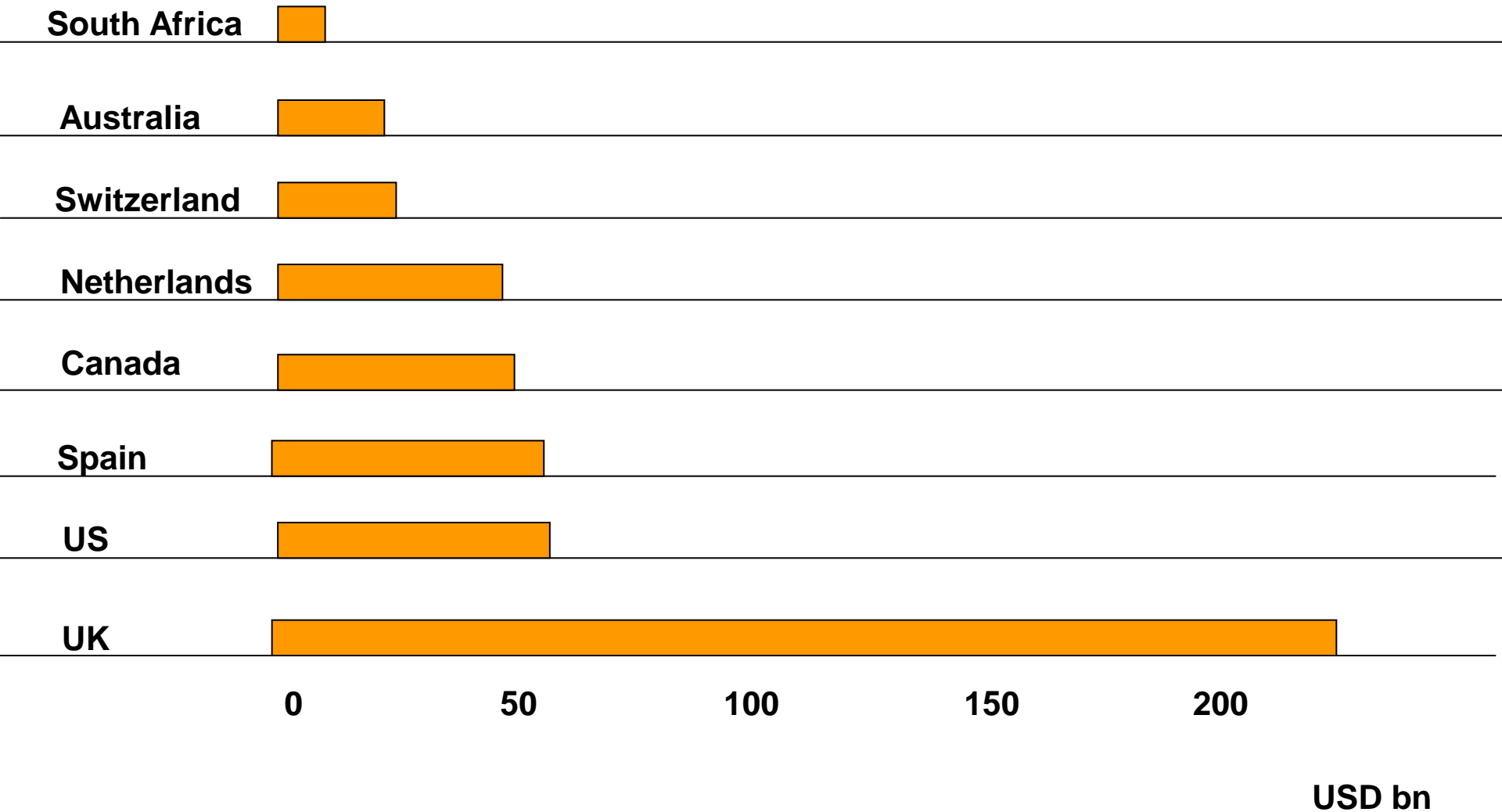
There is a trade-off between level of death benefit and income for life



The scale of the mortality credit at older ages makes annuitization essential for anyone without extensive alternative wealth

Why are annuities difficult to provide

Country market size by immediate annuity reserves in USD bn, 2008



Why are annuities difficult to provide?

- Insufficient supply of long-term risk-free bonds
- Credit risk too great with corporate bonds with maturities over 10 years:
 - Confirmed by Global Banking Crisis
 - Insurers hold bank bonds!
- Longevity risk

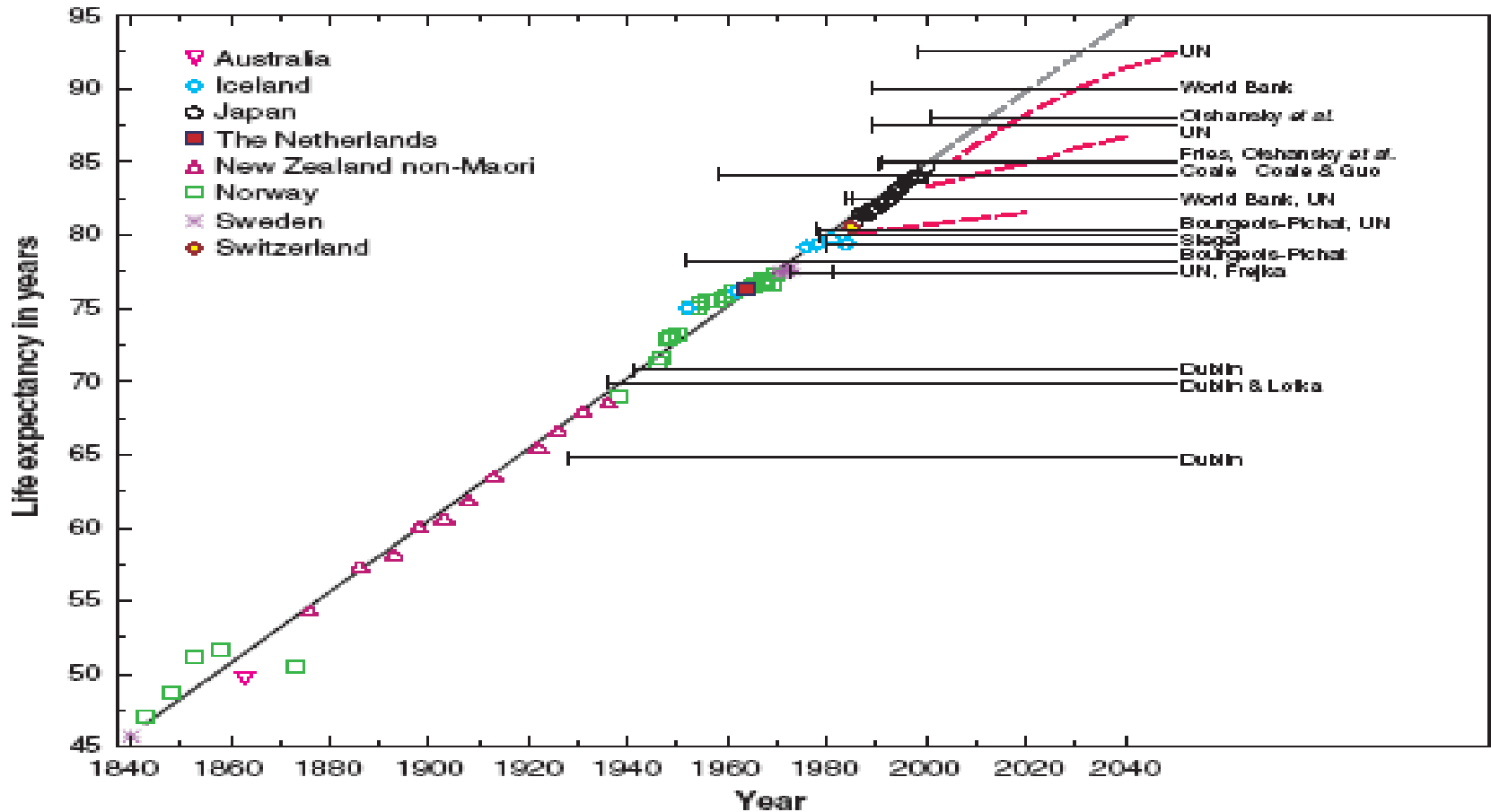
Longevity risk

Decomposition of longevity risk

$$\begin{aligned} &\text{Total longevity risk} \\ &= \\ &\text{Systematic longevity risk} \\ &\quad [\text{Trend risk}] \\ &+ \\ &\text{Idiosyncratic longevity risk} \\ &\quad [\text{Random variation risk}] \end{aligned}$$

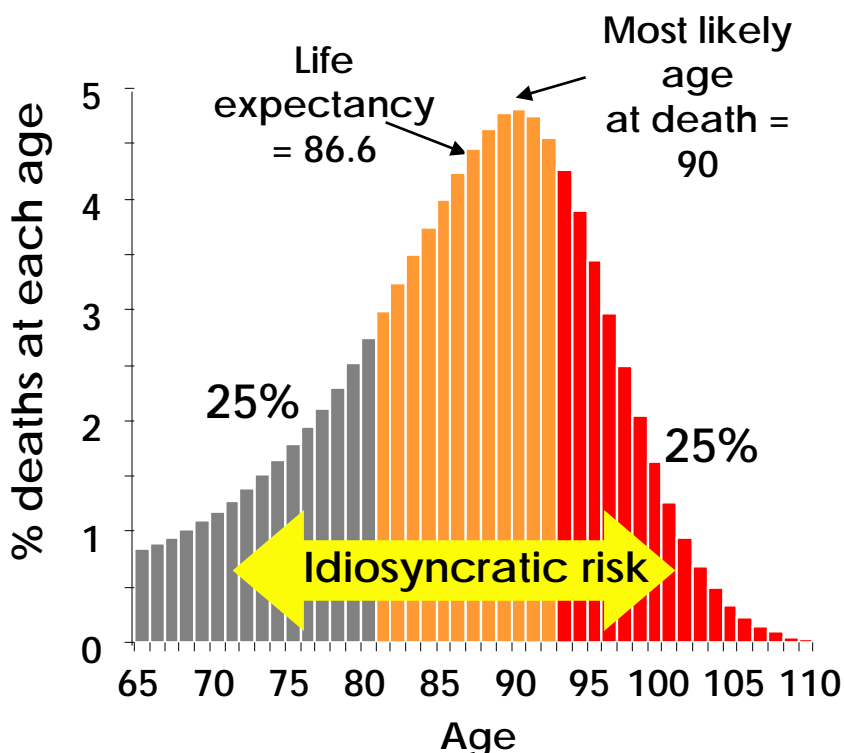
Systematic longevity risk

(Broken limits to life expectancy – Oeppen & Vaupel)



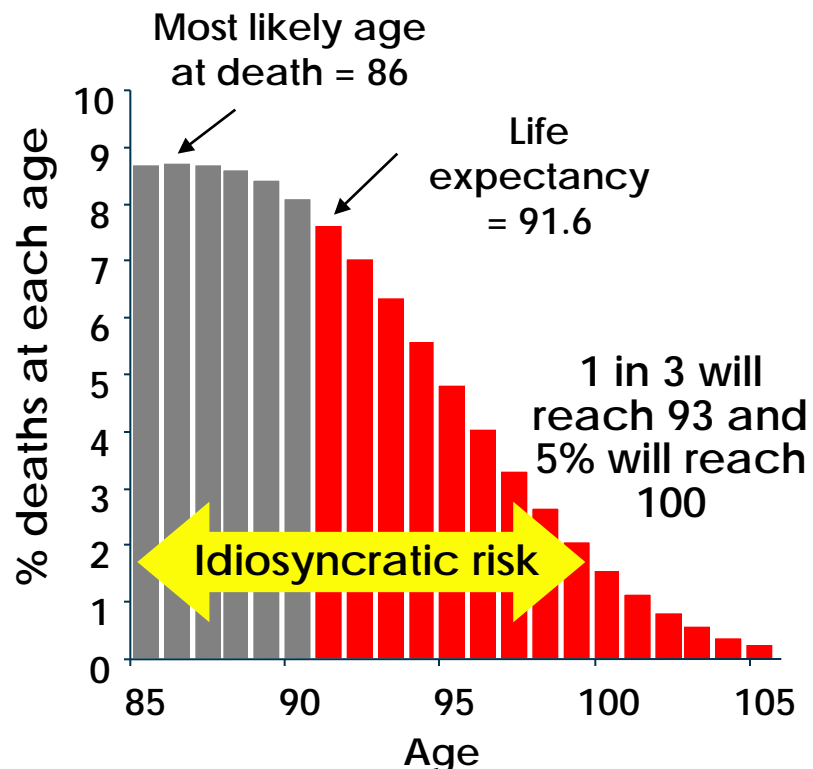
Random variation in life times

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

Solutions for longevity risk

Solutions for longevity risk

- Index retirement age to increases in life expectancy:
 - Aim to have the same ratio of working life to retirement across generations?
- Introduce instruments to hedge systematic longevity risk

Decomposition of longevity risk

Total longevity risk

=

Systematic longevity risk

[Trend risk]

+

Idiosyncratic longevity risk

[Random variation risk]

**Government
shares risk by issuing
Longevity Bonds**

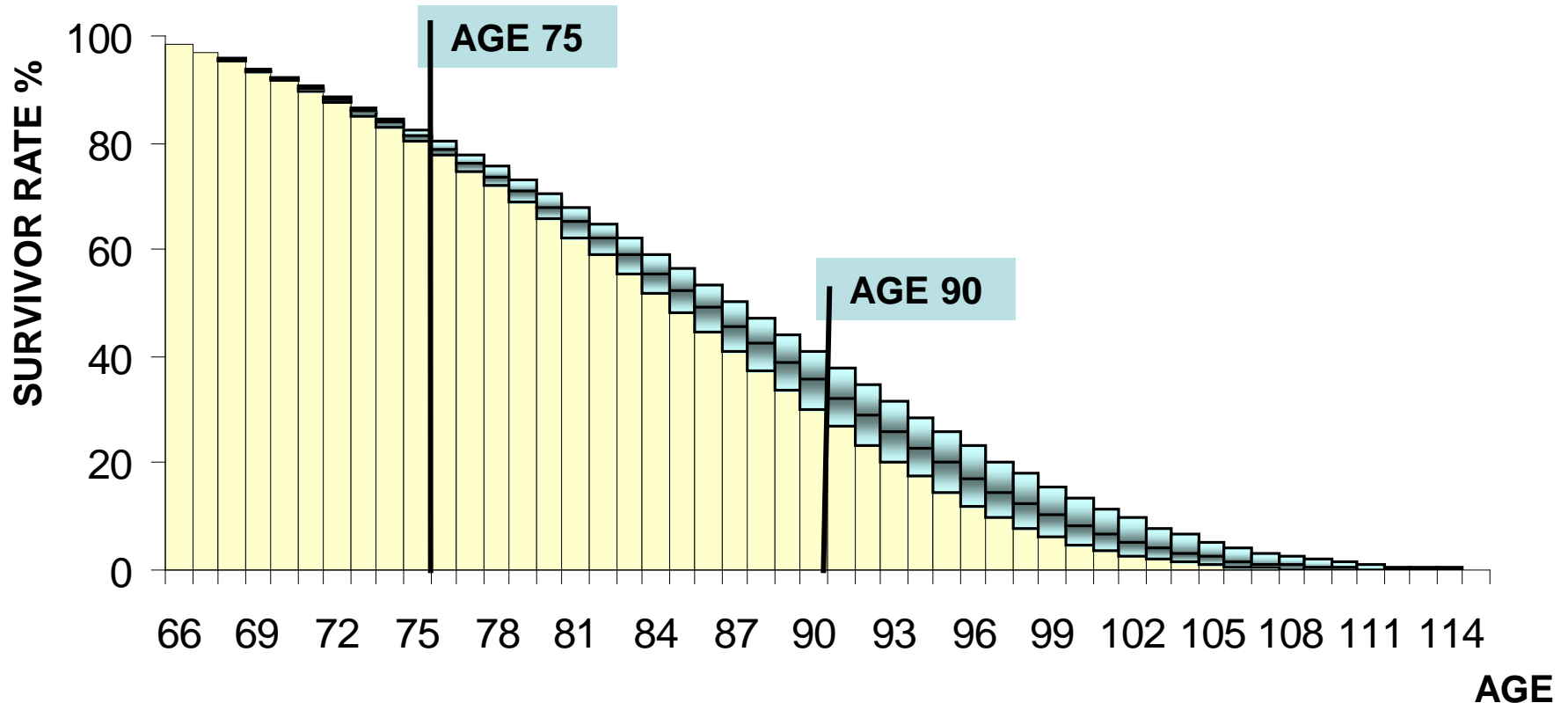


**Private sector
hedges with
longevity swaps**



Survivor fan chart

(Cairns-Blake-Dowd model)

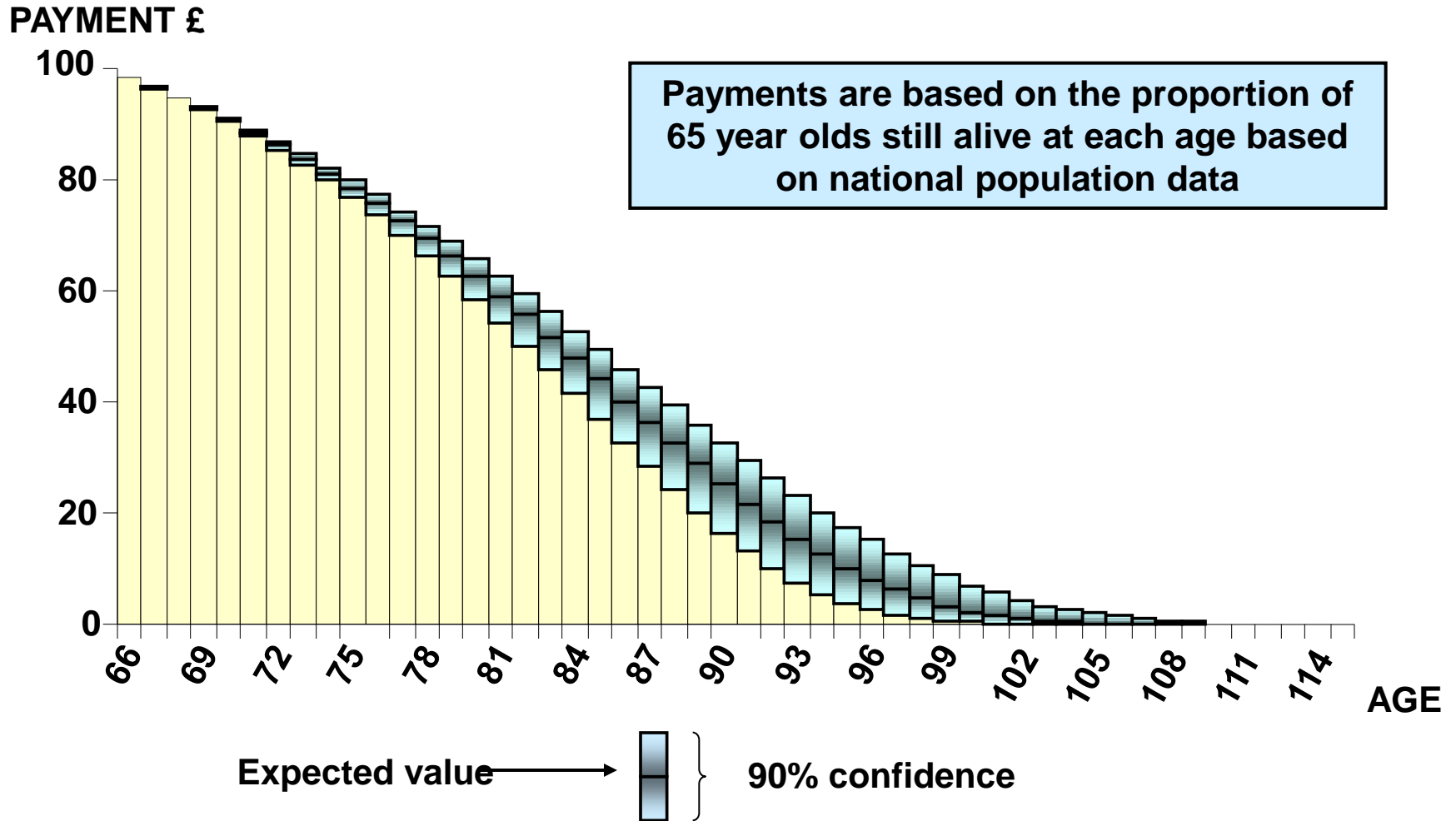


Expected value → } 90% confidence

What is a Longevity Bond?

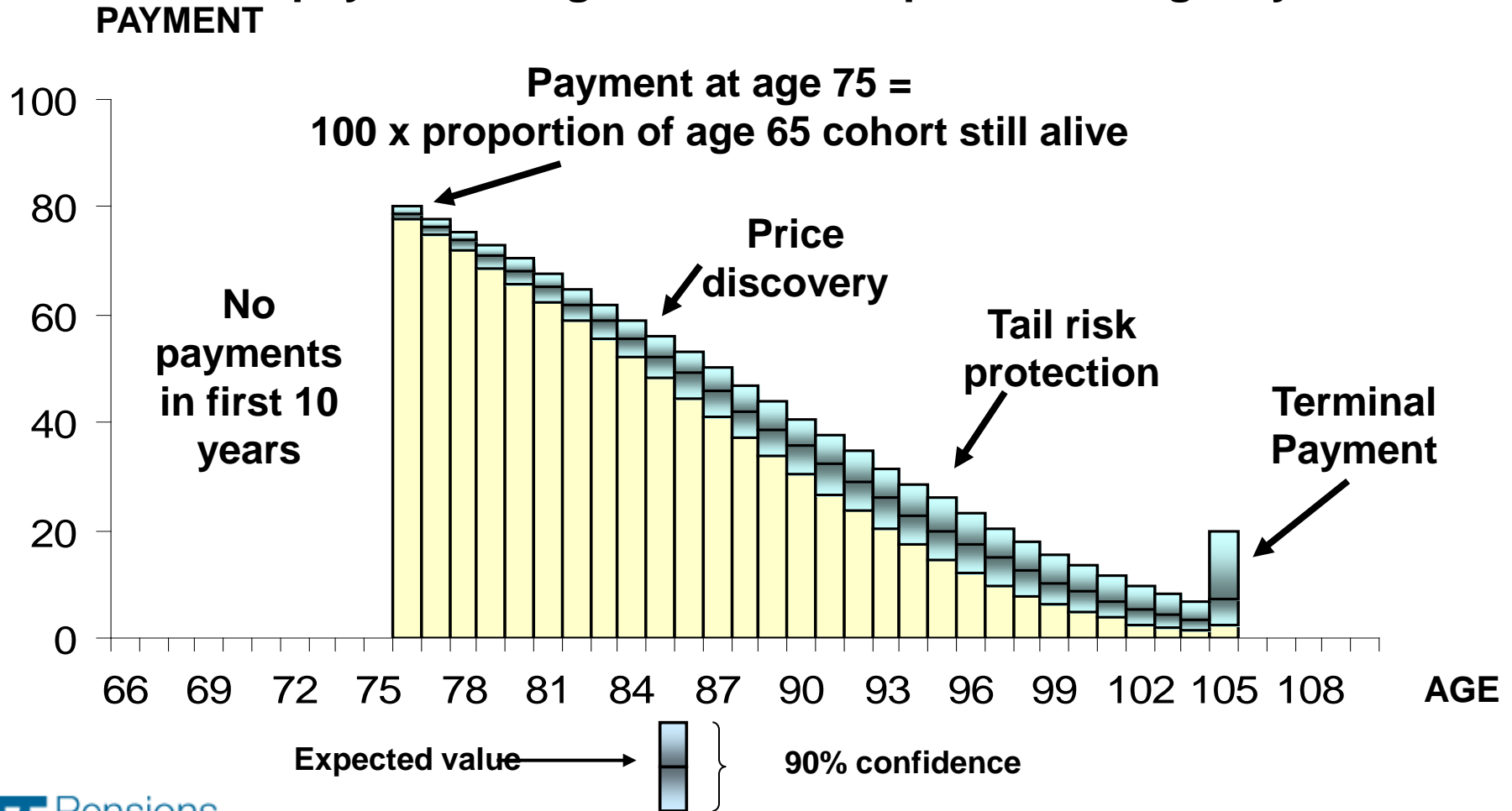
- Longevity Bonds pay declining coupons linked to the survivorship of a cohort of the population, say 65-year-old males
- The coupons payable at age 75 will depend on the proportion of 65-year-old males who survive to age 75
- The coupon payments continue until the maturity date of the bond:
 - e.g.,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

Original Survivor Bond



What is a Longevity Bond?

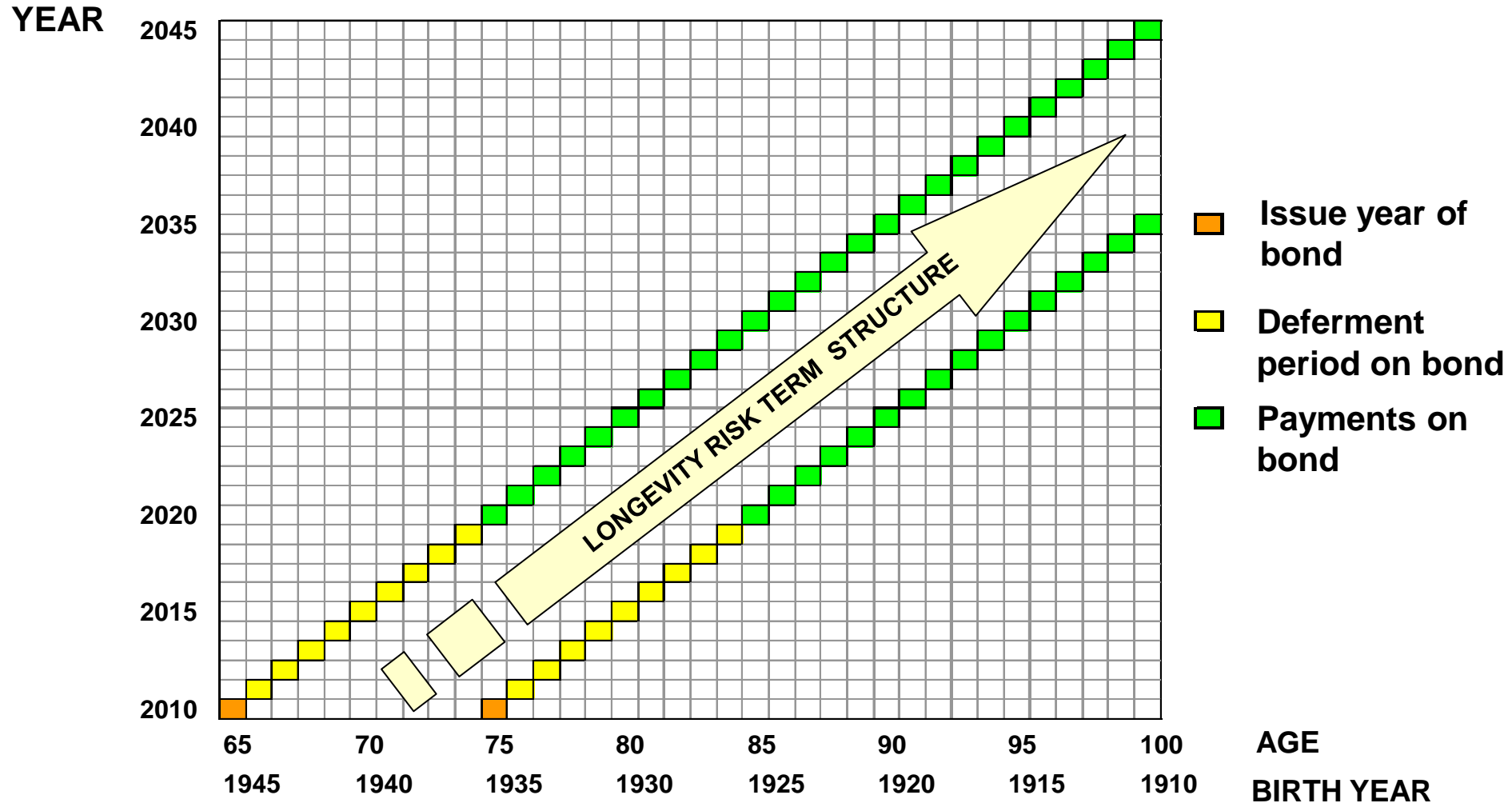
Longevity Bond payable from age 75 with terminal payment at age 105 to cover post-105 longevity risk



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

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



An efficient capital market

- Help ensure efficient annuity market
- Reduce concentration risk
- Construction of national longevity indices
 - timely publication, accurate and independent
- Facilitate price discovery
 - price points for longevity risk
 - riskless term structure for survivor rates
 - Solvency II
 - longevity swaps and other longevity derivatives

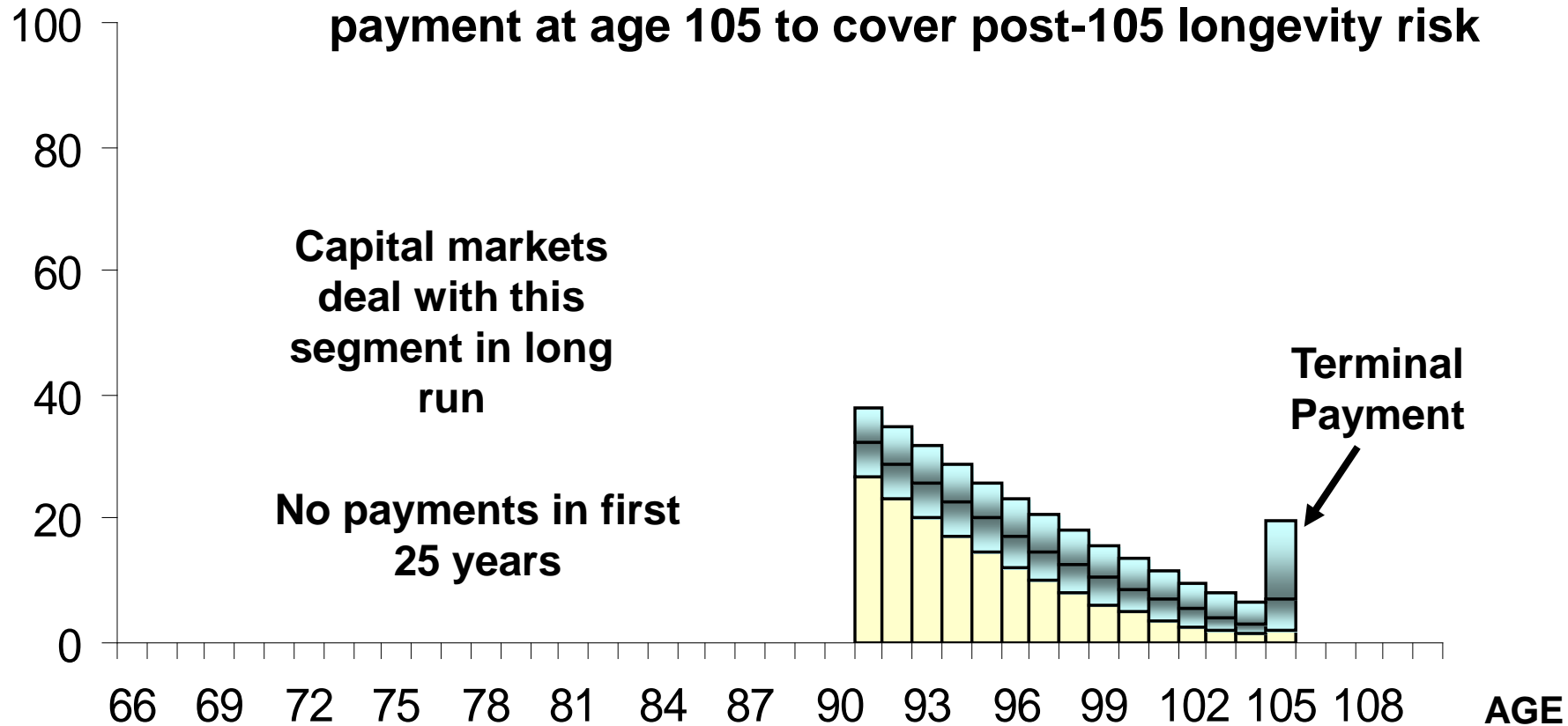
Intergenerational risk sharing

- Key role for Government
- Share longevity risk fairly across generations
- Fair risk premium
- Requirement for ongoing supply of deferred tail
Longevity Bonds

Only deferred tail Longevity Bonds needed from Government in long run

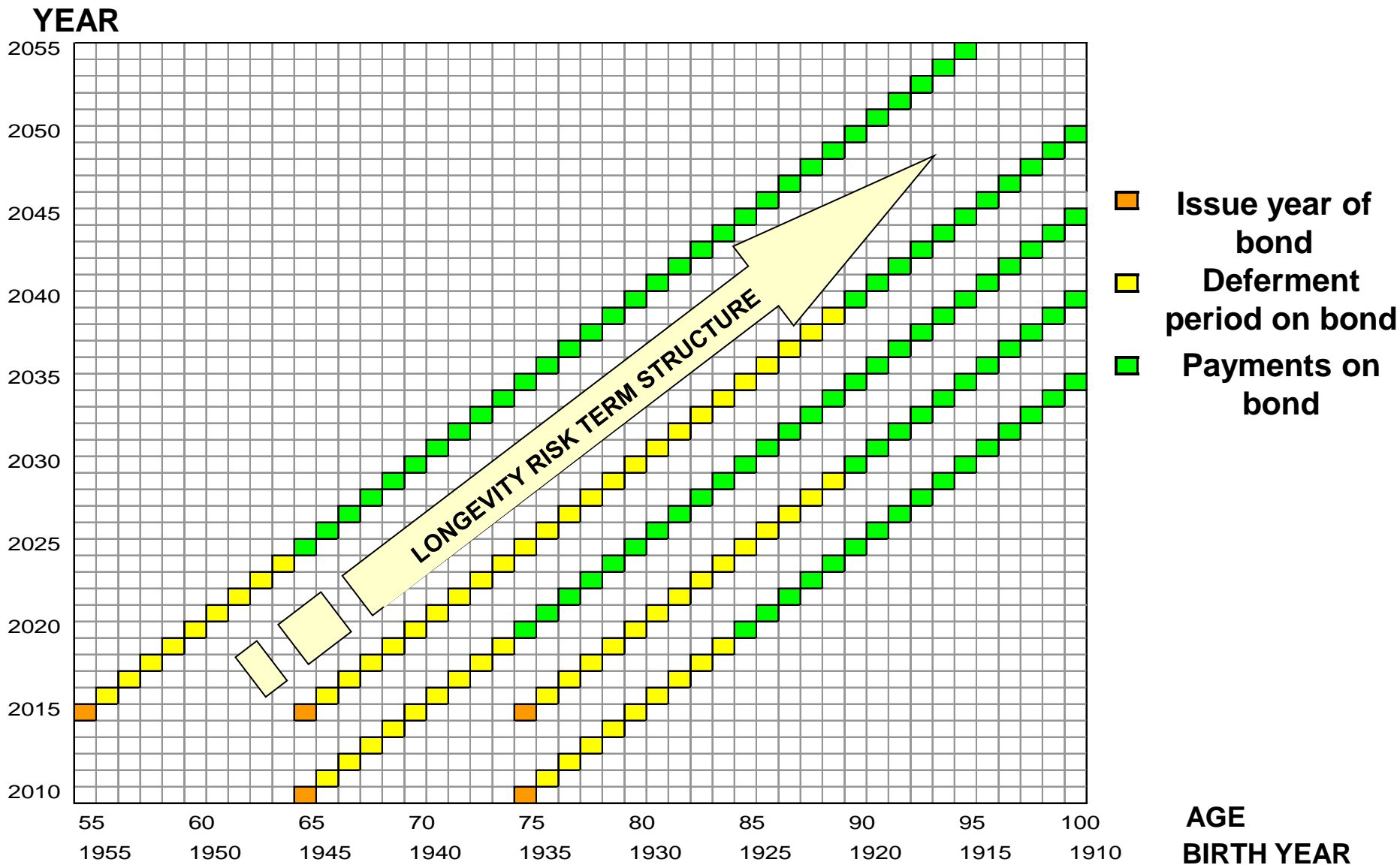
PAYMENT

Longevity Bond payable from age 90 with terminal payment at age 105 to cover post-105 longevity risk



Expected value → } 90% confidence

Government can increase coverage over time and move to focusing on tail risk

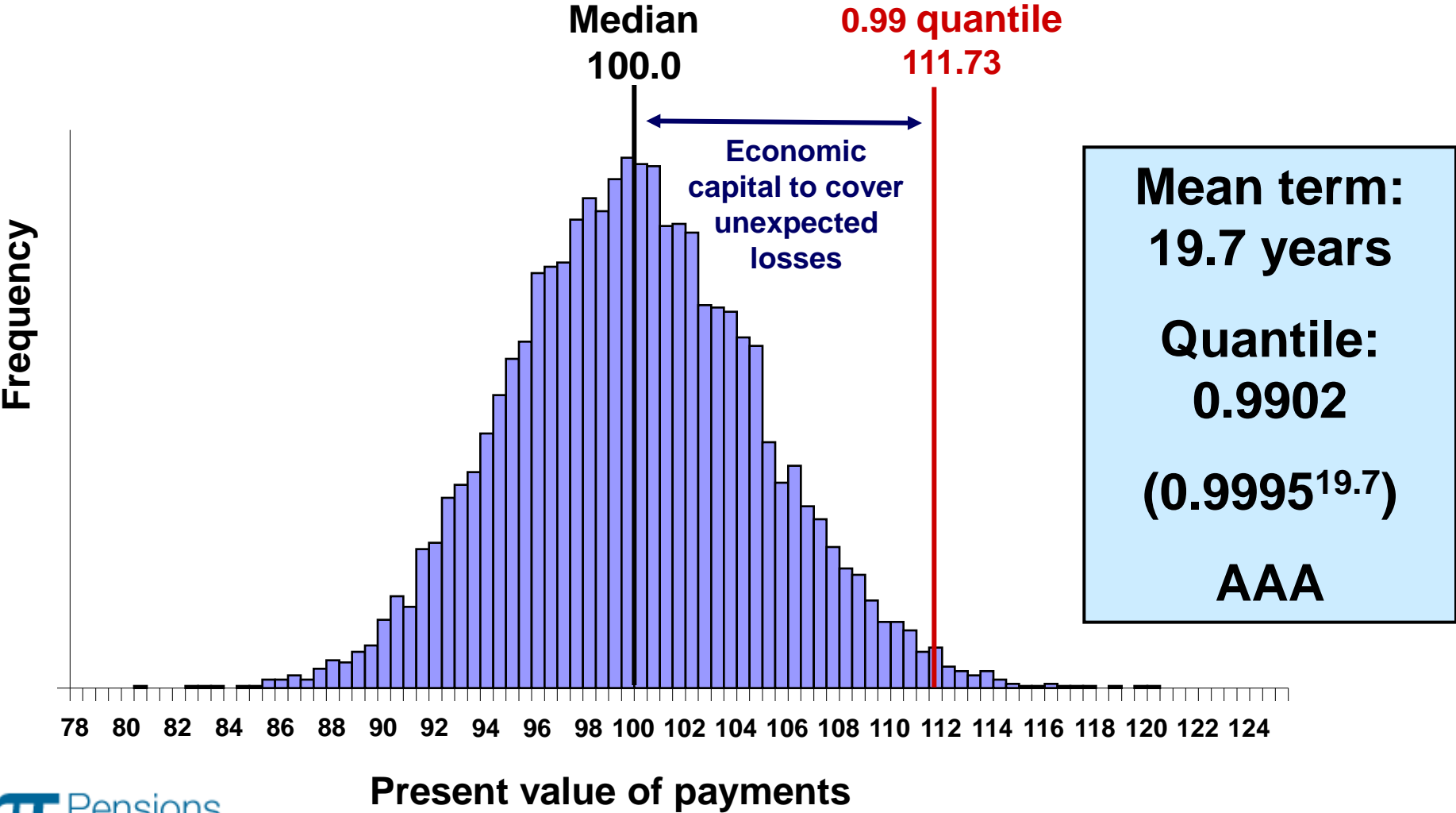


Pricing

- 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

Longevity Bond with coupon of £19.15 adjusted for survivorship of age 65 cohort



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
LBM(75,75)	1.2%	16.5 bps	1.8%	24.7 bps
LBM(75,85)	4.1%	27.6 bps	6.2%	40.8 bps
LBM(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%.

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

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

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

Support for Governments issuing Longevity Bonds

- The UK 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 linking State retirement age to longevity and by raising future 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."

Source: Pension Commission 2nd report, 2005, page 229

**Additional support from IMF, OECD, WEF, CBI, and
UK Insurance Industry Working Group**

Support for Governments issuing Longevity Bonds

Pension Commission

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"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."

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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

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

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."

Source: 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."

Source: 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 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

Conclusions

Conclusions

- Annuities are so important because they are the only financial instrument capable of hedging idiosyncratic longevity risk
- But they are so difficult to provide because:
 - There is a shortage of long-term risk-free bonds
 - There are currently no Longevity Bonds to hedge systematic longevity risk
- Critical role for governments to issue Longevity Bonds

Thank you!

**Longevity 7:
Seventh International Longevity Risk
and Capital Markets Solutions
Conference**

8-9 September 2011

Frankfurt

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