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Spend more today: Using behavioural economics to improve retirement expenditure decisions

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Economics to Improve Retirement Expenditure
Decisions

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Using Behavioural Economics to Improve Retirement Expenditure Decisions

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Abstract

This paper examines how behavioural economics can be used to improve the expenditure decisions of retirees. It identifies how accumulated assets can be used optimally throughout retirement to produce life-long income when required, to make provision for contingencies – such as unanticipated spikes in expenditure – and to optimize the size and timing of bequests. We do this using a *S*PEED*O*ME*TE*R (or *S*pending *O*ptimally *T*hroughout *R*etirement) retirement expenditure plan which employs defaults within a choice architecture. At its simplest, the plan involves just four key behavioural nudges: (1) **First, make a plan** – ideally with, but if necessary without, an adviser; (2) **automatic phasing of annuitization** which is designed to tackle the aversion to large irreversible transactions and losing control of assets and so allows the greatest possible degree of flexibility in managing the run-down of retirement assets; (3) **capital protection** in the form of 'money-back' annuities which deals with loss aversion, i.e., the fear of losing your money if you die early; and (4) the slogan '**spend more today**' which utilizes hyperbolic discounting to satisfy the human trait of wanting jam today and to reinforce the idea that '**buying an annuity is a smart thing to do**'.

Spending Optimally Throughout Retirement: Using Behavioural Economics to Improve Retirement Expenditure Decisions

1. Introduction

In 2004, Shlomo Benartzi and Richard Thaler (2004) came up with the brilliantly simple idea of **S**AVE **M**ORE **T**OMORROW (**SM**AR**T**) plans which exploited behavioural traits such as inertia, hyperbolic discounting[1] and money illusion[2] to increase retirement savings using automatic deferred salary sacrifice.[3] The concept worked and has been implemented, with certain modifications, in a number of countries. For example, in the UK, a new national pension system called NEST (the National Employment Savings Trust) is being introduced in 2012 (Pensions Acts 2007 and 2008). This will use auto-enrolment, rather than auto-salary sacrifice, to increase retirement savings. Younger employees can therefore overcome a potential problem facing many of their older colleagues, namely insufficient pension savings leading to poverty in old age, a phenomenon that is inconsistent with the predictions of the Life Cycle Model (LCM).[4]

Behavioural economists have identified some of the limitations of conventional economic theory caused by the failure to take human behaviour into account. Richard Thaler and Cass Sunstein in their best selling 2008 book *Nudge: Improving Decisions about Health, Wealth and Happiness* define two very different types of consumers – 'econs' and 'humans'. In a retirement expenditure context, 'econs' are fully rational life-cycle financial planners. 'Humans', by contrast, try to make the best decisions for themselves, but are subject to behavioural traits that limit their ability to implement their plans. Thaler and Sunstein believe that very few people are 'econs' and their book provides examples of how to nudge 'humans' into making optimal choices.[5]

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[1] This means that individuals use higher discount rates for more distant cash flows than they do for nearer cash flows, with the consequence that distant cash flows are relatively much less highly valued today than nearby cash flows.

[2] This is where individuals fail to recognize the difference between nominal and real (i.e., inflation-adjusted) values.

[3] This is where a portion of future pay rises is diverted to the employee's pension plan.

[4] The LCM was introduced by Ando and Modigliani (1963) and is still the dominant model used by conventional economists. In the LCM, individuals are assumed to have the skills to allocate their lifetime income and assets over their life cycle in order to maximize the expected lifetime utility of the consumption stream that can be purchased with the income and assets, taking account of attitude to risk. In the absence of a bequest motive, accumulated savings are run down to zero at the time of death: individuals die clutching their last penny and never run out of money while still alive.

[5] The LCM, assumes everyone is an 'econ', but very few people in the real world (i.e., 'humans') appear to behave according to the predictions of the LCM and most appear to undersave for their retirement and underspend during their retirement. It is, however, arguable that many current older workers (i.e., the current Baby Boomers born between 1945 and 1965) are not actually 'undersaved' if we take account of their defined

In simple terms, the aim of this paper is to look at how 'econs' would optimize their financial plans in retirement and then to find ways to nudge 'human' retirees into making optimal choices. Is there something akin to *SMART* plans to help retirees spend the money that they have saved during their working lives by being optimally 'smart' through retirement?

As the Baby Boomers begin to retire, a different set of behavioural issues confront them, reluctance to save is replaced by a reluctance to annuitize and the possible suboptimal drawdown of retirement assets. This paper examines ways in which behavioural economics can be used to overcome the so-called 'annuity puzzle', the reluctance of retirees to voluntarily annuitize sufficient of their assets to adequately hedge their longevity risk.[6] We do this by introducing *SPEEDOMETER* (or *S*pending *O*ptimally *T*hroughout *R*etirement) retirement expenditure plans. We use the term *SPEEDOMETER* to reflect the fact that spending optimally is related to the speed with which assets are drawn down and a *SPEEDOMETER* is a useful device both for measuring and influencing speed.

A *SPEEDOMETER* retirement expenditure plan helps retirees pace their spending throughout retirement in order to optimize their lifetime income to cope with retirement income shocks and their ability to make intended bequests by: (1) first, making a plan, either by using an on-line or telephone-based service providing generic financial advice or if wealth permits, involving a financial adviser whose role is to assist with making and implementing the plan and conducting annual reviews;[7] (2) managing *all* assets and income sources holistically to secure, as a *minimum*, a core inflation-protected income sufficient to meet the retiree's 'essential' needs for the remainder of their life;[8] (3) using insurance solutions, when available and cost effective, to cover contingencies, and, where possible, maintaining flexibility by holding sufficient assets to meet uninsurable shocks (i.e., a 'rainy day' fund); (4) using automatic, phased annuitization into 'money-back',[9] inflation-linked, fixed

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benefit (DB) pension entitlements, housing equity and greater inheritance (again due to the increases in the value of their parents' houses); see, e.g., Willetts (2010). However, it can be argued that much of this is due to luck rather than skill. In contrast, it is widely recognized that both Generation X (born between 1965 and 1980) and Generation Y (born after 1980) are undersaving.

[6] In the UK, until the June 2010 Budget, there was a mandatory requirement for a defined contribution (DC) pension plan member to secure pension income by age 75 at the latest with at least 75% of the fund; for 99% of retirees this was achieved by the use of a lifetime annuity. But there is a widespread view that this is not a 'smart' purchase. There is minimal annuitization of non-pension assets.

[7] *SPEEDOMETER* plans need to take account of the taxation implications on income, capital gains and inheritance. They also need to take account of the interaction with means-tested state benefits. For example, in the UK, the state provides some insurance against shocks, e.g., incapacity benefits, which reduces the need for private insurance. Similarly, in the UK, if the 'rainy day' fund is too high, this would remove the entitlement to means-tested benefits such as Housing and Council Tax Benefits.

[8] We define 'essential' income as the income required to cover the plan member's minimum basic expenditure needs.

[9] 'Money-back' annuities are capital protected annuities and work as follows. On death, any excess of the original purchase price over the gross annuity payments already received is returned to the annuitant's estate

or investment-linked lifetime annuities or into variable annuities – depending on the degree of risk aversion and wealth of the plan member – to secure an 'adequate' level of life-long income[10] above the minimum if there is sufficient wealth to do so; and (5) offering a simplified choice architecture for managing any residual wealth with the aim of achieving a 'desired' standard of living in retirement,[11] while allowing part of the remaining wealth to be bequested at a time of the retiree's choosing.

We believe the plan is suitable for all members of society, except the super-rich, although the size of the minimum income level will differ depending on circumstances (e.g., health status) and the socio-economic group to which the retiree belongs. Part 2 will be the most important part of the plan for the mass market with limited bequestable assets. The remainder of the plan is designed primarily for the mass affluent, although it might also have some relevance both for members of the mass market with some housing equity and for the high net worth segments of society.

A *S*PEED*O*ME*TE*R plan is one that we believe an 'econ' would choose. But we also need to recognize explicitly that most of us are 'humans' and need an appropriate choice architecture, as well as some advice and nudging, along the lines of Thaler and Sunstein (2008), towards the optimal solution provided by the *S*PEED*O*ME*TE*R plan. The plan recognizes that it is not a question of *whether* retirees should annuitize some of their wealth, but *when* they should do so.[12] Retirees with modest wealth in excess of the optimal 'rainy day' fund cannot really afford to take on investment and longevity risks and therefore need to annuitize sooner rather than later in order to secure at least an adequate lifetime income. Those with more wealth can use annuitization to insure against their income falling below what they consider to be an adequate or even a desired level and to reduce the variability around the level and timing of the inheritance they pass on to their heirs; in particular, annuitization enables bequests to be made prior to death.[13] It is optimal for couples to annuitize later than singles. In short, a *S*PEED*O*ME*TE*R plan with its optimal use of annuitization, allows retirees to 'spend more today'*,* safely. In fact, it is analogous in the distribution phase of the life cycle to a *SM*AR*T* plan in the accumulation phase, although it is considerably more sophisticated, since it also deals with the optimal investment and longevity risk strategies in later life. Planning retirement income is complex, given the unknown and effectively uncontrollable time period over which consumption has to be spread. By contrast, in the accumulation phase,

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net of any tax. The guaranteed payment schedule with a 'money-back' annuity involves a decreasing death benefit to ensure that the sum of the overall payments is at least equal to the original purchase price.

[10] We define 'adequate' income as the income required to achieve a minimum lifestyle to which the plan member aspires in retirement.

[11] We define 'desired' income as the income required to achieve the full lifestyle to which the plan member aspires in retirement.

[12] Income from defined benefit schemes is recognized within the *S*PEED*O*ME*TE*R plan and typically viewed as similar to an index-linked annuity. Retirees who are members of DB pension schemes are likely to have less flexibility around phasing and when they can start receiving their pension income.

[13] This might be optimal in order to reduce inheritance tax or maximize the welfare of heirs.

individuals can influence, at least to a degree, when they exit the labour market and are able to adjust their savings rate.

While the paper focuses on how to spend wealth optimally, it is important to recognize that the key foundation of any successful retirement expenditure plan is accumulating sufficient savings prior to retirement. In the UK, annuities are often blamed for poor retirement incomes when the root cause is not annuities – which recent studies[14] have shown offer good value (in the sense of having relatively high money's worth[15]) in the competitive UK market – but rather an inadequate retirement fund as well as reductions in the real value of state and private pensions.

The outline of the paper is as follows. In section 2, we examine needs, risks and financial resources in retirement. Section 3 reviews the range of retirement income products available. Section 4 discusses the optimal use of these products for different market segments – the low affluent, the mass market, the mass affluent and the high net worth – considering how, if retirees were behaving optimally, they would determine their optimal investment portfolio and their optimal age to annuitize, taking into account the desire to retain flexibility to allow for uninsurable shocks. Section 5 looks at the barriers that need to be overcome in getting to the optimal level of annuitization, while Section 6 discusses the choice architecture required to 'nudge' retirees to make better financial planning decisions. Section 7 concludes.

Throughout, it is important to bear in mind the following definition of a pension plan: it provides retirement income security for however long the plan member lives (Bodie (1990)). If a plan does not do this, it should be classified as a wealth management plan, *but not* a pension plan. We believe that a *S*PEED*O*ME*TE*R plan is more general than a simple pension plan, because it looks at all of a retiree's assets and income sources, and uses them optimally to maximize the expected utility or welfare of retirement expenditure. We also believe that a *S*PEED*O*ME*TE*R plan is more useful than a typical wealth management plan for two key reasons: (1) it explicitly uses annuitization and its timing to meet expenditure needs and to make bequests more effectively and (2) it actively uses behavioural economics to nudge retirees to make the best decisions for their circumstances.

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[14] See, e.g., Finkelstein and Poterba (2002), Cannon and Tonks (2008).

2. Needs, Risks and Financial Resources in Retirement

2.1 *Needs*

Consumption needs in retirement are neither smooth nor certain. Consumption expenditure in retirement typically exhibits a U-shaped pattern (see Figure 1). First, there is a period of active retirement in which retirees do the things they promised to do, but did not have the time to do, while they were in work. Then, there is a period of inactive retirement: aches and pains become more prominent and eventually people cannot even be bothered to go out and buy a daily newspaper. Finally, medical, care and possibly nursing home expenses come to dominate expenditure. For some, maximizing inheritance is an important consideration.

Figure 1: Income needs in retirement are not smooth or certain
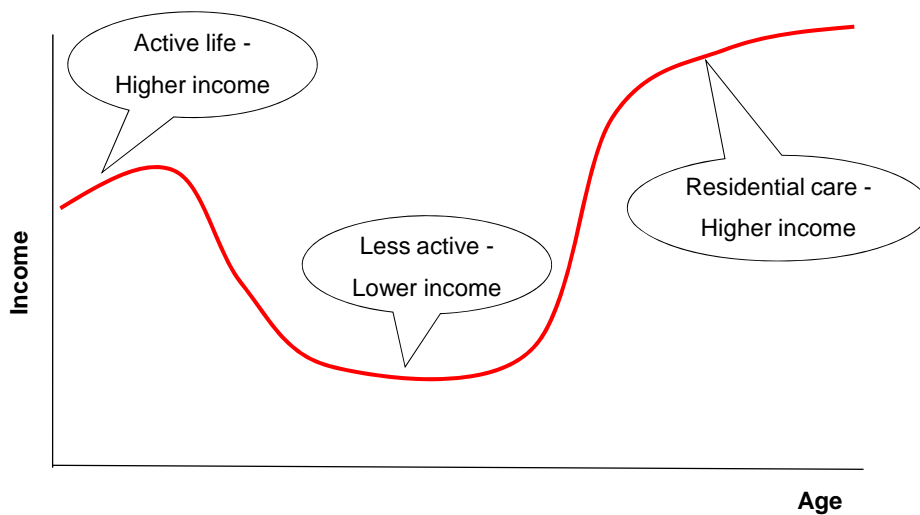
2.2 *Risks*

There are many events that can impact even a well-structured retirement expenditure plan. Living through retirement can be a bit like the snakes and ladders game that we played in our childhood. Many events are unpredictable and essentially random or at least the timing of their occurrence is random. They typically impact single people and couples in different ways: couples often benefit from two incomes and can support each other.

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[15] The ratio of the expected discounted value of the annuity payments to the market price of the annuity. This will be less than 100% to allow for selection effects and annuity provider costs and profit. The money's worth is one measure of the value for money of an annuity.

There are many snakes or adverse events:

- Failure of private pension plans, with the prospect of a reduced pension if a plan falls into the Pension Protection Fund.[16]

- Poor (i.e., low or negative) investment returns on household financial assets, leading to a depletion of wealth. Investment and reinvestment risks are present if retirement assets are held in anything other than conventional lifetime annuities. Stock market indices can fall by 10% or more in a single day – as we witnessed in 2008, in response to the 2008-09 Global Financial Crisis.[17] Such falls can seriously damage wealth if a fixed income is still drawn from it.

- Low interest rates. Not only does this affect the income received from bank and building society deposits – the only financial assets held by a large percentage of retirees – there is interest-rate risk when an annuity is purchased. If interest rates are low at the time of purchase, the annuitant will be locked into a permanently low annuity income.

- Period of high inflation: the purchasing power of money is reduced by half in 14 years with 5% inflation, in 7 years with 10% inflation. An index-linked annuity can protect against inflation, however.[18]

- Changes in taxation and state benefit rules.

- Debts that have not been paid off whilst in work (consumer loans, outstanding mortgage, etc).

- Loss of or inability to find post-retirement work.

- Unexpected expenditure, such as a major repair bill.

- Unexpected needs of dependants or relatives.

- Ill health: this can affect not only the retiree, but the need to care for a partner can also have a major impact on retirement plans.

- Funding for long-term care: 1 in 5 retirees in the UK will have to find the means to fund long-term care, which ranges between £329 per week for stays in residential homes to £455 per week for stays in nursing homes.[19]

- Divorce: this is on the rise for retired couples.

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[16] The UK Pension Protection Fund is a statutory fund run by the Board of the Pension Protection Fund, a statutory corporation established under the provisions of the Pensions Act 2004 to protect the benefits of members of private-sector defined benefit pension plans – up to certain limits – in the event that plan sponsors become insolvent. It is financed by a compulsory levy on all private-sector DB pension plans.

[17] On 10 October 2008, the S&P500 index fell 10.7%, while the FTSE100 index fell 8.9%; the banks Morgan Stanley and HBOS fell by 25% and 19%, respectively.

[18] There could still be inflation risk even if an index-linked annuity is purchased, since retiree inflation might differ from the inflation index underlying most index-linked annuities (typically the retail price index (RPI) or the consumer price index (CPI) in the UK).

[19] http://www.privatehealth.co.uk/healthinsurance/long-term-care-plans/facts-and-figures/; accessed 13 April 2010.

- Death of a partner: this can also have a major impact on retirement plans, especially if it results in a significant reduction in pension income.

- Longevity risk. This has two extremes: the risk of outliving one's resources and hence the failure to leave an intended bequest, but also the risk of underspending in retirement and hence leaving unintended bequests. Individuals find it difficult to appreciate the variability of actual lifetimes around the expectation of life. Figure 2 shows that for typical 65-year old males in the UK today, life expectancy is 87.8, but 25% will reach 94 and 8% will reach 100. A male aged 85 today can expect to live another 7.1 years to 92.1, 26% can expect to reach 95 and 7% to reach a 100.

Figure 2: Variability in life expectancy

Expected distribution of deaths: male 65   **Expected distribution of deaths: male 85**
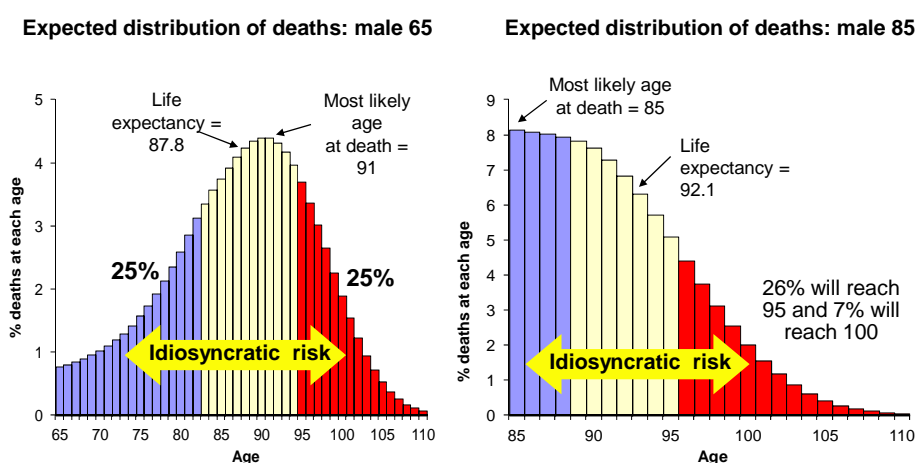
Source: 100% PNMA00 2010 plus improvements in-line with CMI_2009_M [1.00%]

Regrettably, there are fewer ladders, or favourable events, to help boost long-term retirement income. The main resources in retirement will be state benefits and allowances – both means-tested and non-means-tested – and private pensions, but some retirees will also benefit from:

- Significant non-pension financial assets.

- Housing equity release: this is probably the most important potential ladder for most owner-occupiers in retirement.

- Part-time working.

- Additional state benefits and allowances which can help offset some of the additional expenditure increases due to ill health, care needs or higher fuel costs in old age.[20]

- Life, critical illness, health and long-term care insurance.

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[20] Given the relatively low value of the Basic State Pension in the UK, the UK has developed an extensive range of means-tested benefits and allowances to combat pensioner poverty. Any retirement expenditure plan for the mass market needs to take the benefit rule structure into account.

- Inheritance from parents.
- Lower inflation.
- Higher investment returns.
- Marriage: marriage or re-marriage after the divorce or death of a spouse is, of course, a major event which should be a big ladder, because couples typically benefit from joint income and can support each other.

Of course, the analogy of the snakes and ladders game is not quite right. Snakes and ladders is essentially a game of chance with very limited tactical or strategic options. However, with appropriate retirement planning, retirees can be helped by advisers to prepare in advance to mitigate the impact of many of the shocks.

2.3 *Financial resources*

Retirement planning needs to take account of all of a retiree's assets: state pensions and any benefit entitlements, defined benefit (DB) and defined contribution (DC) pensions, non-pension assets and housing wealth. For those with a number of sources of wealth, holistic retirement planning is essential to optimize income and tax.

Figure 3: Total wealth for ages 55 to 64 in 2005
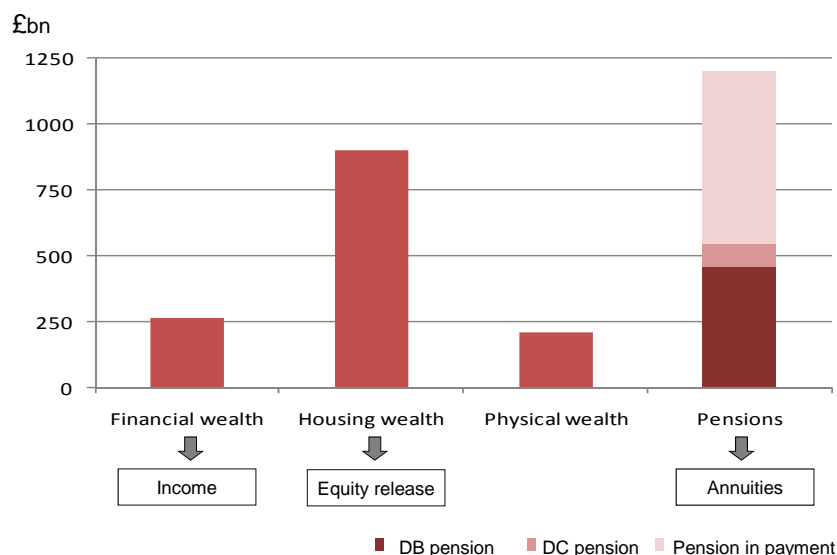
Source: Wealth and Assets Survey 2006-2008, Office for National Statistics

As Figure 3 shows, many of the Baby Boomers approaching retirement in the UK have accumulated significant wealth. The 7.1 million people aged between 55 and 64 who represent the first wave of Baby Boomers have accumulated over £2.5trn of wealth comprising £1.2trn of

pensions wealth, £900bn of housing wealth, £265bn of financial wealth and £208bn of physical wealth. £557bn of the pension wealth is already in payment, with £459bn of DB pension wealth and £87bn of DC pension wealth still to be converted into retirement income. Clearly, some of the housing wealth could be converted into income by using equity release and an income could also be generated from the assets that make up financial wealth. The pension wealth figure makes no allowance for Basic State and Second State pensions but does include public sector employee pensions even though they are largely unfunded.

The wealth profile of the Baby Boomers is highly skewed and, in addition to earnings and inheritance, depends significantly on whether they participated in a DB pension scheme for a large proportion of their working life and also bought a house in the 1970s and 1980s. 79% of this age group have a private house giving average (median) housing wealth for those with a house of some £270,000 (£200,000). Almost a third of the group have no pension wealth, while the two thirds with some pension wealth have a mean pension wealth of £250,300.

Clearly with such a skewed distribution of wealth, it is useful to segment the pre-retirement market. According to the FSA Baseline Survey,[21] there were some 8.8m people over 50 in the UK in 2005 who had not yet retired. This cohort can be broken down into: 3 million (35%) low affluence (net income below £10,000 and mean financial wealth £2,200); 4 million (45%) mass market (net income between £10,000 and £30,000, with mean financial wealth of £13,300); and 1.8 million (20%) mass affluent and high net wealth (net income over £30,000 and mean financial wealth of £71,400). Even within this last category, financial wealth is highly skewed with median financial wealth equal to just over one half of the mean at £37,400).[22]
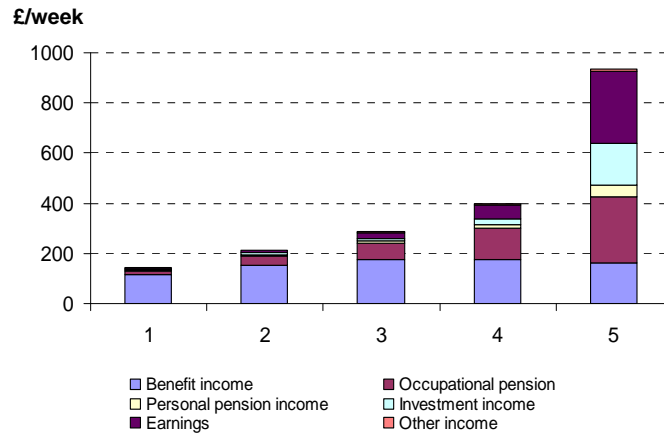
Figures 4 and 5 show the key sources of income in retirement by quintiles of the gross income distribution for retirees in the UK in 2006-07 in absolute and relative terms, respectively. What is clear is how much retirees depend on the state for retirement income,[23] especially once earnings cease, and how it is really only the top 40% or even top 20% of pensioner household units that have the luxury of worrying about funding an 'adequate' income level, let alone a 'desirable' one.

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[21] FSA Baseline Survey of Financial Capability (2006).
[22] The wealth figures here ignore the value of Basic and Second State pensions and other state benefits.
[23] Benefit income includes Basic and Second State pensions and other state benefits.
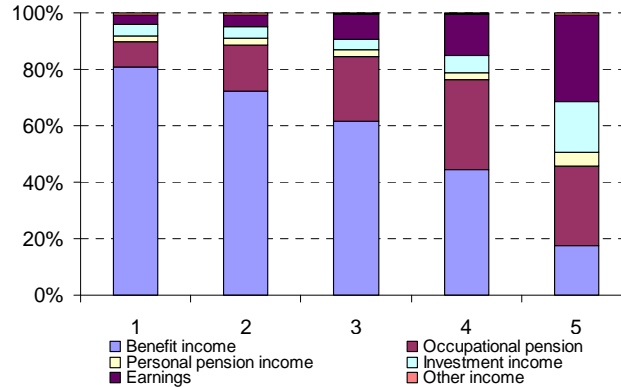
Figure 4: Components of mean gross income per pensioner unit by quintiles of the net income distribution: 2006-2007

£/week

Benefit income — Occupational pension
Personal pension income — Investment income
Earnings — Other income

Pensioner unit = all single pensioners + couples

Source: Department for Work and Pensions

Figure 5: Percentage contribution to mean gross income per pensioner unit by quintiles of the net income distribution: 2006-07

Benefit income — Occupational pension
Personal pension income — Investment income
Earnings — Other income

Pensioner unit = all single pensioners + couples

Source: Department for Work and Pensions

3. Retirement Income Products

3.1 *Annuitization*

Before discussing retirement income products in detail, we need to define annuitization. We use the term annuitization to cover all products that can guarantee a minimum lifetime income however long the retiree might live and whatever happens to investment returns. Insurance companies can

provide this guaranteed lifetime income either by operating a cross-subsidy or by making an explicit charge.

With conventional lifetime annuities, the retiree's capital is put at risk in exchange for a mortality cross-subsidy. This is the transfer of wealth within a pool of annuitants from those who die earlier than their life expectancy – and hence lose their residual capital – to those who live longer: an earlier-than-expected death creates a mortality release which the annuity provider uses to fund income for those who live longer than expected. In effect, the mortality cross-subsidy generates survivor credits which increase with age and which continue as long as the annuitant is alive; thereby ensuring the lifetime income guarantee.

With variable annuities, extra fund charges are made for the lifetime guarantee and these accumulate the longer the policyholder lives. The result is that those dying early provide only a modest cross-subsidy to those living longest. Those living longest pay the most charges and this is reflected in a lower lifetime income than available under the conventional annuity's cross-subsidy approach, all other things being equal.

As we have already commented, many of the Baby Boomers in the UK are retiring with a significant proportion of their pension wealth in the form of a DB pension. This effectively results in automatic annuitization of DB pension wealth. The focus in this paper is, accordingly, on the optimal use of DC and non-pension wealth.

3.2 *Defined contribution pension products*

The principal retirement income products available from DC pension plans in the UK are:
- Conventional lifetime annuities, such as fixed and index-linked annuities.
- Income drawdown (also known as systematic, programmed, or phased withdrawal): the retiree's assets remain fully invested, but some of the assets are sold each year to pay an income to the retiree (in addition to any income the assets themselves produce).
- Investment-linked annuities – such as with-profit annuities, unit-linked annuities, flexible annuities – and variable annuities.

Figure 6 shows that the UK DC retirement income market was worth £12.4bn in 2009, of which 80% was in the form of conventional annuities, 15.5% in drawdown and just 4.5% in investment-linked annuities. The market share of conventional annuities grew from 59% in 2000 to 80% in 2009 by volume.

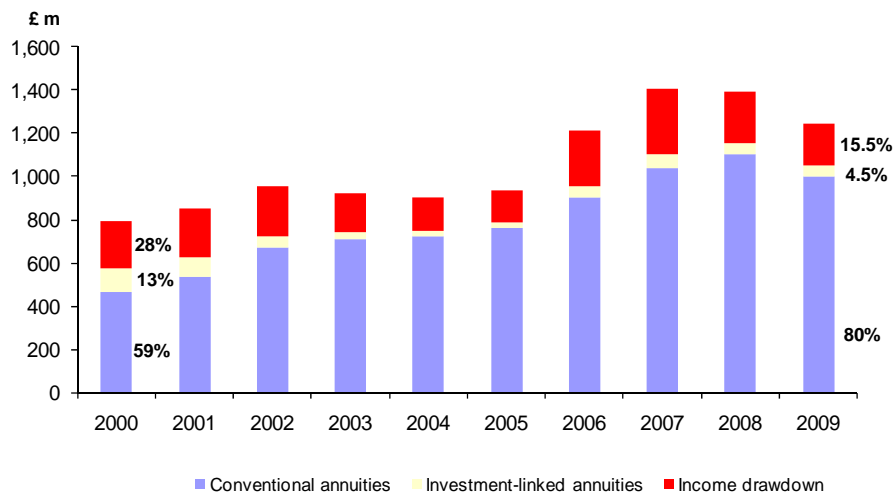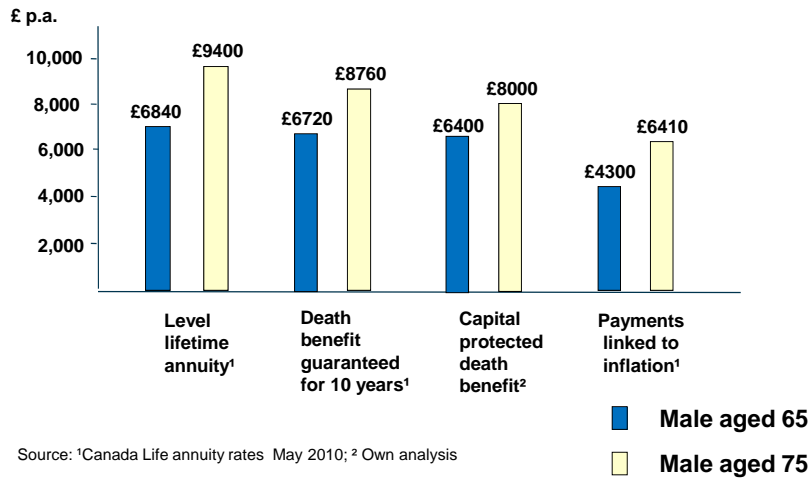**Figure 6: Sales of UK retirement income market products: 2000-2009**

£ m

1,600	

15.5%
4.5%

28%
13%

59%

80%

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009

■ Conventional annuities   ■ Investment-linked annuities   ■ Income drawdown

Source: ABI new business market data

Figure 7: Lifetime annuities in the UK

Typical annuity rates for £100,000 premium

£ p.a.

£9400
£6840
£8760
£6720
£8000
£6400
£6410
£4300

Level lifetime annuity[1]   Death benefit guaranteed for 10 years[1]   Capital protected death benefit[2]   Payments linked to inflation[1]

■ Male aged 65
□ Male aged 75

Source: [1]Canada Life annuity rates May 2010; [2] Own analysis

3.2.1 Conventional lifetime annuities

Conventional lifetime annuities provide a guaranteed income for life, either in nominal or real terms. In their simplest form, there is no death benefit and the income is a fixed monetary amount which includes the survivor credits. Figure 7 shows that, as of May 2010, a £100,000 premium will buy a

65-year-old male a fixed annuity for life of £6,840 per annum. Guaranteeing that the annuity payments are made for at least 10 years reduces the annual payment by 2% to £6,720. A capital-protected annuity[24] reduces the annual payment by 6.4% to £6,400.[25] An index-linked annuity starts at £4,300 and will increase in line with increases in the RPI.

The purchaser of a conventional lifetime annuity removes two key risks, longevity risk and investment risk. Longevity risk is removed by the insurance company guaranteeing to pay income however long the pensioner lives. The Global Financial Crisis has highlighted the importance of the investment guarantee that insurance companies give to a retiree when they buy an annuity. From an investment perspective, retirees gain in four ways:

- First, because annuitants give up control over their assets, insurance companies can invest in illiquid investments such as long-dated corporate bonds to match their liabilities. Insurance companies pass on a significant portion of the liquidity premium to retirees resulting in higher annuity rates.
- Insurance companies are able to manage re-investment risk within their annuity portfolios much more efficiently than individuals.
- Insurance companies take on credit risk, again typically in the form of corporate bonds, and pass on some of the credit risk premium to annuitants, since they can diversify the credit risk against longevity risk which has low correlation with credit risk.[26]
- Finally, annuitants benefit from the ability of insurance companies to pool the funds of annuitants which allows them to invest in fixed-interest or inflation-linked investments that would not be directly available to individuals. For example, insurance companies can participate in infrastructure projects or large commercial property investments.

3.2.2 *Income drawdown*

Figure 8 shows the situation with income drawdown and the same £100,000 premium. Suppose the individual decides to withdraw £6,840 each year and that the investment return on the fund is 4.5% after charges.[27] This enables the same income as the annuity to be drawn each year, so long as there are sufficient funds remaining. The bars in Figure 8 show the depletion of the fund, while the line shows the percentage of lives expected to still be alive at each age. The fund is exhausted by

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[24] Pension schemes are currently not permitted to offer capital-protected annuities, although this restriction will shortly be removed.
[25] The reduction in income on a joint-life capital-protected annuity for a couple both aged 65 would be much smaller at around 1%.
[26] Longevity risk is not completely uncorrelated with credit risk, since the holders of corporate bonds in companies with deficits in their pension funds arising from increased longevity face an increase in credit risk.
[27] This rate was chosen as it represents a higher investment return than available under conventional annuities invested in bonds due to a proportion of the fund being invested in equities.

age 90 and there is a 48% chance that the retiree will outlive his assets, maybe by many years. The advantage of drawdown, however, is that if the retiree dies before age 90 – and over half will – his estate will receive the balance of the fund, whereas with a standard annuity without any death benefit, the estate gets nothing.

Figure 8: Drawdown from age 65: Income of £6,840 yearly in arrears with a 4.5% fund growth rate
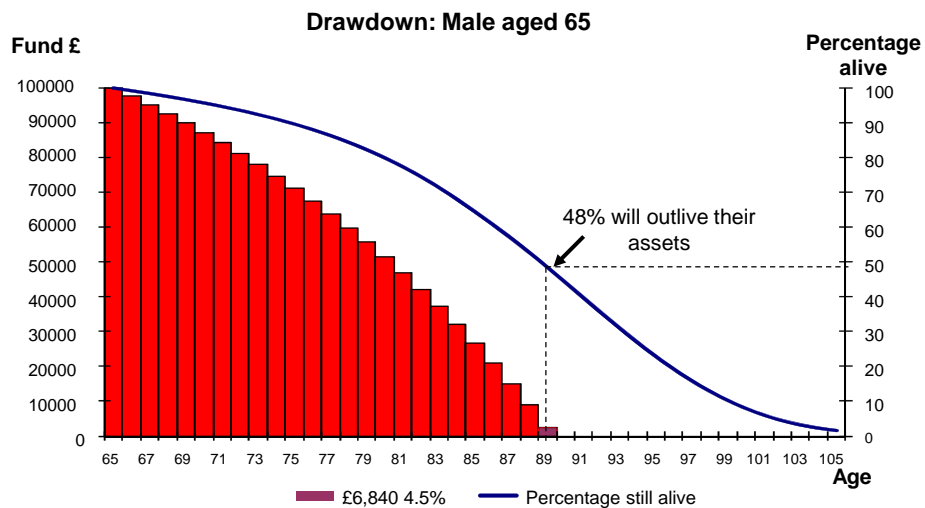
Source: Own analysis using 100% PNMA00 2010 plus improvements in-line with CMI_2009_M [1.00%]

Figure 9: Drawdown from age 65: Income of £6,840 yearly in arrear with a 5.5% fund growth rate
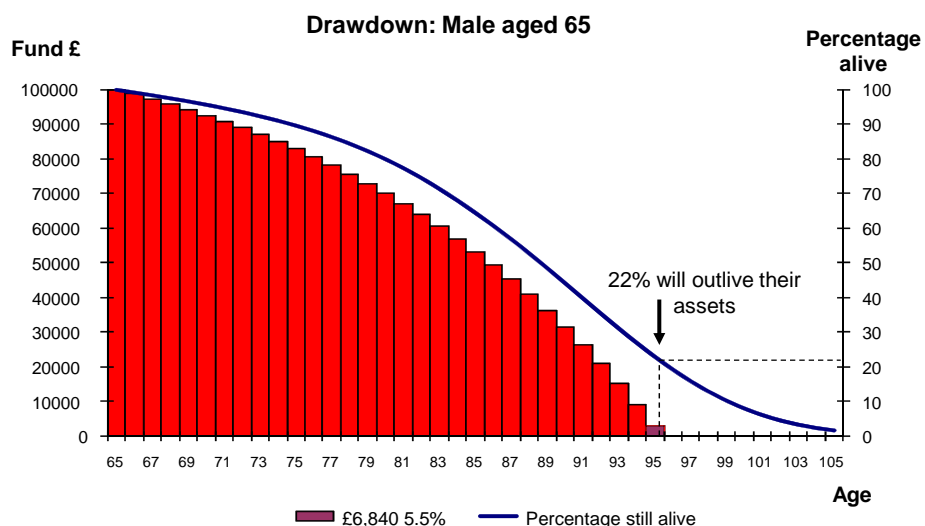
Source: Own analysis using 100% PNMA00 2010 plus improvements in-line with CMI_2009_M [1.00%]

Some retirees might believe they can generate higher returns in retirement by investing a greater proportion of their fund in riskier assets, such as equities. Figure 9 shows what happens when the

annual income drawn remains at £6,840, but an investment return of 5.5% after charges is generated. In this case, the fund would be exhausted by age 96 and some 22% of retirees would still outlive their assets. However, equity prices are more volatile than those of bonds. If income is taken when asset prices are depressed, the fund can run down very quickly particularly when a significant income relative to the fund size is being withdrawn at older ages. The purchasers of income drawdown products retain all risks, particularly longevity and investment risks, and, in addition, do not benefit from survivor credits.

3.2.3 *Investment-linked annuities and variable annuities*

The survivor credits can operate within investment-linked annuities, such as with-profit annuities, unit-linked annuities and flexible annuities (Wadsworth et al. (2001)).

In the case of with-profit annuities, the pension fund is invested in a risk-graded managed fund. The annuity payment is based on an anticipated smoothed investment return. The initial income generally starts at a similar level to the fixed annuity and, if investment performance is good, income increases. However, the annuity payment could be reduced if the assumed smoothed return turns out to be lower than the actual return.

With unit-linked annuities, the capital sum is invested in a unit-linked fund and each year a guaranteed number of units are sold to provide the annuity payment. The initial payment is typically lower than with an equivalent level annuity. The annuity fluctuates in line with the unit-linked fund's price. Income equal to the value of the units is guaranteed to be paid however long the annuitant lives.

With flexible annuities, the annuity payment can be varied within limits at the annuitant's option. Income is dependent on investment performance; if investment performance is lower than expected this impacts the level of future income. The pension fund is invested in a risk-graded managed or unit-linked fund. A variation on this is to purchase a sequence of 5-year limited period annuities to provide the income, at each stage retaining sufficient wealth to fund future purchases in the sequence.

US-style variable annuities (VAs) have recently been introduced into the UK. While VAs can operate in a similar way to that in the USA for non-pension assets, they have had to be adapted to fit UK

pension regulations. VAs can be thought of as drawdown with guarantees, and, as a result of the guarantees, will provide a lower income than a lifetime annuity.[28]

3.3 *Non-pension products*

As highlighted in Section 2, mass affluent and high net wealth retirees have considerable non-pension wealth. With non-pension products, there is a wider choice of investments. Options include:

- Cash-based products and guaranteed bonds from National Savings, banks, building societies and insurance companies.
- Life bonds, with-profits bonds, US-style variable annuities and mutual funds offering exposure to equities, corporate bonds and property are also available.
- Insurance companies also offer purchased life annuities (PLA)[29] and immediate-needs annuities[30] which provide a guaranteed lifetime income.
- Direct property investments ranging from own residence, buy-to-let and commercial property.
- More specialist investments often with tax incentives and which typically offer a higher reward in exchange for higher risk.

4. The Optimal Use of Products and the Optimal Investment Strategy

4.1 *The optimal use of products*

The optimal use of the products discussed in the previous section will depend on the source of the retiree's wealth and the segment of the market to which the retiree belongs.

Retirement expenditure planning is about tradeoffs:

- Higher income and expenditure today **v** higher income and expenditure later.
- Higher income and expenditure **v** higher inheritance.
- Protecting against future inflation **v** higher immediate income.
- More investment risk **v** more certainty in retirement income.
- Buying longevity insurance **v** assuming longevity risk.

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[28] For more details of the UK annuity market, see Wadsworth et al. (2001), Boardman (2006) and Cannon and Tonks (2008).

[29] Purchased life annuities is the name given to annuities that are voluntarily purchased in the UK. Part of the annuity payment is a return of capital and this part of the annuity payment is not taxed. This contrasts with pension annuities which are also known as compulsory purchase annuities. Since the pension fund at retirement benefitted from generous tax breaks during the accumulation stage of the pension plan, the whole of a pension annuity payment is subject to tax.

[30] In the UK, these are annuities purchased when a retiree enters a care home; the annuity payments are made directly to the care home and are paid tax free.

Personal circumstances will influence the appropriate decisions for an individual. Nevertheless, these tradeoffs are hard even for professional financial planners, economists and actuaries to make, let alone members of the general public. Most people typically have limited planning skills, a very limited understanding of inflation, investment and longevity risks, and find it difficult to make choices that impact outcomes some time into the future. Planning retirement finances in the context of the level of uncertainty surrounding the length of life depicted in Figure 2 is difficult and shows the importance of a guaranteed lifetime income.

In general terms, successful retirement expenditure planning can be defined as ensuring a dependable post-tax income stream for life to meet expected needs, with insurance strategies to cover the key risks that could significantly upset the plan together with a 'rainy day' fund to provide the flexibility for when insurance is either unavailable or uneconomic. It is important to ensure that first 'essential' and then 'adequate' income levels are as secure as possible. Adequate income is an income which better reflects a retiree's needs taking account of past living standards. Some flexibility can be retained initially around how and when income between an 'essential' level and a 'adequate' level is secured. The closer the cost of securing 'adequate' income is to total wealth, the more important it is to use annuitization products as soon as possible. Much more flexibility can apply to wealth beyond the 'adequate' level, as 'desirable' spending tends to be more ad hoc (e.g., a world cruise) and is likely to compete with the wish to make bequests.

Planning and associated budgeting become particularly important in retirement on account of the difficulty, if not impossibility, of returning to employment in order to generate additional income. The first task in retirement is therefore to make a plan starting by comparing projected essential expenditures against projected total after-tax income, including any DB pension, state pensions and means-tested benefits, making allowance for any inflationary uprating. If there is an expenditure deficit, the retiree needs to consider how the gap can be filled; this may require a reassessment of adequate and essential expenditure. If there is an expenditure surplus – current as well as projected in future years – the retiree can plan for some desirable expenditures. The retiree also needs to assess potential risks and changes to both projected essential expenditures and projected post-tax income arising from, say, tax changes or changes in circumstances (see snakes and ladders above).

Turning to the different market segments, we begin with the low affluent and the mass market. Low affluent retirees have very little savings, pension or housing wealth and therefore will be very reliant on state support throughout their retirement. Most mass market retirees also have limited means: 90% have DC pension funds below £50,000 at retirement, almost two-thirds have less than

£20,000.[31] Since state pensions and benefits are the dominant source of retirement income for the majority of these retirees (see Figure 5), mass market households are likely to have to accept a relatively simple strategy. Their primary focus will be on achieving the optimal balance between the size of their 'rainy day' fund and their level of guaranteed retirement income, taking into account any implications of the size of the 'rainy day' fund on their entitlement to means-tested state benefits.[32] A conventional annuity-based solution is probably going to be the best option for most of the mass market. In practice, the mass market will rely heavily on the state and any housing equity will be used to provide for health care and other retirement contingencies. Bequests, mainly in the form of residual housing equity, will be typically left more by chance than design.

The position of the 20% minority fortunate enough to be in the mass affluent and high net worth segments is different. For these retirees, retirement income and expenditure planning needs to be looked at holistically.

The first point to recognize is that it is a very complex task to optimize the controlled rundown of a retiree's assets throughout their retirement, especially in the early years of retirement. Optimization is particularly difficult for retirees in their 60s who are looking forward to a retirement of 20 years or more. The investment strategy needs to be far more sophisticated in decumulation than in accumulation. This is because of the lack of uncertainty around the duration of the payments and the difficulty of recovering from adverse investment conditions if, at the same time, the retiree needs to sell assets to provide income. Unlike mass market retirees who can rely on the majority of their income being inflation protected by the state, the mass affluent need to take account of and manage their inflation risk. Given the considerable doubt and uncertainty in the early years of retirement, it generally makes sense for retirees to be as flexible as possible and retain control over their assets if they can afford to do so.

Mass affluent pensioners should take early steps to top up their essential income and secure an adequate base income using an index-linked annuity. They should also look to use insurance, if available and cost effective, to reduce the uncertainty from adverse events. Housing equity has a key role in any optimization strategy: it could provide a source of additional income utilizing equity release. In addition, housing equity allows greater investment risk to be taken and it will often be the main funding source for any bequests.

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[31] Association of British Insurers.
[32] In the UK, 25% of the accumulated pension pot can be taken as a tax-free lump sum. This, or at least part of it, can be used as the 'rainy day' fund. Note that if retirees have greater than £16,000, this can reduce their entitlement to means-tested state benefits.

Fortunately, as people get older or, more strictly, as their remaining life expectancy decreases, the optimization task becomes simpler. When life expectancy is less than 5 years, investment considerations become easier as bonds or annuities and cash become the optimal core holding. Also if and when people go into a nursing home, income expenditure becomes less volatile and more predictable. Overall, there is a narrowing funnel of uncertainty based on life expectancy.

4.2 *The optimal investment strategy including optimal age to annuitize*

4.2.1 *Males*

The optimal investment and longevity strategy is complex and impossible to implement without sophisticated stochastic dynamic programming software. Milevsky (1998) proposed a simple rule of thumb for deciding when to switch from risky equity-linked assets to an annuity: this is when the survivor credit resulting from the mortality cross-subsidy exceeds the equity premium as shown in Figure 10. The survivor credit for a particular age (x) can be thought of as the excess return on a level annuity over a risk-free investment: it is equal to the ratio of the proportion of the annuitants aged x who die during a particular year (having survived to the beginning of that year) to the proportion of the annuitants aged x who survive the particular year. The equity premium is the excess return of equities over a similar risk-free investment.

Figure 10: The Milevsky switching rule
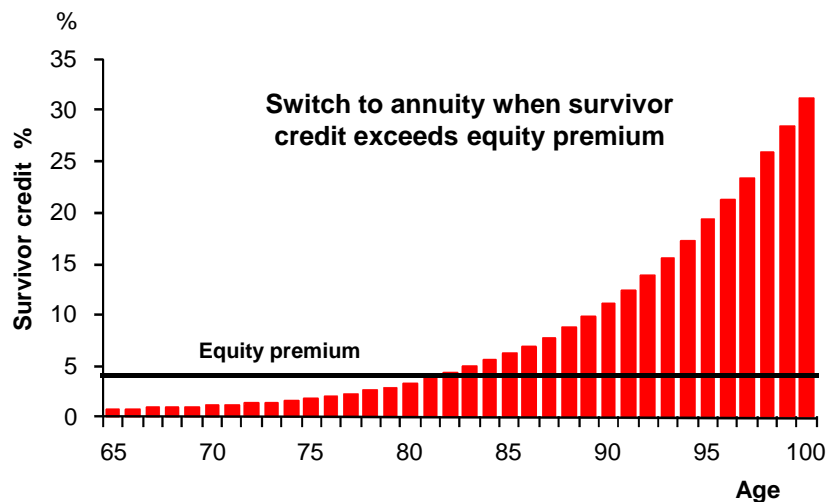
Source: 100% PNMA00 2010 plus improvements in-line with CMI_2009_M [1.00%]; Survivor credit = $q_x / (1-q_x)$

In the early years after retirement, the equity premium exceeds the survivor credit and, all other things being as expected, the retiree receives a higher average return from investing in an equity-dominated portfolio than investing in a fixed annuity. However, the level of the survivor credits increases each year and eventually exceeds the equity premium. Figure 10 shows that the switchover age is around 80 If the equity premium is 4%.

This approach has been a popular rule of thumb used by advisers to determine when retirees should annuitize. However, Wadsworth et al (2001) argue that investment-linked annuities fully hedge longevity risk, while also benefiting from both survivor credits and higher average returns than fixed annuities. Boardman (2006) showed that death benefits can be built into the annuity. In simple terms, all contracts trade off death benefits against higher income. Ultimately optimization comes down to what risk of a reduction in future lifetime income a retiree is prepared to accept for retaining control over their assets.

If a retiree decides not to annuitize his retirement pot at the beginning of a year, then, all things being equal, he will secure a lower income if he annuitizes at the end of the year.[33] As Figure 10 shows, the survivor credits also increase exponentially as age increases, thereby, from a longevity risk perspective, making annuitization essential for anyone without extensive wealth.

In the early years of retirement, it is investment risk, rather than the longevity risk, that is likely to be more significant. The loss of survivor credits in the early years can result in a reduced income of a few percent, but investment risk can have a much bigger impact. If annuitization is delayed a year, then the fund can suffer significant investment losses, particularly if a large proportion of the fund is held in equities. There could be some mitigation if the interest rates used in calculating annuity prices increase to reflect a fall in equity values,[34] but the impact can still be very significant. Of course, if we believe in mean reversion, the retiree could delay annuitizing and wait for equity values to recover. However if the retiree needs to continue to withdraw income when investment values are depressed, the fund can run down rapidly. Depending on the scale of other wealth, the retiree might not be able to delay annuitization and hence might be forced to buy an annuity with the proceeds from a depleted pension fund. As the retiree gets older, the impact of any investment losses also grows in importance, because the percentage of the fund that needs to be withdrawn each year to maintain the desired income increases as the fund is run down.

For the vast majority, it is not a question of if, but when they should annuitize. The key questions are: what is the optimal asset allocation and when should assets be annuitized? Increasingly

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[33] This occurs because if a retiree aged x (with life expectancy e_x) lives to the end of the year, his life expectancy at age x+1 (e_{x+1}) will be greater than his life expectancy at the beginning of the year minus the year he has survived (i.e., $e_{x+1} > e_x - 1$). An approximation for the reduced income that the retiree will be able to secure at the year end is $(e_x - 1)/e_{x+1}$. This yearly reduction factor decreases as x increases, so the impact of not annuitizing grows exponentially as the retiree ages. The actual loss from a longevity risk perspective will be higher or lower depending on any changes that are made during the year to longevity assumptions around current levels and future improvements.

34 Yields on long-dated bonds tend to be negatively correlated with equity values.

sophisticated stochastic dynamic programming models are being developed to attempt to answer these questions.

The optimal investment strategy will be the one that maximizes the retiree's expected utility or welfare of expenditure over their expected remaining lifetime (Merton (1971), Blake et al. (2003)). This requires knowledge of the retiree's relative risk aversion (RRA)[35] and bequest intensity[36] parameters. These influence both the optimal weighting of risk assets (principally equities) in the post-retirement investment portfolio and the optimal age to annuitize.

Table 1 shows typical ranges for four broad categories of risk aversion and the corresponding optimal weight in equities and optimal age to annuitize for a UK male when there is no desire to leave a bequest, according to a study by Blake et al. (2003) which used stochastic dynamic programming to work out the optimal strategy over time under the assumption that the only assets are pension assets. When risk aversion is low, a high equity exposure is optimal, and can even go as high as 100% in the case where risk aversion is very low (i.e., close to being risk neutral). On the other hand, when risk aversion is extreme, the optimal strategy is to purchase annuities and have no equity exposure at all.

Table 1: The optimal weight in equities and optimal age to annuitize with no bequest requirement		
Relative risk aversion	**Optimal weight in equities**	**Optimal age to annuitize**
Very low: Below 1.43	Extreme: 100%	Between 73 and 79*
Low: 1.43-2.25	High: 75%	Between 70 and 72*
Moderate: 2.26-3.56	Moderate: 50%	Between 66 and 69*
High/extreme: Above 3.56	None: Annuities only	Immediately at retirement age of 65
Note: * Depending on fund performance – poor fund performance will trigger earlier annuitization		
Source: Blake et al. (2003, Tables 5 and 6)		

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[35] RRA determines the size of the risk premium that an investor would be willing to pay (as a percentage of wealth) to avoid risk or volatility, where the risk premium = RRA x *volatility* and *volatility* measures the standard deviation of the return on wealth (Pratt (1964)). Increasing RRA increases the risk premium and also implies that the percentage of wealth willingly exposed to risk decreases with the level of wealth. Blake (1996) reports studies which indicate that RRA can differ widely across individuals, ranging between 1 and 48.

[36] This quantifies the desire to make a bequest.

In terms of deciding the best age to annuitize, the optimal dynamic strategy operates as follows. At the beginning of each year, the retiree decides to annuitize immediately, or wait one more year, taking into account the expected return on the fund, the probability of surviving the year and the value, if any, attached to a bequest (of the remaining fund) if the retiree happened to die during the year (Blake et al. (2003, Section 4.6)). If investments are performing well, it is more likely that annuitization will be delayed.[37] However, if the fund size is small, say as a result of very poor performance over the preceding year, this is likely to bring forward the annuitization decision, because the bequest value of the fund is small and the retiree can start to enjoy the maximum possible secured lifetime income by electing to receive survivor credits.

When risk aversion is very low, it does not become optimal to annuitize until some age between 73 and 79, with the precise age depending on the individual's actual RRA; at this age, it becomes optimal to annuitize all remaining assets. For those who are extremely risk averse, it is optimal to annuitize immediately on retirement. For those with low or moderate risk aversion, it is optimal to annuitize some time between the ages of 66 and 72, depending on fund performance. Larger fund sizes will delay the optimal age to annuitize.[38]

At each level of risk aversion, any value attached to the bequest delays annuitization. It also increases the optimal equity weighting if the degree of risk aversion is already high, but has no effect on the optimal equity weighting if the degree of risk aversion is moderate or low. These findings are shown in Table 2.

| Table 2: The optimal weight in equities and optimal age to annuitize with a bequest requirement		
Relative risk aversion	**Optimal weight in equities**	**Optimal age to annuitize**
Very low: Below 1.43	Extreme: 100%	Between 75 and 80*
Low: 1.43-2.25	High: 75%	Between 71 and 74*
Moderate: 2.26-3.56	Moderate: 50%	Between 68 and 71*
High: 3.57-4.50	Low: 25%	Between 66 and 67 *
Extreme: Above 4.50	None: Annuities only	Immediately at retirement age of 65
Note: * Depending on fund performance – poor fund performance will trigger earlier retirement		
Source: Blake et al. (2003, Tables 5 and 6)		

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[37] In other words, the optimal annuitization age is path dependent (i.e., dependent on the size of the fund and the realized return on the fund).

The bequest motive considered above focused on ensuring capital in pension funds is not lost prematurely. However, it is important to recognize that both pension and purchased life annuities can be useful to the high net worth segment to secure the bequests they wish to make. By annuitizing sufficient wealth to live comfortably in old age, the wealthy can ring fence assets that they wish their children to inherit. In this sense, annuities are valuable in reducing the variability in the amount of wealth to be inherited as well as the timing. With sufficient annuitization and long-term care insurance in place, wealthy people can chose when the desired bequest takes place and can minimize the tax consequences.

4.2.2 *Females and couples*

The analysis above was based on a single male life. It is interesting to consider the position for females and couples. Figure 11 shows the distribution of deaths from age 65 for males, females and couples. As expected, the ranges are greater for females and couples than males and the chances of dying are lower at younger ages. The shape of the distribution curves becomes more skewed as age increases and variability increases, as shown in Figure 12.

**Figure 11: Expected distribution of deaths from age 65
for males, females and couples**
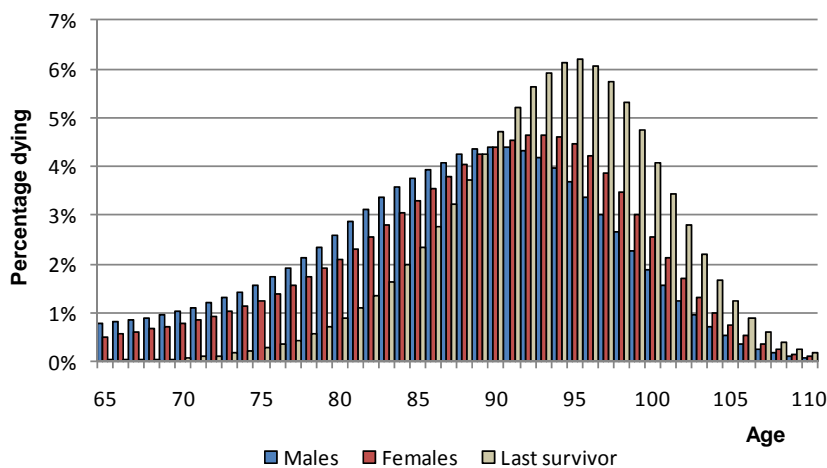
Source: 100% PNMA00 2010 plus improvements in-line with CMI_2009_M [1.00%]

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[38] The model in Blake et al. (2003) did not allow for longevity improvements. When longevity improvements are allowed for, the optimal age to annuitize will increase over time. An alternative to annuitizing when an individual reaches a certain age is to annuitize when an individual's life expectancy falls below a certain level.

Figure 12: Expected distribution of deaths from age 85 for males, females and couples
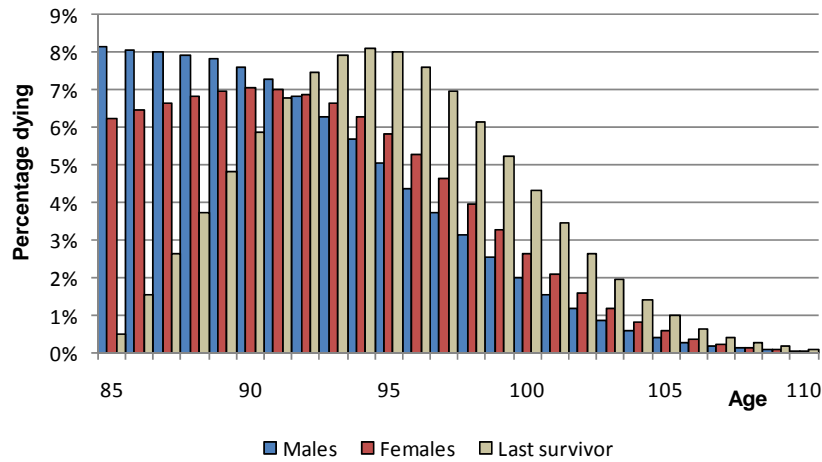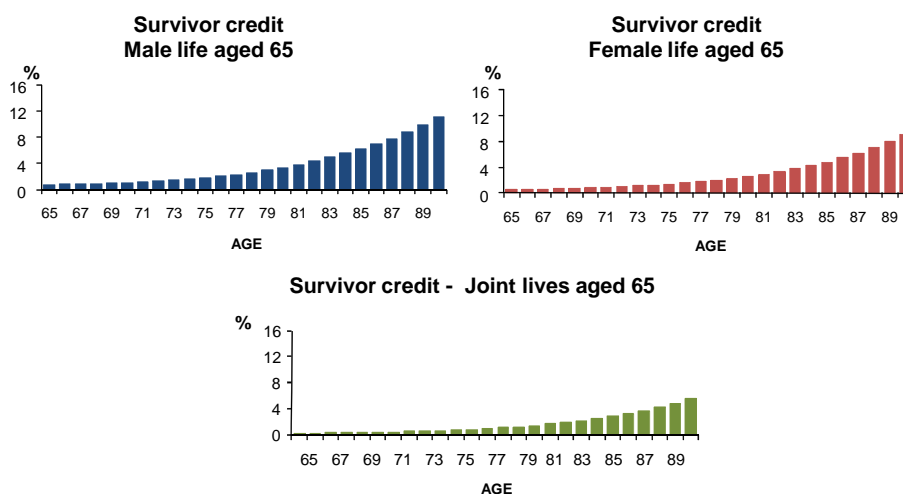

Source: 100% PNMA00 2010 plus improvements in-line with CMI_2009_M [1.00%]

These lower early death rates are reflected in the level of the survivor credits as indicated in Figure 13 for males and females aged 65 in 2010. In particular, the level of the survivor credit in joint-life cases is very small in the earlier years and while both individuals are still alive. The chances of all of the annuity fund being released for redistribution to others is very low, as this will only occur if both lives die during the year. The more likely scenario is that one of the lives will die and this will allow the annuity provider to reduce the reserves it is holding on the contract, since it will now only have to hold capital sufficient to pay a single life annuity. The release of reserves will be credited to the survivor credit account to be shared across all the active annuities. However, in the early years of the contract, both the chances of one of the lives dying and the level of the resultant release of reserves is still small, hence the significantly lower survivor credits shown for joint lives compared with either male or females separately.

This has a significant impact on the value of couples annuitizing early, a point which perhaps has not been fully appreciated to date. For many mass affluent couples who are prepared to take investment risk, it might well make sense not to be fully annuitized until they are well into their 80s if regulations allow. Clearly, the age of annuitization should be brought forward if one partner dies, but the key point is that the loss of benefit from the survivor credit will have been insignificant while both partners are alive. The bottom line is that females and couples would, other things being equal, optimally annuitize later than men.

Figure 13: Optimal age to annuitize is later for females and couples

Source: 100% PNMA00 2010 plus improvements in-line with CMI_2009_M [1.00%]; Survivor credit = $q_x / (1-q_x)$

4.3 *The optimal level of annuitization*

Although a lifetime annuity hedges longevity risk, there are some rational reasons for not fully annuitizing retirement wealth with a conventional level annuity, the type that most people buy and the only type that might be available in certain countries. A conventional level annuity does not:

- Have the flexibility to change the pattern of income payments made in response to a change in circumstances after the annuity has been purchased.
- Allow for bequests other than through limited death benefit options (Dynan et al. (2002), Davidoff et al. (2005)).
- Hedge post-retirement inflation.
- Allow for post-retirement investment opportunities and differing attitudes to risk.
- Allow for poor health at retirement or long-term care costs.

Now in developed annuity markets, such as the UK, annuities have been introduced to deal with some of these issues. For example, it is possible to purchase a value-protected annuity,[39] an index-linked annuity, an investment-linked annuity, and an impaired life annuity. Indeed, those with impaired lives, such as individuals with cancer, get higher guaranteed income levels to reflect this, so the selection effect is minimized.[40]

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[39] Value-protected annuities currently provide capital protection on death up to age 75. The Coalition Government elected in May 2010 has indicated that it will allow lump sum death benefits beyond age 75.

[40] Selection effects arise when non-typical individuals – with either much higher or much lower life expectancies than average – choose or select to buy annuities and receive a return that is actuarially unfair –

Although the design of annuities has improved, they still lack flexibility once purchased and this is an important weakness, given the length of time people live after retirement. A lifetime annuity does not allow for precautionary expenditures, such as major repairs to home or car or lumpy medical expenses. Credit markets are imperfect and it is difficult, if not impossible, to borrow against future annuity payments, since they cannot be assigned. As a result, individuals tend to retain large holdings of non-annuitized assets until very late in life to allow for such expenses (Sinclair and Smetters (2004), Turra and Mitchell (2004), De Nardi et al. (2006)).

It is also important to examine other income sources in retirement and consider how these might rationally influence the demand for annuities. For individuals who have significant DB pensions and other sources of disposable wealth, being able to invest the fund directly, rather than annuitize, might be a more rational option. Risk sharing within the family reduces the demand for joint-life annuities (Kotlikoff and Spivak (1981), Brown and Poterba (2000)). Finally, annuities might be poor value due to adverse selection and cost loadings (Friedman and Warshawsky (1990)). The money's worth of an annuity typically lies in the range 90-94% in competitive annuity markets and these cost loadings are not large enough to offset the welfare gains from annuitization (Mitchell et al. (1999)). In particular, the scale of the market in the UK has allowed individual life expectancies to be taken into account, with the result that annuities have become much fairer.

'All-or-nothing' annuitization is likely to be suboptimal (Milevsky and Young (2002), Horneff et al. (2008)). The phased purchase of annuities over time might be a better option, since it deals with interest-rate risk (by helping to hedge the interest-rate cycle),[41] the possibility that investment returns might be higher in the phasing-in period, and the possibility, however unlikely, that expected mortality rates might be higher in future.

4.4 *Summary*

To sum up, the key issues relating to the optimal timing and level of annuitization of DC pension wealth are:
- The value to securing the survivor credit which will be a function of remaining life expectancy and marital status.

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either too high or too low – compared with the average annuitant. If the return offered to these individuals is too high, this can reduce the annuity provider's profit. If the return offered to these individuals is too low, this reduces the value of the annuity they receive, i.e., its money's worth.

[41] Blake et al. (2003) examined the age at which it becomes optimal to annuitize fully. There is no interest risk in their model, so phased annuitization to hedge interest-rate risk is never an optimal strategy in their model.

- The value of locking into a guaranteed lifetime income which will be a function of wealth including entitlement to state and DB pensions, required income level and expectations concerning future inflation.
- Attitude to risk.
- The value attached both to bequests and to their timing.
- The money's worth of the annuity and hence the fairness of annuity pricing, taking account of the retiree's health and life expectancy. If the money's worth of available annuities is very poor, it might be rational not to annuitize, despite the loss of longevity risk protection.

5. Why do people not behave optimally?

In the previous section, we discussed what people would do if they were behaving optimally in retirement. But there is a lot of evidence to indicate that people do not behave optimally. For example, retirees do not annuitize sufficiently, at least according to economic theory (Yaari (1965), Davidoff et al. (2005)). Yet, as we have seen, conventional lifetime annuities provide the maximum lifetime income, for a given amount of capital, to protect retirees from outliving their resources however long they remain alive.[42] Economists call this reluctance to annuitize the 'annuity puzzle'. Even individuals with shorter expected lifetimes, such as the low paid, would benefit from annuitization (Brown (2003)).

A related issue is that, again according to economic theory, retirees do not dis-save sufficiently during retirement. In the US, only 30% of assets are 'life-cycle assets', intended for decumulation during the current working generation's lifetime; the rest were inherited (Kotlikoff and Summers (1981)). It is hard to believe that previous generations of US citizens planned to bequest so much of their wealth to future generations: it is much more likely that these bequests were unintentional with retirees' spending too little for fear of running out of money.

In the previous section, we put forward some powerful rational reasons for not annuitizing all wealth, e.g., it is optimal to retain flexibility if contingent spikes in expenditures cannot be insured against or can only be insured at excessive cost. However, there are a whole range of behavioural reasons why retirees do not annuitize a sufficient proportion of their retirement wealth:
- Inertia and procrastination: people have to make the active decision to start a retirement expenditure plan or purchase an annuity.
- Poor financial literacy: many, if not most, people do not recognize the importance of securing a basic understanding of retirement income provision and planning and, as a consequence,

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[42] As discussed in Section 3, variable annuities also provide a guaranteed income for life, but this is achieved through charges, so the guaranteed income is considerably lower than with a conventional annuity.

are not sufficiently competent to manage the conversion of their investments to income in old age (Dus et al. (2004)) or are unwilling to make the effort to understand unfamiliar products (Hu and Scott (2007)).

● This is compounded by poor estimates of life expectancy and poor understanding of the variability of actual lifetimes: in short, a poor understanding of the nature of longevity risk. Figure 14 shows the results of a study by O'Brien et al. (2005) of how people in different age groups in the UK underestimate how long they will live compared with how long the UK Government Actuary's Department (GAD) expects them to live. Most men in their 60s underestimate their life expectancy by around 5 years at retirement, while for women it is around 3 years. Even more important, individuals find it difficult to appreciate the variability around expectation of life (Figure 2). Similar results hold in the US (Drinkwater and Sondergeld (2004)).

Figure 14: Individual underestimates of life expectancy by age
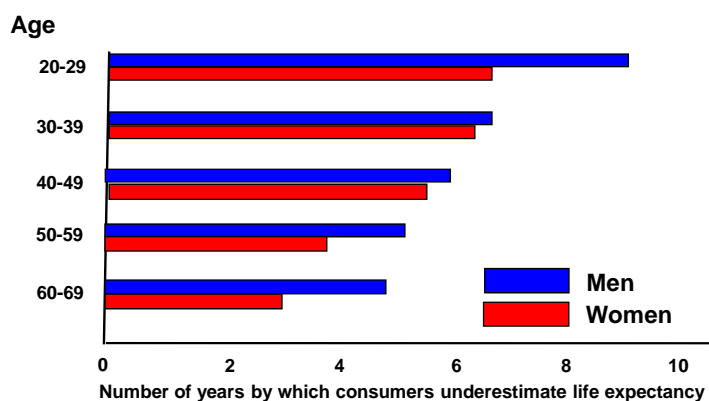
Sources: O'Brien, et al. (2005), self-estimated life expectancy compared with GAD forecast life expectancy; own analysis.

● Aversion to dealing with complex problems involving a sequence of choices.
● Related to this is the issue of choice overload – having so many choices that you end up making no choice at all.
● Aversion to planning – particularly in respect of large infrequent transactions.
● Related to this is aversion to paying for advice.
● Illusion of control: people like to feel in control of their capital, but annuitization leads to a 'loss of control'.
● Unwillingness to contemplate unpleasant events, e.g., dying and leaving behind dependants.

- Overconfidence: many people underestimate how much they need to live on after retirement.
- Lack of self-control: some people actually spend all their retirement savings within a few years of retirement.
- Hyberbolic discounting: this leads to a poor understanding of the distant future and a poor understanding of the effects of inflation in reducing purchasing power over time (Laibson (1997), Warner and Pleeter (2001)).
- Framing effects: retirees can be unduly influenced by the way things are communicated to them. For example, choices can be framed in a way that causes people to overvalue the 'large' lump sum in their pension fund at retirement and undervalue the 'small' annuity (Brown et al. (2008)).
- Negative norming of annuities: annuities have a bad press in the UK. Commentators typically convey a negative impression about annuities and frequently talk about annuities being 'legalized theft' rather than the 'smart' thing to buy. It is interesting to contrast this with the positive view of DB pension schemes which effectively enrol all pensioners into an annuity!
- Regret aversion rather than risk aversion: many individuals appear to regret making losses and seek to avoid putting themselves into a position where losses might occur, even if this means foregoing large gains with a high probability; Kahneman and Tversky (1979) and Tversky and Kahneman (1991, 1992) named the theory underlying this behaviour (Cumulative) Prospect Theory. Such behaviour is inconsistent with the LCM which assumes that risk aversion influences but does not impede risk-taking behaviour and which recognizes that losses are an occasional and unavoidable consequence of the risk taking that is needed to maximize expected utility. A common view is that '*annuities are a gamble*'. The probability of dying very soon after purchasing an annuity is very low, but this probability is likely to be overestimated, so the 'loss' is perceived to be high: '*what dying* and *losing all my capital too*!' Conversely the significant probability of outliving one's resources if one does not annuitize is underestimated, so the 'gain' is perceived to be low. Hence the 'gain' from annuitizing will give only a small utility benefit, while the 'loss' from dying early might have a large utility loss. Loss aversion is not by itself a sign of irrational behaviour. However, the tendency to overestimate the probability of low-probability events and underestimate the probability of high-probability events is certainly irrational.

6. Nudging and Choice Architecture

In the previous two sections, we considered the optimal use of annuitization and the behavioural reasons why the level of annuitization in retirement is lower than optimal. We also provided some rational reasons for not annuitizing or more commonly delaying annuitization.

Improvements in the design of annuities – particularly those related to capital protection and improving the money's worth of annuities for those with impaired lives – have gone some way to removing the rational reasons for inadequate annuitization, although the issue of inflexibility once an annuity has been purchased remains. However, these improvements have not dealt with the behavioural barriers to higher annuitization. Yet, it remains the case that only lifetime annuities can mitigate poor estimates of life expectancy, poor understanding of longevity risk and some of the behavioural biases outlined in the previous section. In fact, we can think of annuities as a perfect bond maturing precisely when the individual (or couple) dies. Nevertheless, we should not underestimate the barriers involved in getting people to the optimal level and timing of annuitization.

In this section, we return again to Thaler and Sunstein's distinction between 'econs' and 'humans' and accept that most people belong to the latter group. We should therefore recognize that the retirement stage of a pension plan is just too complex for most people to deal with without any outside intervention. This implies that we need to consider how nudging and the use of a choice architecture in decision making – ideally also combined with advice – can be used to help 'humans' make optimal solutions for themselves. This is where a *S*PEED*O*ME*TE**R* retirement expenditure plan comes in.

We need to recognize that retirees: have different expenditure needs during different phases of their retirement; need to pace their spending throughout retirement in order to optimize the use of their lifetime assets and income and their ability to make intended bequests; and need a choice architecture that reflects the market segment to which they belong.

Bearing all these considerations in mind, a *S*PEED*O*ME*TE**R* plan has the following components:

(1) **First, make a plan**. This can be done, either by an on-line or telephone-based service providing generic financial advice or if wealth permits, involving a financial adviser whose role is to assist with making and implementing the plan and conducting annual reviews. The remaining components implement the plan. Ideally, planning should occur throughout the accumulation phase. It is very important as retirees approach retirement for planning to take

place to determine the optimal time for annuitizing as this can determine the optimal life-cycle strategy including a pre-commitment to automatically phase into annuities.[43]

(2) **Second, secure 'essential' income**. The plan needs to take an holistic approach to managing *all* assets and income sources in retirement and not just pension assets and income, with the aim of securing, as a very *minimum*, a core inflation-protected income sufficient to allow the retiree to meet 'essential' needs for the remainder of their life. The default annuity will be a 'money-back' index-linked lifetime annuity with the option to opt for an alternative choice.[44,45]

(3) **Third, have insurance and a 'rainy day' fund to cover contingencies**. The plan uses insurance, when available and cost effective, to cover contingency events, such as repairs to white goods, central heating and car. Some expenditures in retirement will be lumpy (e.g., holidays and car purchase), so it is important to have a 'rainy day' fund of liquid assets in order to retain as much flexibility as possible with retirement assets. The lower the level of insurance used, the higher the 'rainy day' fund needs to be. Care costs are potentially the greatest spike to expenditure. In the UK, there is currently a limited insurance market for care costs other than immediate-needs annuities that can be purchased when retirees enter care homes. This lack of pre-funded long-term care insurance requires the mass affluent to retain a considerable fund against this possibility. For those with limited means, the state will provide care and this illustrates the need for retirees to be aware of how they can maximize means-tested benefits to their advantage.

(4) **Fourth, secure 'adequate' income.** Many people will, of course, wish to secure a higher standard of living in retirement than the essential level if they have sufficient resources to meet their needs and wishes throughout retirement, including desired bequests. Implementation will involve the annuitization of (at least some of) these assets as a default option to reach an 'adequate' level of income. However, the nature of the default annuity will depend on the market segment to which the retiree belongs. For the mass affluent and high net worth segments of the market, the plan involves automatic, phased annuitization into

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[43] Planning needs to capture sufficient information about the retiree (date of birth of spouse, health of retiree and spouse, etc.) to establish the default arrangements at retirement which would typically be 25% cash lump sum together with a joint life capital protected inflation linked annuity payable monthly with 2/3rds income to spouse.

[44] This recommendation implicitly assumes that the value for money of index-linked annuities is sufficiently high to justify the recommendation. However, a shortage of index-linked bonds to back the annuity payments might mean that index-linked annuities have a lower money's worth than level annuities.

[45] We are fully aware of the effect that inflation has in reducing the purchasing power of income over time, which is why we recommend that the default option should be an index-linked annuity. However, there is an argument, in the UK context, to allow the default option to be a level annuity. This is because, for the mass market, a high proportion of the income retirees receive will be in the form of index-linked state benefits.

'money-back', inflation-linked, fixed, investment-linked or variable annuities (depending on the degree of risk aversion and level of wealth of the plan member).[46]

(5) **Fifth, achieve a 'desired' standard of living and make bequests.** The plan offers a simplified choice architecture for managing any residual wealth with the aim of achieving a 'desired' standard of living in retirement, while allowing part of the remaining wealth to be bequested at a time of the retiree's choosing. The plan would involve the following:

- o A choice of balanced or diversified growth funds offering a limited range of equity weightings: Blake et al. (2003) show that a choice of just four different equity weightings, 25%, 50%, 75% and 100% is adequate for most members.

- o Possible additional annuitization (e.g., into a purchased life annuity or an immediate-needs annuity to cover long-term care costs) to reduce the variability around the level and timing of any desired inheritance.

- o Psychological barriers, due to loss aversion, to buying long-term care insurance might be partially overcome through bundling the insurance with an annuity, as suggested by Murtaugh et al. (2001).[47]

We believe that the only way that a *S*PEED*O*ME*TE*R plan will work for mass market employees is if they are automatically enrolled into one during a pre-retirement advice surgery ideally arranged through their employer, their pension provider or potentially using services provided by the Consumer Financial Education Body (CFEB).[48] Ideally, there needs to be a co-ordinated approach to education, selection of life-cycle default strategies and the effective use of the OMO when appropriate.[49] This is necessary to overcome inertia and procrastination, the two key behavioural barriers to decision making. Similar strategies can be used to get them to start the plan as was used to get employees to start a *SM*AR*T* plan, e.g., sign up now for a plan that starts on the retirement date in six months' time, with the option to drop out at any time beforehand.

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[46] See Gale et al. (2008) for particular application of this.

[47] It is not yet possible in the UK to purchase a life-care annuity which is an annuity combined with long-term care insurance and which benefits from offsetting selection effects (Murtaugh et al. (2001)). Life-care annuities are permissible in the US. The 2006 Pension Protection Act in the US clarified the tax treatment of annuities when combined with long-term care insurance. The tax provisions of the Act came into effect on 1 January 2010. Prior to this date, life care annuities were not offered for sale by providers.

[48] The UK's Consumer Financial Education Body is responsible for helping consumers understand financial matters and manage their finances better. CFEB was established by the Financial Services Authority following the Thoreson Review of Generic Financial Advice (Thoresen 2008).

[49] CFEB offers Moneymadeclear™ on-line tools to help people compare the annuity rates available in the market before making their purchase (this is known as the open market option (OMO) in the UK) and a telephone helpline to answer questions.

For the mass affluent and high net worth segments of the market, the first key nudge of the plan is to get pre-retirees to talk to an independent financial adviser.[50] The extent and timing of the annuitization will depend on the initial assessment by the adviser and the subsequent realized investment performance. Couples will need more flexibility than singles. High net worth retirees will need more flexibility than the mass affluent. The plan also involves annual reviews with the adviser covering: needs (including medical and care needs), state benefits, drawdown strategies for non-pension assets (such as housing equity release), inheritance, and tax. A key task of the adviser is to assess the initial attitude to risk of the member[51] in order to determine the appropriate investment strategy for assets that have not been annuitized and to consider whether this has changed in the annual reviews of the plan. It is also important to take actual investment and health experience into account at each annual review. Similarly, it is important to recognize that attitudes themselves can be flexible. The attitudes of parents and children tend to change as they age. Consider the difference in attitudes between 65-year old parents with 45-year old children and 85-year old parents with 65-year old children: if nothing else, grandchildren come into the picture. Attitudes to annuitization will also change. Once a retiree has held an annuity for some time, they can appreciate better the value of annuitization and be less averse to further annuity purchases.[52]

Having secured an income for life using lifetime annuities, having insured against lumpy contingencies, and having retained sufficient liquid assets to cover uninsurable contingencies, retirees can be confident that they can spend up to the full value of the annuity payment each period because they will never run out of money however long they live and they will never need to draw on their inheritance assets either.

A *S*PEED*O*ME*TE R* plan deals with the behavioural traits listed in the previous section:

- Critically, the plan utilizes inertia and procrastination, since, once auto-enrolled, individuals do not tend to change their minds: annuities are, after all, for life!
- Equally important, the plan uses defaults for the mass market (especially into index-linked annuities) and advice as the key nudge for the mass affluent.
- The plan deals with the complexity of decumulation decision making *not* the member, via simple default choices depending on risk aversion, thereby avoiding choice overload and choice sequencing problems, as well as bypassing the problems of poor financial literacy, planning aversion, a poor understanding of longevity risk and the unwillingness of retirees to recognize their own mortality.

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[50] If that fails, then mass affluent members should at least be nudged to use the CFEB on-line tools and a telephone helpline.
[51] Byrne and Blake (2006) have developed a risk profile questionnaire for this purpose.

- The plan accepts individuals suffer from overconfidence and have self-control and hyperbolic discounting problems and would benefit from using commitment devices.
- The use of 'money-back' annuities deals with the aversion to losing control of and the fear of loss of capital on early death. 'Money-back' annuities have the following advantages:
  - They remove the single biggest consumer objection to annuities: *'If I die soon after I retire, the annuity provider will keep my fund'*
  - The 'live or die' guarantee of getting your money back provides a simple underpin
  - They are very easy to explain and for consumers to understand
  - A lump sum repayment rather than the continuation of current income for a guaranteed period of 5 or 10 years – which has been the norm in the UK – is more easy for people to understand and due to hyperbolic discounting is more valued.
  - The cost of the guarantee is transparent and allows consumers to make an informed choice
  - They automatically phase pension funds into full annuitization
  - They remove a significant barrier to pre-retirement saving: people won't save voluntarily if they don't believe that it pays to save.
- The phasing of annuitization deals with the aversion to making large transactions and possible regret about getting the timing wrong.
- Except for plan members who reveal themselves to be extremely risk averse, the annuity will not be the most prominent feature of the plan for the mass affluent in their early years of retirement. For most mass affluent plan members, what will be discussed first will be the management of retirement assets in accordance with the member's attitude to risk. Annuities will merely be one component of the management of retirement assets. This helps to overcome framing effects.
- Having dealt with design, effective communication is an equally important feature of *S*PEED*O*ME*TE*R plans. It is vitally important that all retirees come to believe that '**buying an annuity is a smart thing to do**' and buying an annuity remains the norm. It should be a norm that retirees feel very comfortable with because they understand that by annuitizing their wealth, they can '**spend more today**'.

For *S*PEED*O*ME*TE*R plans to be effective, they need to comprise a small set of well-designed default options with the flexibility either to change the default if the adviser identifies the need to do so after the initial discussion with the plan member or to move to a new default option if circumstances change.[53] We give some examples of the kind of flexibility we envisage:

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[52] Studies show that people with annuities are happier: they can spend their annuity payments in full each period knowing they have full longevity risk protection (e.g., Panis (2004)).
[53] However, it is important to note that this flexibility is available prior to annuitization, but not after.

- The default is an index-linked annuity, but it is possible to spend more today even if the plan member buys a level annuity, because they wish to enjoy higher real income at the beginning of their retirement. Nevertheless, we do not recommend this, as it leaves the annuitant exposed to inflation risk.

- For those with sufficient wealth, their needs could be provided from variable annuities or other insurance products that provide a guaranteed base income, rather than lifetime annuities.

- Where appropriate, non-pension assets should be annuitized as well. Drawing the maximum income may still be compatible with optimizing inheritance plans (depending on tax rules), but definitely fits in with the concept that *SPEEDOMETER* plans maximize both flexibility and money to spend.

- Annuitization is valid in joint-life cases, but the optimal timing of annuitization is later for reasons discussed earlier and a higher risk investment strategy might also be appropriate.

- The optimal size of the 'rainy day' fund will change as circumstances change. For example, when a retiree goes into a care home, contingent expenditures are likely to be significantly reduced.

7. Conclusions

SPEEDOMETER (or *S*pending *O*ptimally *T*hroughout *R*etirement) retirement expenditure plans provide an holistic approach to dealing with needs, risks and available financial resources in retirement.

At their simplest, *SPEEDOMETER* plans involve just four key behavioural nudges:
- **First, make a plan** – ideally with, but if necessary without, an adviser.
- **Automatic phasing of annuitization** (i.e., gradual auto-enrolment): this is designed to tackle the aversion to large irreversible transactions and losing control of assets and so allow the greatest possible degree of flexibility in managing the run-down of retirement assets.
- **Capital protection** in the form of **'money-back'** annuities: this deals with loss aversion, i.e., the fear of losing your money if you die early.
- The slogan '**spend more today**' which utilizes hyperbolic discounting to satisfy the human trait of wanting jam today and to reinforce the idea that '**buying an annuity is a smart thing to do**'.

SPEEDOMETER plans are designed for both 'econs' and 'humans', but a libertarian paternalistic approach (along the lines of Thaler and Sunstein (2003)) needs to be adopted to encourage

'humans' to implement them. They involve a strong nudge to encourage 'humans' to begin the plan and annuitization as a default strategy at some stage in the plan member's (and possibly their partner's) life. This is because longevity risk is significant and poorly understood and the consequences for an individual's well-being of ending up with insufficient assets in old age are great. In short, 'humans' find it difficult to understand the value of annuitization. Advising them about this, but then leaving it up to them to annuitize on a voluntary basis is simply not going to work in many, if not most, cases.

The guarantee of an income for life provided by an annuity is likely to be essential for the vast majority of retirees who need the security of a lifetime income. Even those with extensive wealth should consider annuitization to avoid the risk that an intended bequest will instead be needed for income in later life. So our view is that the issue should not be about whether annuitization of pension fund assets (and, indeed, non-pension assets) should be the default, rather it should be about the point at which annuitization should apply and what level of wealth needs to be annuitized. We believe that there is an optimal time and level of wealth to annuitize and these will be a function of the plan member's age or life expectancy, gender, marital status, level of total assets, attitude to risk, desire to leave a bequest and the fairness of annuity pricing.

For those with a low level of total assets (the mass market), annuitization of most of the accumulated pension pot – having taken out a lump sum to provide the 'rainy day' fund – is likely to be the best strategy. For those with greater resources (the mass affluent), the level of annuitization at retirement should be sufficient to secure, at the very least, a minimum income level to meet 'essential' expected needs (allowing for any state support). However, a higher level of base income will be required to achieve an 'adequate' life-long living standard. Having secured this, the plan member can then have some flexibility over the management of remaining assets to achieve a 'desired' standard of living. This flexibility can continue until the time comes – which will again depend on age or remaining life expectancy, health and the size of the available mortality cross-subsidy – to secure desired bequests, at which point the plan member might consider further annuitization. All market segments should consider using insurance to cover possible spikes in expenditure in retirement.

The key philosophy behind *S*PEED*O*ME*TER* plans is this: if it is good advice at some point in the life cycle to be smart and 'save more tomorrow', it must be the case that at a later point in the life cycle, having hedged your longevity and care risks, secured a desired income for the remainder of your life and made allowance for inheritance, the smart thing to do is 'spend more today', safe in the knowledge that you will be able to continue to live your life to the full however long you may live.

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