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**Investment Choices and the Governance of DC  
Pension Plans**

David McCarthy and Paul Thornton





**The optimal demand for  
investment guarantees inside DC  
pension accounts**

David McCarthy

# Investment guarantees in DC pensions

- A lot of work has focussed on the optimal investment strategies of DC accounts
  - But it has largely focused on the choice between bonds and equities
- What about guaranteed investment vehicles?
  - e.g. guaranteed capital bonds or similar
  - An anonymised real-world example from a UK high street bank is on the next slide...

Investments >

> Investment Bonds

> Guaranteed Capital Bonds

> Investment Funds

> Leveraged Investments

> Large investments

All Save and invest options >

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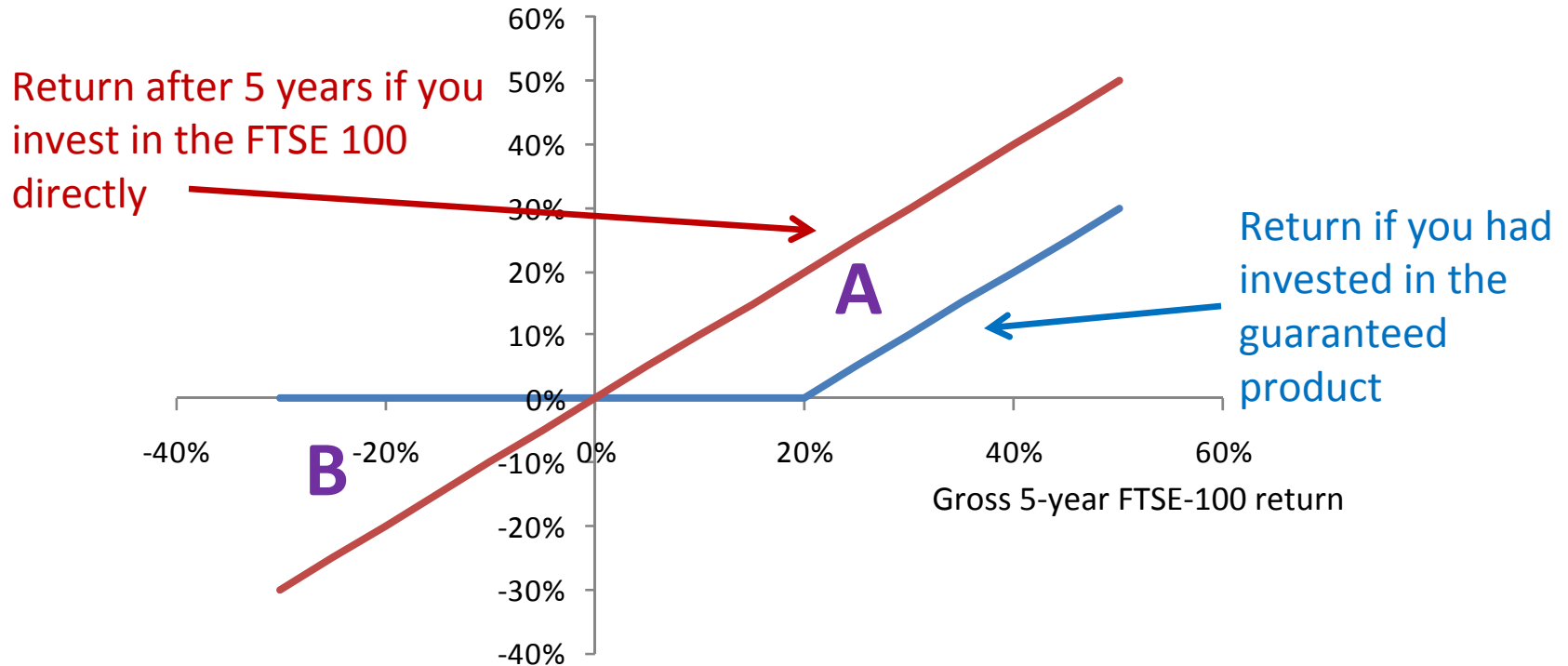
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# Return profile of this product



- Friday's dividend yield on the FTSE-100 index was 3.67%, so over 5 years, this equates to a 20% return reduction

# Financial theory: pricing

- We can use Black-Scholes theory to price this kind of guarantee
  - the price of a guarantee is the market value of a portfolio of assets, which, when invested following a dynamic investment strategy, perfectly replicates the payoffs of the guarantee
  - Many authors have done this, including Smetters (2002), Pennacchi (1999), Lachance and Mitchell (2003) and Cantor and Sefton (2004)
  - Pricing guarantees is expensive because you need to hold many assets today to hedge the cost of market downturns (precisely because the assets you need to hold are worth less when the market turns down)
- Our high street bank's charges of 20% are not too far out of line

# Economic theory: demand

- One of the implications of financial theory is that in a Black-Scholes world, the guaranteed product is redundant
  - Continuous, costless trading implies that participants can replicate the guarantee – or any other desired investment outcome – on their own without needing to purchase the option
  - In the real world, individuals buy option-type products because they don't have the ability or know-how to trade dynamically and so they sub-contract this to banks who do
- What would optimal demand for guarantees be if they were not redundant?

# Fundamentals of asset allocation

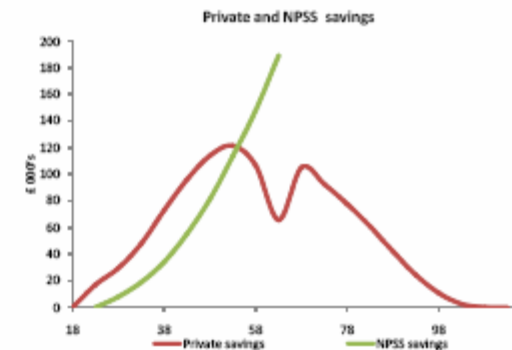
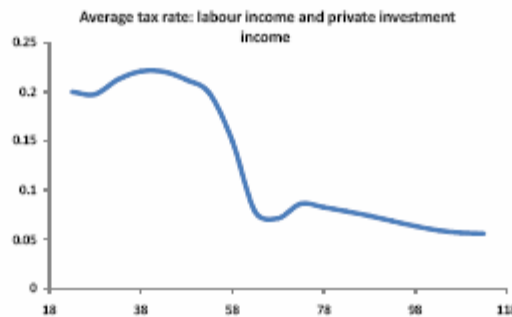
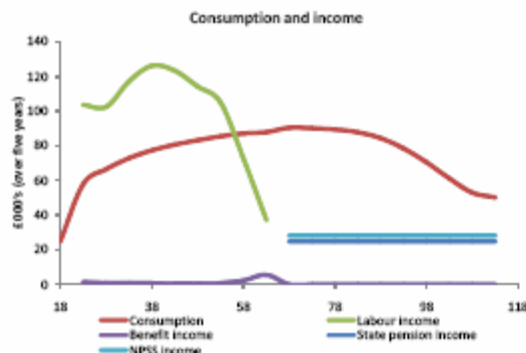
- Basic theory is Merton's (1969) theory, with labour income
  - CRRA preferences, human capital wealth only slightly correlated with financial wealth, constant investment opportunities
  - Investors able to trade between a stock and a bond continuously and costlessly will optimally hold a constant proportion of their total wealth in the stock and the bond, which proportion is independent of the time to retirement
    - but because financial wealth increases as a proportion of total wealth as individuals age, the proportion of financial wealth held in equities falls as individuals age

# My investigation

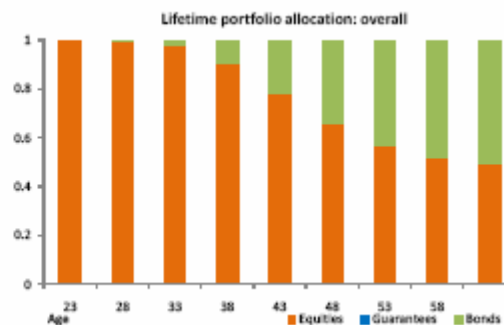
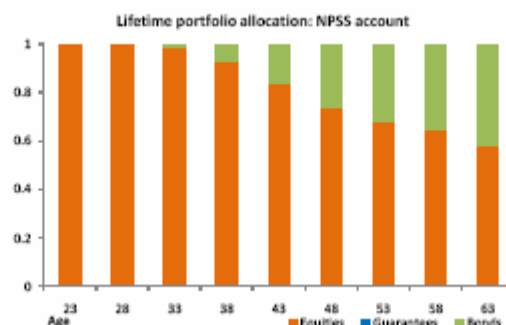
- Was performed for the Department for Work and Pensions
- Investigated the optimal holdings of 5-year guaranteed investment products inside the UK's system of personal accounts
- Restricted investment rebalancing to 5-year time periods (so the investment guarantee was not redundant)
- Took account of
  - UK tax and means-tested benefit systems
  - Earnings risk and labour force participation risk
  - Mortality risk
  - Investment risk

# Model involved...

- .....numerically solving an optimal life-cycle model to get optimal consumption rule and optimal investment strategy in private accounts and DC pension accounts
- And then simulating the life course of thousands of individuals who made decisions according to the optimal rules derived
  - Average individuals looked like this:



# Optimal lifetime investment strategies



Higher investment in bonds outside personal accounts than inside them, reflecting assumed capital constraints

Almost no investment in guarantees, even when these are priced at well below the fair Black-Scholes price

Declining investment in equities as individuals age, consistent with Merton

- Overall: nonexistent demand for guarantees!

# Optimal demand for investment guarantees

- In fact, it proved almost impossible to generate demand for investment guarantees at prices close to fair
  - even when means-tested benefits were removed
  - even when risk aversion was made implausibly high
  - even though individuals simultaneously hold bonds and equities in both private wealth and DC pension wealth (so the lack of demand could not be explained by an equity risk premium puzzle-type argument)
- Only once investment guarantees became extremely cheap (< half the fair price), did individuals began to demand them
- Black-Scholes price and demand are independent

# Why is demand so low?

- In the UK, pension assets cannot be accessed until retirement, so 5-year underperformance is not really relevant (and not worth a 20% charge)
- The chance of equities under-performing over 30-years is low BUT the cost of hedging against underperformance is high (not contradictory)
- Guarantees are provided outside pension accounts in the UK in the form of means-tested benefits

# Alternatives to investment guarantees

- Instead of offering investment guarantees inside the DC account, you could also:
  - Restrict investment options (e.g. force individuals to invest a minimum proportion of their accounts in bonds), OR
  - Offer some kind of benefit outside the account (e.g. a defined benefit minimum income guarantee)
- In practice:
  - Every mandatory DC pension system around the world offers at least one, most actually offer more than one (Walliser, 2003)
  - Many voluntary DC pension systems do too (Turner and Rajnes, 2003)

# A puzzle?

- If optimal demand for guarantees is so low, why are they so prevalent?
- The role of many mandatory DC account systems is poverty prevention as well as consumption smoothing, which explains the higher prevalence of guarantees in these systems than in voluntary ones
- Regret – rather than expected utility - may be an important consideration underlying the demand for guarantees, examined theoretically by Muermann et al (2006)
- Lack of awareness of true costs of guarantees may also be an important factor

# An opportunity?

- The vast majority of people in DC accounts follow the default investment strategy
- Investment guarantees can be replicated in a broad sense simply by increasing the proportion of the DC account held in bonds
- Might be better to make the default strategy more conservative than to provide investment guarantees
  - Note that from an economic point of view this is just a form of money illusion!
    - Individuals lose out on risk-adjusted returns in an expected utility sense, exactly as they would if they had investment guarantees (an agency cost of DC pension systems, if you will)