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THE UNDER-PENSIONED: TECHNICAL PAPER

The Under-pensioned: Technical paper

A Technical Report by Chris Curry
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Introduction

This technical paper is a companion document to *The Under-pensioned*[1], which estimates the risks of being under-pensioned relative to the pension income of the 'policy stereotype' individual often used in pension planning and policy presentation. *The Under-pensioned* identifies the main causes of low pension income:

- **Low earnings:** state and private pension incomes are lower for those who had lower earnings during working life
- **Labour market experience**: time spent out of standard, full-time employment can reduce state and private pension income
- **Private pension coverage**: low and/or infrequent contributions to private pensions (either by an individual or an employer) reduces private pension income
- **The length of time spent in retirement**: state and private pension income falls relative to other incomes (such as the incomes of those in work, and means-tested benefits) the longer it is received.

To look at the impact of these characteristics, the PPI has constructed a model to look at the projected retirement incomes of different hypothetical individuals – the Individual Model (IM). The model makes comparisons of retirement incomes for different individuals over different periods of time, and can be used to highlight the characteristics that reduce retirement income, and estimate by how much.

The rest of this technical paper outlines the IM in more detail, and shows some of the results used in *The Under-pensioned*, which contains more interpretation of the results. Other papers in *The Under-pensioned* series look at specific groups who display the characteristics most likely to lead to low pension income. More detailed reports on pension income for women, disabled people, ethnic minorities and non-standard workers are available from the PPI website.

[1] Curry (2003)

The Under-pensioned: Technical paper summary

Low earnings are the most important cause of low pension income. The direct link between the amount of state or private pension and earnings level means that pension income is directly linked to earnings when in work.

Any time not spent in full-time work reduces pension income. Part-time work results in lower pension income.

Low or irregular private pension contributions reduce pension income. Lack of access to private pension arrangements, either through an employer or individually, reduces pension income.

Retiring later can improve pension incomes. The positive impact of working one year longer can be larger than the negative impact of retiring one year earlier.

Living to older ages reduces pension income. Pension income falls relative to earnings after retirement.

Disadvantage is cumulative. Disadvantages combine to reduce pension income substantially.

The current pension system will not resolve the under-pensioned problem. Increased redistribution through State Second Pension and the rapid expansion of means-testing through the Pension Credit will not fully compensate under-pensioned groups. In future, even the policy stereotype will need to claim the Pension Credit from state pension age, reducing the value of making private pension contributions.

Factors affecting the level of pension income

This section uses the PPI's Individual Model (IM) to quantify the impact on pension income of different characteristics[2]. To do this, a reference individual is defined, and then characteristics of the reference individual are changed one-by-one. This highlights changes in income due to different labour market behaviour, different private pension saving behaviour, different retirement choices and the length of time spent in retirement.

This chapter concentrates on the results obtained from the IM. More technical details about the structure of the model, the assumptions used, and sensitivity analysis are shown in the appendices to this report.

The reference individual – a 'policy stereotype'

To look at the impact of various changes in working life characteristics, a baseline, or reference individual is needed to measure change against. The IM reference individual is:

- A man
- Starting work at age 21
- Fully retiring at State Pension Age (SPA - 65) giving a working life of 44 years
- In continuous full-time employment
- Earning median age-specific earnings
- Making continuous private pension contributions of 8% a year[3]

A list of all of the assumptions used for the reference individual can be found in appendix 2.

Some of the characteristics of the reference individual are 'composite', based on aggregate characteristics across the UK. These characteristics reflect the average across the population as a whole. For example, earnings are based on all full-time employees, including male, female, white, ethnic minority, disabled and non-disabled. It has been necessary to make an assumption about some other characteristics. For example, a gender had to be assigned to model life expectancy.

The particular characteristics of the reference individual are those most often used to evaluate the outcomes of the UK pension system (and sometimes implicit in its design), and can be seen as a 'policy stereotype'. **However, the policy stereotype by no means represents an average or typical pensioner.**

Most pensioners are women. Few people remain in work to age 65. Even fewer will have 44 years of continuous pension contributions. More people are having spells when they are not in full-time employment – either through unemployment, temporary work or self-employment. People may have had less access to private pension provision in the past, or access to lower private pension provision.

[2] A full description of the IM can be found in Appendix 1

[3] Or having them made on his behalf by his employer

Although all of the characteristics of the policy stereotype seem reasonable in isolation, they combine to give a pension income above the average. **The level of pension income calculated for the policy stereotype retiring in 2003, at 42% of national average earnings (NAE), is higher than the average level of pension income for a single pensioner today of 37% of NAE .**

The policy stereotype who retires in 2003 is estimated to start with total pension income (state and private) of £202 per week, and a replacement rate (compared to earnings in the year before retirement) of 68%. He would become entitled to the Pension Credit at age 76 (Table 1).

Table 1: IM Results for the policy stereotype (in 2003 price terms)

		Year of retirement		
		2003	**2028**	**2048**
At retirement	Real income	£202	£302	£455
	% average earnings	42%	39%	39%
	Replacement rate	68%	63%	64%
At age 75	Real income	£201	£339	£509
	% average earnings	35%	36%	36%
At age 85	Real income	£228	£384	£576
	% average earnings	32%	33%	33%
Age of eligibility for Pension Credit		76	65	65

His son and grandson, retiring in 2028 and 2048, receive a higher real income - £302 in 2028 and £455 in 2048, but receive a lower proportion of average earnings. For all, the pension as a proportion of average earnings declines during retirement, until they qualify for the Pension Credit. This happens much earlier for later generations – both the policy stereotype's son and grandson are entitled to Pension Credit as soon as they retire.

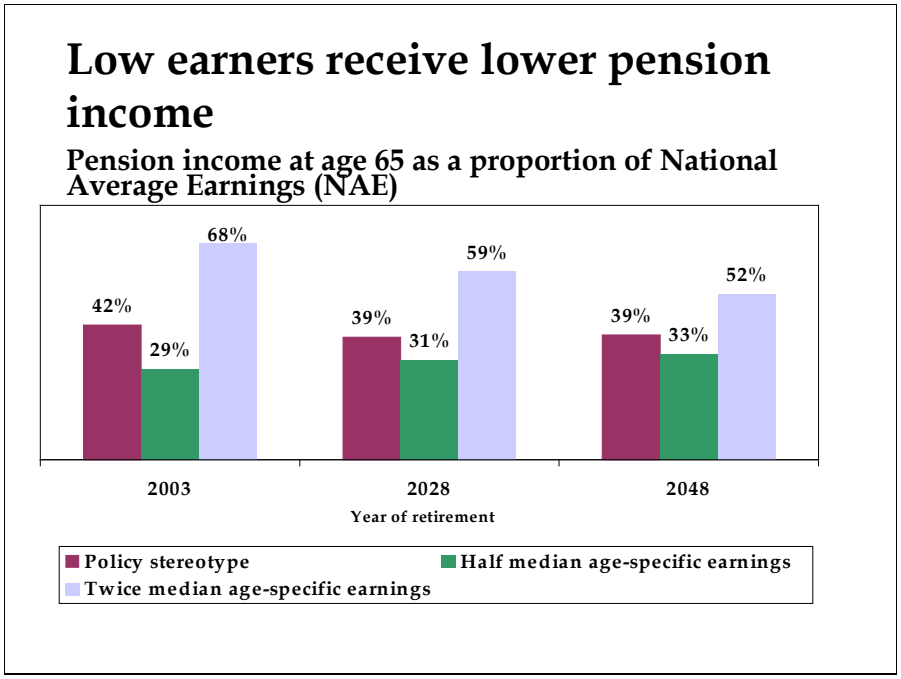
The fact that outcomes are different for different generations highlights how the UK pension system is changing over time. For the policy stereotype's son, retiring in 2028, half of his working life will have been spent accruing rights under old pension systems. For example, he would have accrued SERPS for 20 years, as well as S2P in the future. If he had had any period as a carer before then, he would not have had any protection under SERPS, while *his* son, retiring in 2048, would be protected for caring at the same age under S2P. The state of the pension system throughout different periods of the reference individuals' lives affects pension income, as well as changing characteristics.

The next sections of this report look at the impact on the pension income of the policy stereotype (and his descendants) of changing characteristics *one at a time*. This is to give an illustration of the broad order of magnitude of specific changes, rather than a realistic example of, say, a self-employed individual. Further sections look at the impact of cumulative changes in characteristics and how outcomes change in the future.

Low earnings are the most important cause of low pension income.

Individuals with low earnings throughout their working life receive lower pension income (Chart 1). The Basic State Pension is flat-rate, but income from second-tier and private pensions is lower for those with lower earnings. For future generations, the reduction is partially offset by higher State Second Pension benefits.

Chart 1[4]



[4] PPI calculations from the IM. Each example is based on the policy stereotype, the only difference being the assumed level of earnings. The policy stereotype has median age-specific earnings

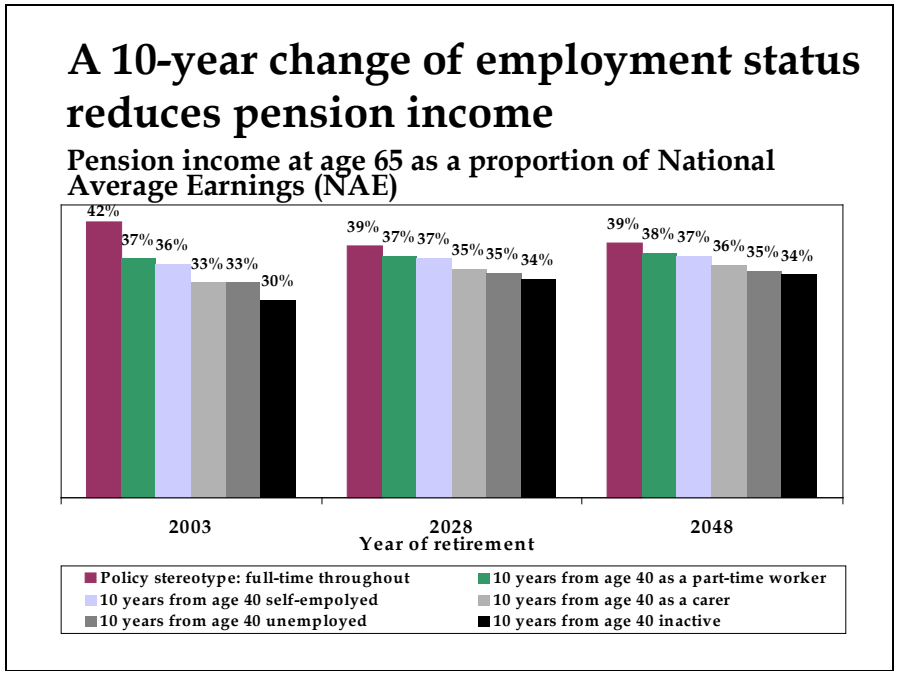
Any time not spent in full-time work reduces pension income

People who do not work as a full-time employee are likely to receive lower income from BSP, SERPS/S2P and private pensions. The size of the impact depends upon the alternative chosen instead of full-time work:

- Part-time workers have lower income, and so receive lower SERPS/S2P benefits and make smaller private pension contributions (if they make any)
- The self-employed are not members of SERPS/S2P
- Full-time carers for children or elderly relatives receive some protection of state benefits through credits for BSP and S2P , but in the absence of earnings may be less likely to be able to afford to make private pension contributions
- The unemployed receive credits for BSP, but not SERPS/S2P and may not be able to afford to continue private pension contributions
- An individual not in work, and not qualifying for any caring credits, may not build up any state pension entitlement.

A 10-year change in employment status in the middle of a career that is otherwise as a full-time employee can have a large impact on the level of pension income received, depending on the new employment status (Chart 2).

Chart 2[5]



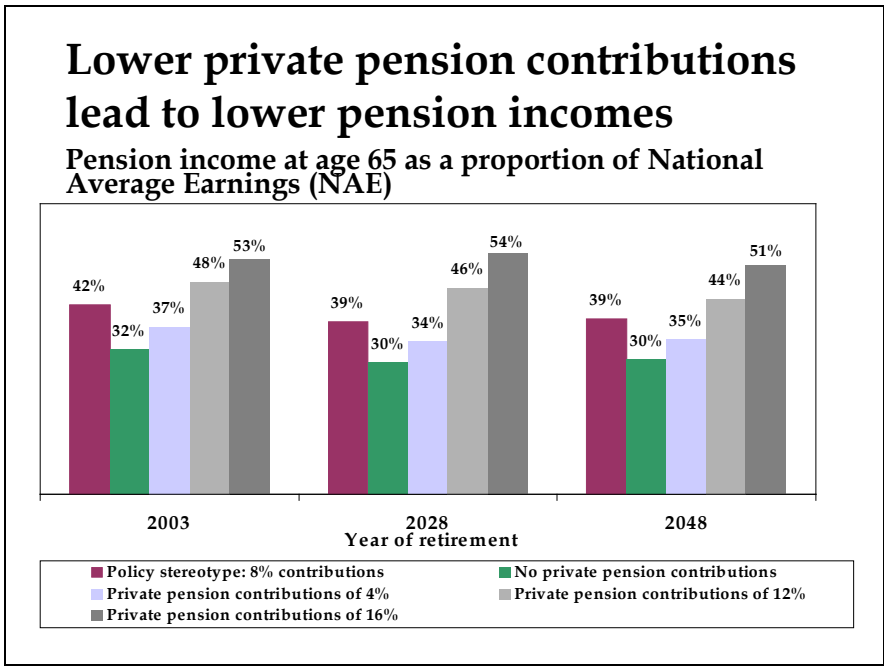
[5] PPI calculations from the IM. Each example is based on the policy stereotype, with different employment status assumed between ages 30 and 39. The carer is assumed to be caring for a new child at age 30, so qualifies for S2P credits for the first 5 years (until age 34). Self-employed and part-time examples are assumed to continue to make private pension contributions.

Low or irregular private pension contributions reduce pension income

Pension level is linked to contribution level

All other things being equal, an individual making low private pension contributions receives a lower level of pension income, and someone not making any private pension contributions receives a significantly lower pension income (Chart 3). Higher private pension contributions increase pension income. The relationship between private pension contributions and pension income is not directly proportional, due to the impact of means-tested benefits – smaller private pension contributions can be offset by higher entitlement to the Pension Credit.

Chart 3[6]

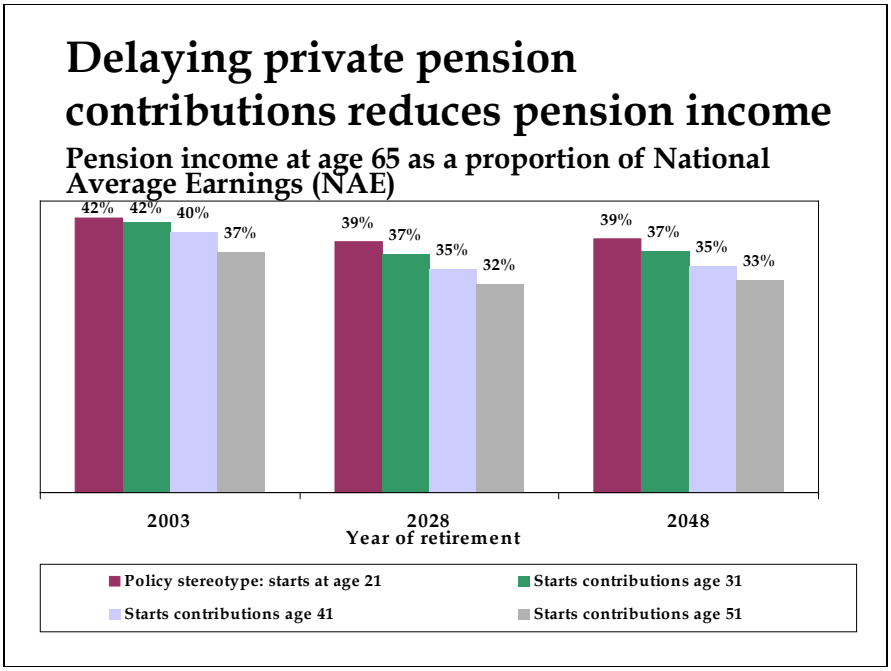


[6] PPI calculations from the IM. Each example is based on the policy stereotype, with different levels of private pension contribution, constant throughout working life.

Pension levels depend on the number of contributions made

The level of pension income is also dependent on when contributions to a private pension are started. Delaying making pension contributions can lead to a significant reduction in pension income (Chart 4), as less interest is built up on contributions.

Chart 4[7]

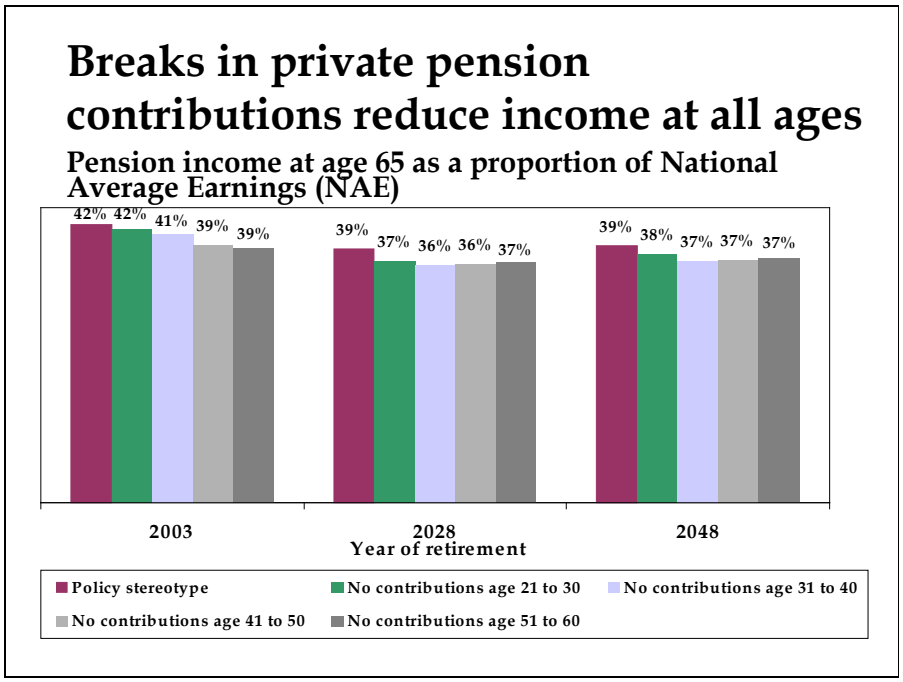


[7] PPI calculations from the IM. Each example is based on the policy stereotype, with different starting ages for pension contributions.

Pension contributions are not always continuous. Even if an individual remains in full-time employment throughout their working life, there may be times when pension contributions stop or start – for example changing employers (and so leaving an occupational pension scheme), or an increase in other expenditure (such as raising a family or moving house).

The timing of breaks in contributions is theoretically important in determining the final impact on pension income (Chart 5), as well as the length and number of any breaks. Although the absolute size of pension contributions tends to increase by age (as earnings increase by age and contributions tend to be proportional to earnings), early breaks reduce the effect of compound interest. These two effects tend to cancel each other out, so that pension income does not depend greatly on when breaks occur.

Chart 5[8]



[8] PPI calculations from the IM. Each example is based on the policy stereotype, with different 10 –year periods where no pension contributions are made.

Retiring later can improve pension incomes

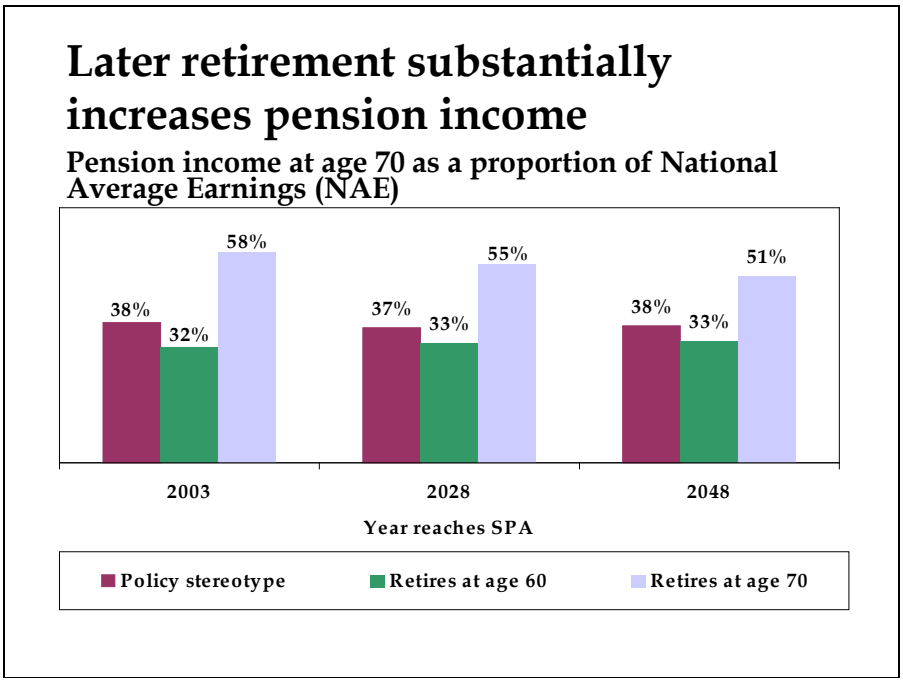
Choosing a later retirement age has three distinct effects on private pension income:

- The number (and size, if earnings increase with age) of contributions is increased
- The cumulative investment return on contributions is higher, as interest accrues over more years
- A higher annuity rate is payable, as the pension is expected to be paid for a shorter length of time.

Retiring at age 70 increases pension income at that age by up to 20 percentage points of NAE (Chart 6).

As well as reducing private pension income, retiring early also reduces the number, and value, of contributions to state pensions. Retiring at age 60 rather than age 65 reduces pension income at age 70 by up to 6 percentage points of NAE.

Chart 6[9]



[9] PPI calculations from the IM. Based on the policy stereotype, with different retirement ages. For retiring early, state pensions are not assumed to be available until state pension age, but private pension income starts from age 60. For late retirement, both state and private pensions are assumed to be deferred, based on the enhanced deferral rates from 2006 outlined in DWP (2002 GP).

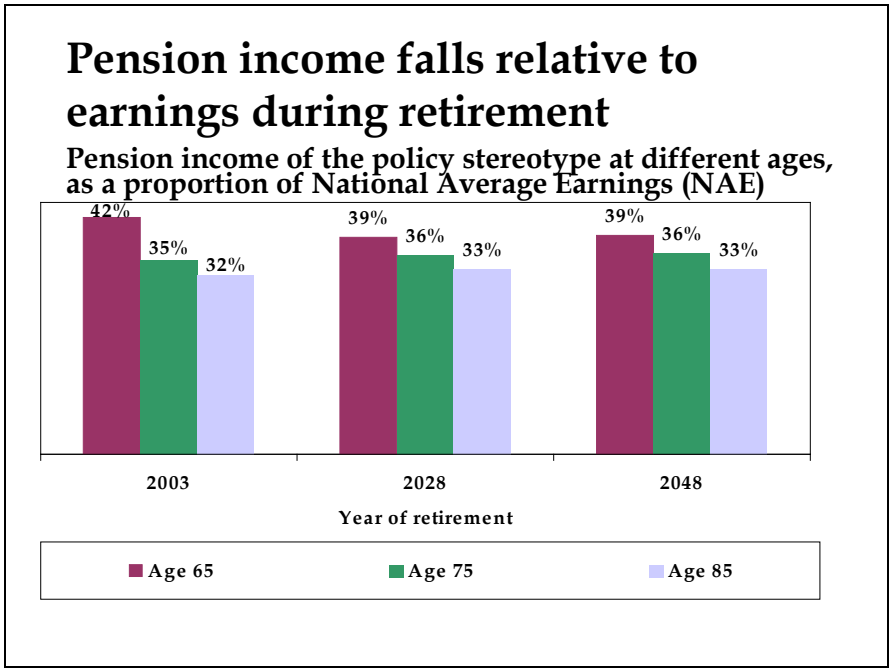
Living to older ages reduces pension income

The relative value of most individual pension income falls during retirement. This means that many individuals, having started retirement without needing to claim Pension Credit, fall back onto Pension Credit at an older age. In future, pensioners will become entitled to Pension Credit earlier in their retirement.

The relative value of most individual pension income falls during retirement

State pensions in payment (not including Pension Credit) are increased each year in line with changes in prices. Some private pensions in payment are also increased in line with prices (the Retail Prices Index – RPI), some to limited changes in prices (e.g., the lower of RPI or 5%), and some are not changed at all (e.g., a level annuity)[10]. At best, total income from pensions each year increases in line with price inflation. If national average earnings (NAE) increases faster than prices, then pension income falls relative to earnings (Chart 7).

Chart 7[11]



The fall in relative value of pension income is only one of the factors leading to falling incomes relative to earnings after retirement[12]. The longer people live, the more likely it is that they have lived longer than they expected, or had saved for. Any savings a person may have made are more likely to have run down. Costs may also increase for older pensioners.

[10] See Appendix 3 for an illustration of the effect of different annuity types

[11] PPI calculations from the IM, based on the policy stereotype

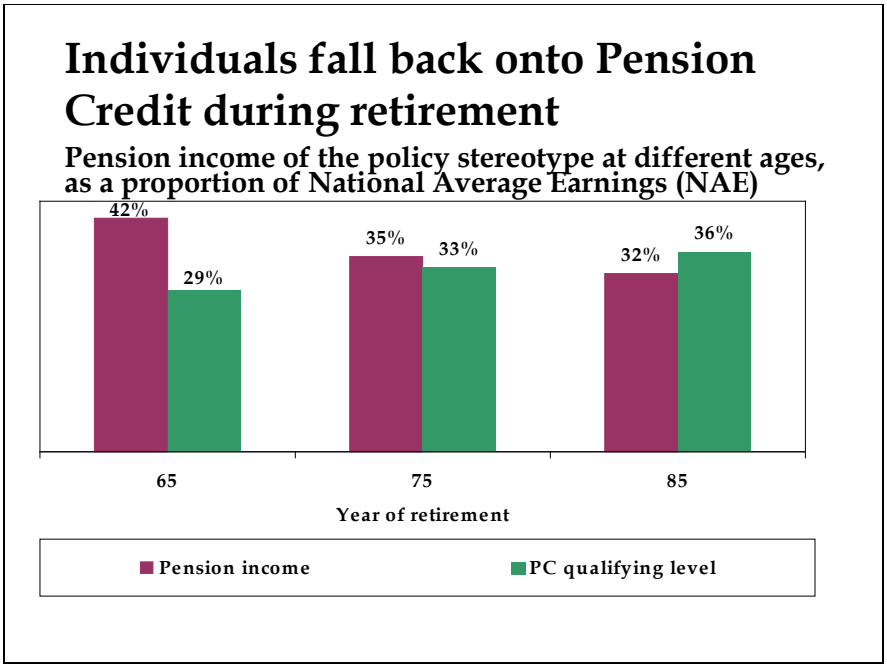
[12] PPI Briefing Note 6 *Why are older pensioners poorer?*

Individuals fall back onto means-tested benefits at older ages

An increasingly important source of state pension income is the Minimum Income Guarantee (MIG), which ensures a minimum level of income (£102.10 a week for single pensioners in 2003). In October 2003, MIG was replaced by the Pension Credit (PC), which consists of a Guarantee Credit (in effect the same as MIG) and a Savings Credit. The Savings Credit is payable on income above the full Basic State Pension level, and can provide a top-up of up to £14.90 a week (for a single pensioner), and is payable on incomes of up to £139 a week (for a single pensioner).

Until the end of this parliament (May 2006 at the latest), the Guarantee Credit component of the Pension Credit will be increased every year in line with the growth in average earnings. The level of income below which individuals are entitled to the Savings Credit component of Pension Credit will increase faster than average earnings, and increase relative to other pension income. Even the policy stereotype, retiring with income substantially above Pension Credit levels falls back onto Pension Credit later in his retirement (Chart 8).

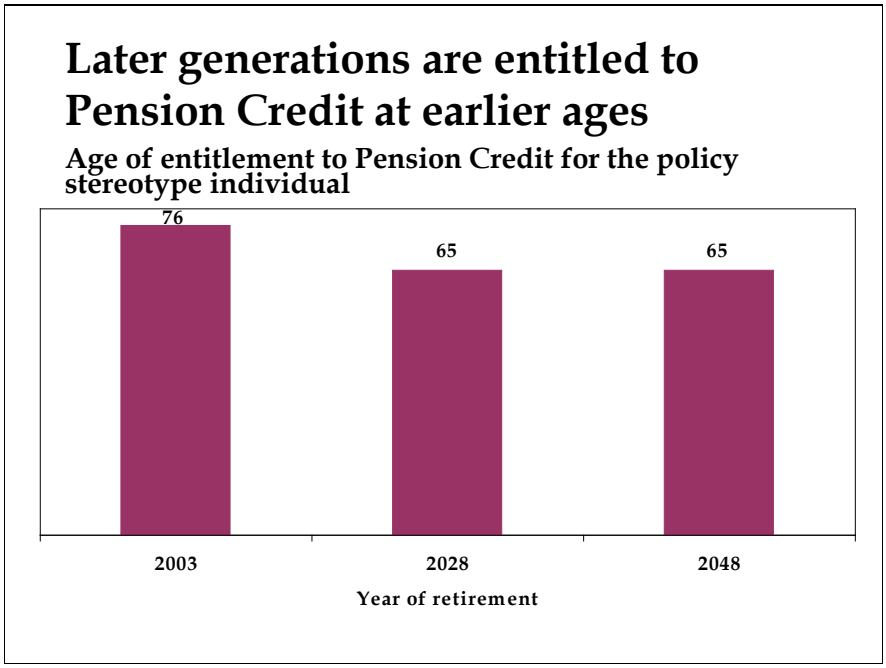
Chart 8[13]



[13] PPI calculations from the IM, based on the reference individual

Over time, the different uprating convention for the Pension Credit compared to other state pensions increases the relative importance of Pension Credit as a component of pension income. A higher proportion of pensioners will be entitled to Pension Credit, and pensioners are likely to be entitled earlier on in his or her retirement. For example, while the policy stereotype retiring in 2003 becomes entitled to Pension Credit at age 76, his son retiring in 2028, and his grandson retiring in 2048 are entitled at age 65 (Chart 9).

Chart 9[14]



[14] PPI calculations from the IM, based on the policy stereotype

Disadvantage is cumulative

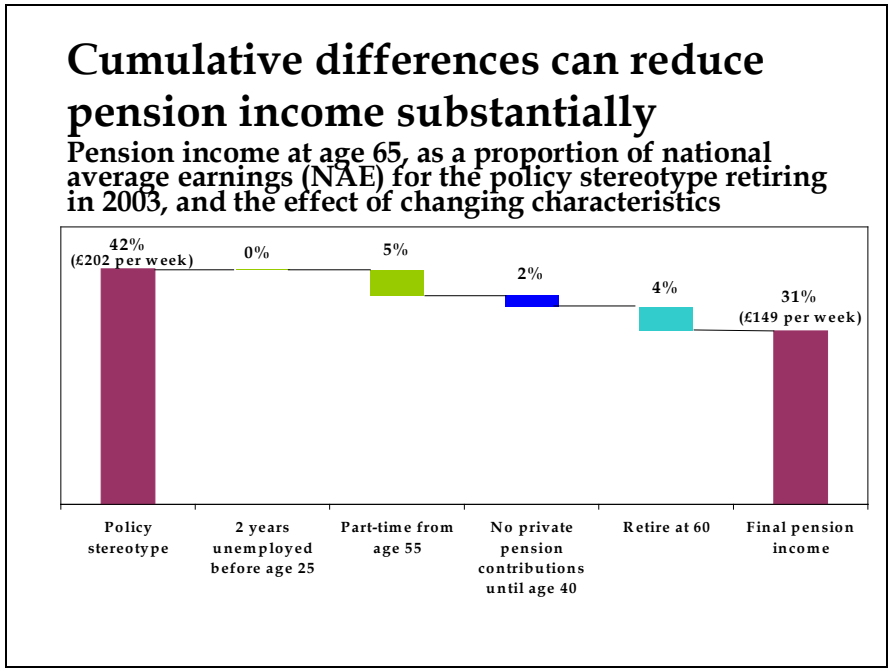
Individuals are likely to have a number of characteristics different from the policy stereotype. A more realistic individual would have a pension income much lower than the policy stereotype. For example, women on average have lower earnings, less full-time employment and fewer private pension contributions[15].

Changing a number of characteristics on top of previous changes helps to build up a picture of how these characteristics interact to change pension income. For example, an individual who:

- Does not start private pension contributions until age 40
- Is unemployed for 2 years between ages 20 and 25
- Works part-time from age 55, and
- Retires early at age 60,

would see a pension income of 11 percentage points of NAE lower than the policy stereotype retiring in 2003 (Chart 10) – a reduction in pension income of one-quarter.

Chart 10[16]



[15] Papers available from the PPI website look at the potential impact on pension income of the different characteristics of a number of specific groups – ethnic minorities, disabled people, those with non-standard employment (such as the self-employed and temporary workers) and women

[16] PPI calculations from the IM

The current pension system will not resolve the under-pensioned problem

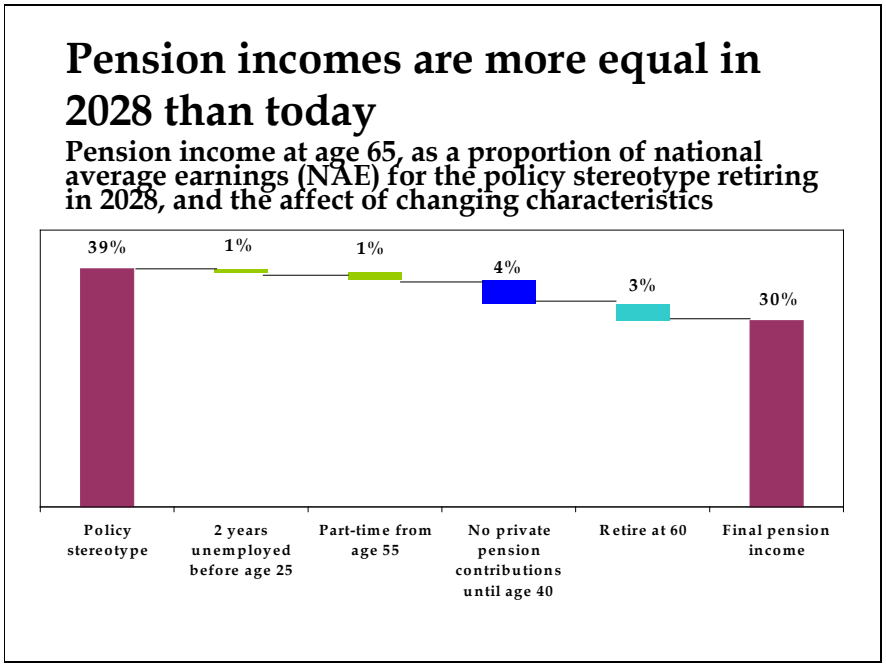
Later generations see a smaller reduction in retirement income from different characteristics (Chart 11 and Chart 12). This is because, overall, the pension system becomes more equal in future, in the sense that a typical individual's pension is closer to that of the policy stereotype individual of that generation[17].

The policy stereotype's grandson, retiring in 2048, receives a pension income 3 percentage point of NAE lower than the policy stereotype today. However, the 'realistic individual's' grandson, also retiring in 2048, does just as well as his grandfather. The difference between the policy stereotype and the 'realistic individual' in this cohort is still 8 percentage points of NAE, around one-fifth of total pension income.

There are 2 main reasons for the equalisation:

- The reduction in pension income due to lower earnings during part-time work is lower in future, as a consequence of the more generous S2P replacing SERPS.
- The value of starting private pension contributions early is reduced. This is not because the contributions themselves are worth less, but because more private pension income is offset by the Pension Credit.

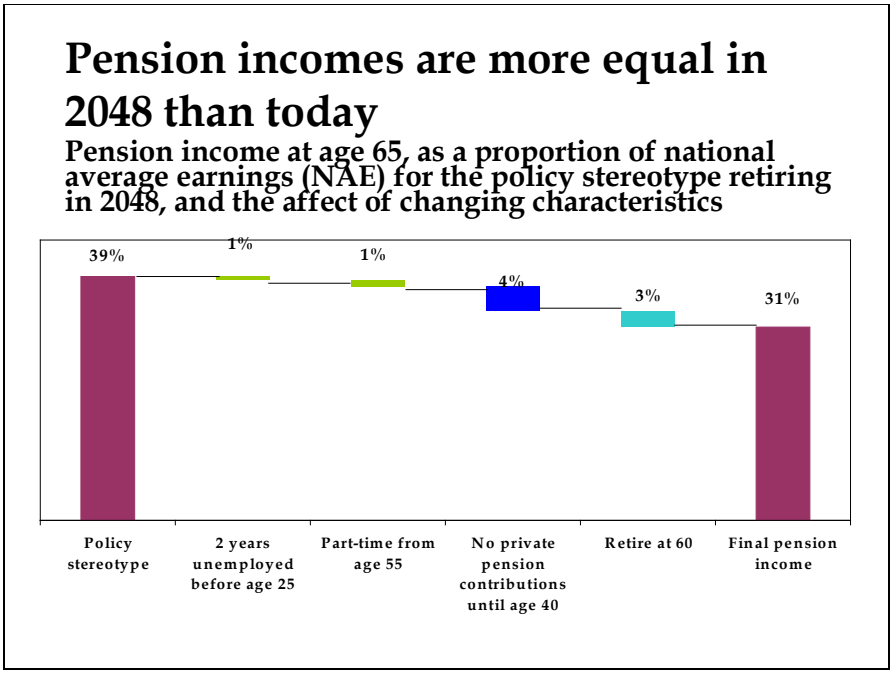
Chart 11[18]



[17] Assuming that Pension Credit is claimed

[18] PPI calculations from the IM

Chart 12[19]



[19] PPI calculations from the IM

Appendix 1: The PPI Individual Model (IM)

The PPI Individual Model (IM) is designed to estimate pension incomes for a hypothetical individual with a specific working life. It models state and private pension income – including Pension Credit – at the point of retirement, and also how income changes during retirement. The model produces estimates of pension income for individuals retiring today, and over the next 50 years.

There have been a number of hypothetical models developed to look at pension outcomes in recent years, most notably PHYLLIS and RITA developed at the London School of Economics[20], and the model developed by PricewaterhouseCoopers[21]. These models have tended to:

- Concentrate mainly on *either* state pension *or* private pension income, or
- Look forward from today, solely analysing outcomes under *future* state pension systems.

These have allowed analysis of the impact of a (part of) the pension system on different types of individuals across a single time period.

In contrast, the IM:

- Covers *both* state *and* private pensions, and
- Covers *historical* pension systems as well as *future* systems.

As well as comparing the impact of a system on individuals, the IM allows the estimated total pension incomes of future pensioners to be compared to the estimated total pension incomes of individuals retiring today.

Hypothetical models are driven by assumptions, and each individual or pension system modelled is highly stylised. The resulting income estimates cannot, therefore, be generalised as being representative of the population as a whole, or even part of the population. They are, however, indicative of the possible differences that can occur between different individuals and/or pension systems.

Broad outline of the IM

The IM is designed to allow modelling of a wide range of hypothetical cases, across different time periods, and to allow the sensitivity of assumptions to different economic conditions to be tested. A number of the key assumptions used in the IM are therefore variable, and determined by the user for each example (Box 1).

[20] Falkingham et al (1998), IPPR (2002)

[21] Hawksworth (2002)

Box 1: IM variables

Economic Variables

- Price inflation
- Annual state pension uprating
- Other state benefit uprating (for age additions, winter fuel payments and the Christmas bonus)
- Real earnings growth
- Real investment returns

Private pension variables

- Level of private pension contribution
- Proportion of private pension taken as lump sum
- Private pension annual management charge
- Annuity type – single/joint (and spouse proportion), escalation, lives covered by private pension

Individual variables

- Gender
- Age in 2003
- Age of starting work
- Retirement age (age at which all paid work activity stops)
- Working life characteristics (see the end of appendix 1)

Details of the assumptions used for the reference individual (or policy stereotype) are given in Appendix 2. A sensitivity analysis is shown in Appendix 3.

The IM covers all of the main components of the state pension system. It models incomes from the Basic State Pension (BSP), Graduated Retirement Pension (GRAD), State Earnings Related Pension Scheme (SERPS), the State Second Pension (S2P) and the Pension Credit (PC). Winter fuel payments and the Christmas bonus are also modelled.

As well as looking at the amounts received at the point of retirement, income is also modelled for a further 30 years after retirement to analyse how total income, and components of income, change over time. Where an individual is modelled as being entitled to PC, he or she is assumed to claim.

The ability to estimate income from benefits such as SERPS and GRAD (which can no longer be accrued) is important, as many people retiring in future will still be receiving benefits from these schemes. For example, a 16 year-old in work in 2001 could have accrued SERPS, which would not be payable until 2050, and then might remain in payment until 2080.

The IM does not explicitly model contracting-out of GRAD, SERPS or S2P, mainly for reasons of simplicity. This is currently a substantial part of the pension system, with an estimated 13 million people contracted-out in 2001/2[22]. If people behaved rationally, the IM could be assumed to represent the minimum pension incomes that individuals receive, on the basis that they would only contract-out of the state system if they would get a higher income from doing so. However, given the complexity of the contracting-out decision[23], it is likely that some people who have contracted-out may receive a lower pension income through doing so. Many of these people may belong to under-pensioned groups. Further development of the IM will consider an extension to model the impact of contracting-out.

The IM does model some private pension structures. For simplicity, only a single type of private pension is modelled. This is a money purchase (or defined contribution) pension, where contributions are invested directly on behalf of an individual, and the sum accumulated is then used to purchase an annuity to provide a pension income. Although this particular type of arrangement will not have been available to all individuals throughout the time period covered by the model, the outcomes could be made comparable to those that were available (such as Defined Benefit occupational pension schemes) through changing the amounts contributed to the pension to take account of employers' contributions.

Annuity rates are based on 1992-based mortality rate tables for men and women[24], adjusted by 3 years to take account of further expected increases in longevity since the tables were constructed. This is consistent with the annuity assumptions used in the FSA/ABI pension calculator[25].

The model is constructed on an annual, tax year basis – that is, details and assumptions covering the pension system are held for each year, and the working life is split into episodes each lasting one year. This leaves a somewhat artificial situation where everything changes on the 1st of April each year[26].

The IM is also based on gross income – no estimation is made of impact of different tax regimes over time. As pension contributions are modelled as a proportion of gross income, there is no need to estimate tax relief on pension contributions.

The IM holds historical data, covering for example contribution conditions and earnings limits, from 1953 to 2003, and projected data to 2100. This means that

[22] PQ David Willetts 17 July 2003, House of Commons Hansard col 531 W

[23] See PPI (2003) pages 36 - 40

[24] Specifically, tablesPMA92 and PFA92

[25] www.pensioncalculator.org.uk

[26] This could lead to some overestimation of pension incomes. For example, credits in state pensions are only awarded for full years of qualification. If an individual was unemployed for 12 months, but only part of this fell into one tax year (April to March), and was employed for the rest of the tax year but earned less than the lower earnings limit, they would not qualify for a BSP qualifying year or a credit (unless voluntary contributions were paid at the end of the year). In the IM, because all of the unemployment period is assumed to fall within a single tax year, a credit is awarded. This will also impact in the same way on Home Responsibilities Protection, awarded for caring for children, and credits in S2P.

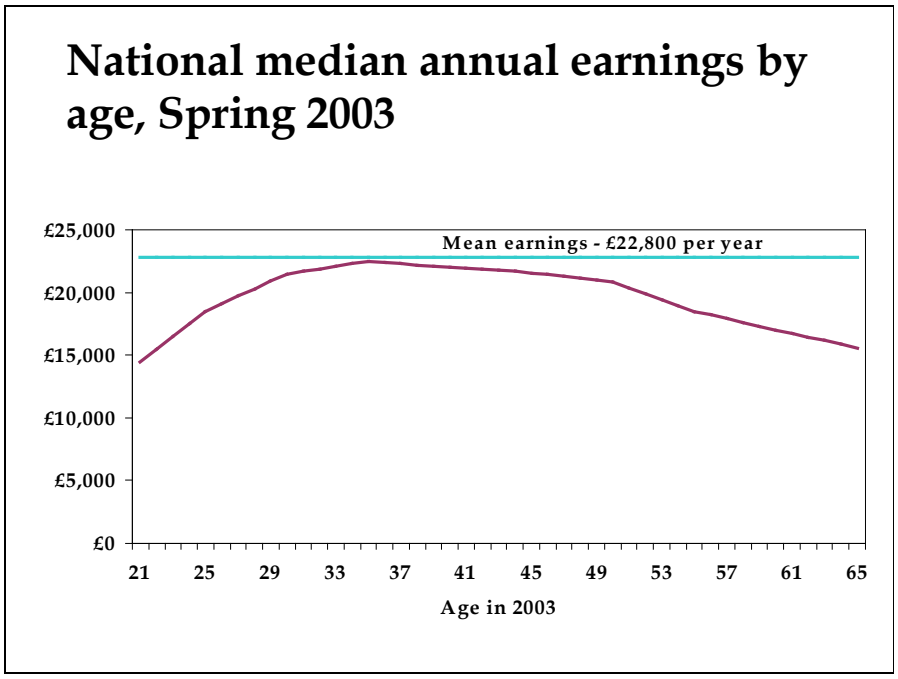
the model can calculate pension income based on a full working life for any individual retiring after 2003 (assuming a maximum 49-year working life).

State pension age (SPA) is calculated by the IM using the age in 2003 and gender input for each example, incorporating the equalisation of SPA for women between 2010 and 2020. Individuals can be assumed to retire before or after SPA. If an individual retires before SPA, private pension is taken at retirement, and credits for state pensions (such as BSP credits for men aged between 60 and 64) are awarded where applicable. If an individual retires after SPA, state pensions are deferred until retirement.

Individual earnings are based upon an age-specific earnings profile – that is, earnings change according to the age of the individual. This is based on the median earnings of all employed individuals at each age estimated from the Spring 2003 Labour Force Survey (LFS) (Chart A1). The LFS is used as it has a larger sample than most other surveys, such as the Family Resources Survey. This is particularly important when looking at the earnings profiles of specific groups of individuals, such as women, people from ethnic minority groups and disabled people. The New Earnings Survey (NES) is another alternative source, and this has a much larger sample than the LFS, but it does not contain enough information to identify specific groups of individuals.

Individuals are assumed to have an earnings profile based on a proportion of the national median at each age – for example, the reference individual has 100% of national median earnings at each age. Using median income levels results in lower income levels than using mean (or 'average') income levels, which are skewed upwards by individuals with very high earnings. The mean earnings estimated across all full-time employees from the Spring 2003 LFS (£22,800 per year) is higher than the median earnings in each age group, even during the peak earnings years between ages 30 and 45.

Chart A1[27]



The age specific profile is used even if there is a gap in the contribution history, such as a spell of unemployment. This means that even after a lengthy spell of time not in work, an individual could return with higher earnings, according to their age and national average earnings growth in the interim. This may overestimate earnings levels.

Using a cross-sectional data set, in effect, to project a longitudinal working life does have some disadvantages[28]. In particular, age characteristics can be mixed with cohort characteristics, so the profiles generated may be an amalgamation of the experiences of different cohorts, rather than an accurate reflection of the experience of any single cohort.

Similarly, using median earnings rather than mean for historical earnings is problematic. To derive earnings prior to 2003, median earnings levels are adjusted by average earnings growth figures, which are based on the year-on-year change in mean earnings[29]. As the mean and median are likely to grow at different rates, this could introduce a bias into the earnings profiles.

Neither of these problems are critically important to the outcomes described in this paper, as the IM is based on hypothetical individuals and investigates either changes in characteristics, or changes in the pension system rather than differences between cohorts.

[27] PPI analysis of the Labour Force Survey, Winter 2002/3

[28] As outlined in Banks et al (1999)

[29] There are no earnings growth series based on median earnings that go back far enough to use in the IM.

If individuals are working part-time, earnings are set as a proportion of their individual level of full-time earnings, rather than of all average full-time earnings.

There are a number of sources of retirement income that are not covered by the IM. The model concentrates purely on pension income, and so other sources of income – such as other savings, earnings, or income from housing assets – are not included. There are also some other state benefits that are not included in the model, such as Housing Benefit, Council Tax Benefit, and disability benefits. These help meet specific needs, and can add considerably to income Over 1.6 million pensioner households received Housing Benefit in 2000/1, at an average of £42.80 a week, and 2.4 million pensioner households received Council Tax Benefit, at an average of £9.20 a week[30]. One fifth of all pensioner households received disability benefits in 2001/2, at an average of £53 a week[31].

Pensioners are also entitled to other benefits, such as free TV licences (over 75s), free NHS prescriptions and eye tests, and subsidised public transport. These are not included in the IM.

The model is based on an individual, and currently does not take account of the income of partners. This can be particularly important when looking at women's income, where individual pension income may be low, so the presence of a partner can have a significant impact on living standards.

Working life characteristics

The IM is flexible enough to cover a very wide range of hypothetical working lives. For each year between the age the individual enters the labour market and the age they leave (both of which can be varied), there is choice of labour market activity, covering:

- Working full-time
- Working part-time
- Unemployed
- Disabled
- Caring (qualifying for HRP)
- Caring (qualifying for HRP and S2P credits)
- Inactive (not qualifying for HRP / credits)
- Self-employed (not qualifying for SERPS/S2P)

Each of these different types of activity can lead to different pension outcomes.

For each year the individual can be assumed to make a private pension contribution (irrespective of working status). This can either be set as a fixed proportion of earnings throughout the working life, or varied on an annual basis – for example where contributions continue when an individual is not in work. Where an individual is not earning, but assumed to be contributing to a pension, the last recorded earnings level is used[32].

[30] DWP (2003 TU)

[31] DWP (2003 PIS)

[32] Subject to an annual contribution limit of £3,600 (not indexed), in line with current legislation

Appendix 2: The reference individual – a 'policy stereotype'

To look at the impact of various changes in working life characteristics, a baseline, or reference individual is needed to measure change against. The IM reference individual is:

- A man
- Starting work at age 21
- Fully retiring at age 65 (SPA) (giving a working life of 44 years)
- In continuous full-time employment
- Earning average age-specific earnings
- Making continuous private pension contributions of 8% a year[33]

Some of the characteristics of the reference individual are 'composite', based on aggregate characteristics across the UK. These characteristics are neutral to reflect the average across the population as a whole. For example, earnings are based on all full-time employees, including male, female, white, ethnic minority, disabled and non-disabled. It has been necessary to make a positive assumption about some other characteristics. For example, a gender had to be assigned to model life expectancy.

These particular characteristics are those most often used to evaluate the outcomes of the UK pension system (and sometimes implicit in its design), and can be seen as a 'policy stereotype'. However, although he has median earnings, this policy stereotype by no means represents an 'average' person.

- There are 6.9 million female pensioners, and 3.9 million male pensioners[34].
- Only 10% of women and 17% of men stop work at state pension age [35].
- Few people will have 44 years of continuous pension contributions. Only 56% of working age people currently have some private pension provision[36], and less than half of people have made pension contributions in each of the last 9 years[37].
- Many people have spells when they are not in full-time employment – either through unemployment, temporary work or self-employment – or they may not be in paid work at all, caring for children, the disabled or the elderly.
- Historically people may have had less access to private pension arrangements (where their employer had no arrangement), or access to less generous private pension arrangements.

[33] 8% is the average private pension contribution – Curry and O'Connell (2003) page 37
[34] Curry and O'Connell (2003) p5
[35] O'Connell (2003) p17
[36] Curry and O'Connell (2003) p 41
[37] Curry and O'Connell (2003) p 42

Although all of the characteristics chosen seem reasonable in isolation, they combine to give an individual whose pension income is likely to be well above the average in future. The level of pension income calculated for the policy stereotype retiring in 2003, at 42% of national average earnings, is higher than the average level of pension income for a single pensioner today[38]. This is despite using an assumed rate of return on pension contributions that is likely to be much lower than that seen historically[39].

Pension income for the policy stereotype is estimated for three different years of retirement, to cover three different stages of the UK pension system – retiring today, based on the historical (SERPS) system, retiring in 2028 for those in the transition between the historical and new (S2P and PC) systems, and retiring in 2048 for those who will have spent their whole working life under the new system.

As well as specific individual characteristics, the pension income of the policy stereotype will depend on a range of economic and pension system assumptions (Box 2). Appendix 3 shows the sensitivity of the results for the policy stereotype to changes in some of these assumptions.

Economic assumptions are based on current best estimates. Inflation is set at the target set for the Bank of England Monetary Policy Committee. Real earnings growth is set to match the assumptions used by HMT and DWP in making long-term projections of pension expenditure[40].

Assumed real investment returns are based on a study of long-term projections[41]. There is considerable uncertainty surrounding future investment returns, and the assumption used here is at the lower end of the projections. Although this gives a lower total income level for the policy stereotype, it also reduces the impact of not making pension contributions. Higher assumed returns would lead to larger fluctuations in pension income for small changes in savings behaviour. Appendix 3 shows the impact on pension levels of assuming real investment returns of 4% and 5% per year.

[38] Based on calculations from the Pensioners' Incomes Series 2001/2 (DWP (2003)). The average pension income for a single pensioner is 37% of National Average Earnings, where pension income includes benefit income, occupational pensions and personal pensions. As benefit income includes disability benefits, housing benefit and council tax benefit, this is in fact an overestimate of pension income.

[39] Although a consistent series back to 1958 is not readily available, pension funds achieved an average annual real return of 6.5% per year in the 20 years to 2002
(Watson Wyatt www.watsonwyatt.com/europe/pubs/longtermstats). The examples in this working paper assume a real annual return of 3% per year, to allow comparisons to be made on a consistent basis between past and future pension systems.

[40] DWP (2002 GP) Annex 3

[41] Projections are consistent with the analysis by PwC conducted for the FSA to inform the decision to leave projection rates for pension products unchanged (FSA (2003)). The figure used in the IM assumes an equity risk premium of 3%, long-term gross gilt yields of 4%, and a portfolio of 60% equities to 40% gilts. The rate is then rounded to the nearest 0.5%.

Box 2: Assumptions used for the policy stereotype

Economic	
Price inflation	2.5% per year
Annual Basic State Pension uprating	2.5% per year
Other state pension uprating	0% per year
Real earnings growth	2.0% per year
Real investment returns	3.0% per year
Private pension	
Proportion of private pension taken as lump sum	0% 1%
Private pension annual management charge	Single, indexed to RPI
Annuity type	Uprated with changes in BSP
State pension	
Lower Earnings Limit (LEL)	Linked to LEL
Upper Earnings Limit (UEL)	Earnings uprated
Lower Earnings Threshold (LET)	Calculated to balance 40% and 10% accrual rates
Upper Earnings Threshold (UET)[42]	Earnings uprated BSP uprated
PC - Guarantee Credit	
PC - Lower threshold for savings credit	

The assumptions used for the state pension system are based on the current conventions for uprating thresholds and benefit levels. There is some question as to whether these conventions will remain in the long-term. In particular, the gap between the BSP and Guarantee Credit level grows quickly, extending entitlement to the Savings Credit.

The different thresholds used to calculate annual S2P entitlements also converge as they are uprated by different amounts, changing the shape of benefit entitlement in future towards a more flat-rate benefit[43].

Although for the comparisons in this working paper the state pension system is not varied, the IM can be used to model the results of using alternative assumptions for these benefits and thresholds.

[42] When the lower / upper earnings thresholds meet the upper earnings limit, they are then increased in line with prices

[43] The Lower Earnings Threshold converges with the Upper Earnings Limit in 2055 on the baseline assumptions. After this point all earnings between the LEL and UEL would be subject to a 40% accrual rate for State Second Pension.

IM Outputs

The IM works in cash terms. The estimated pension income is calculated as the actual amount of money that the individual will receive. While this is easy to interpret for examples retiring in 2003, it is hard to interpret for those retiring in 20 and 50 years time. The cash value of pensions will be much higher than those received today, but prices and earnings will also be much higher than today.

The initial results are therefore converted into a range of different forms, to give a better idea of the *relative* value of pension incomes to today, to those in work, and to previous individual income levels. These include:

- **Real income** – income adjusted for the change in prices between 2003 and the year of retirement. This shows income relative to prices today, and is a broad indication of how much pension income will buy in goods and services, compared to today.
- **Proportion of National Average Earnings (NAE)** – gives a broad indication of income relative to the incomes of people in work[44].
- **Gross replacement rate** – this is the ratio of pension income to earnings in the year before retiring (or the last year of earning). This shows how much of a change there is in individual income there is when reaching retirement.

The change in these measures over the course of retirement is also calculated. Also of interest post-retirement is entitlement to PC, which will extend further up the income distribution in future.

The policy stereotype is estimated to retire with pension income of £202 per week, or 42% of average earnings, in 2003. He would become entitled to the Pension Credit at age 76 (Table A1). His son, retiring in 2028, and his grandson in 2048, would have a higher real income - £302 in 2028 and £455 in 2048, but would receive a slightly lower proportion of average earnings. But each generation qualifies for the Pension Credit much earlier – at age 65 in both the 2028 example and the 2048 example.

[44] The NAE is sourced from the New Earnings Survey (NES), which is the most widely used source for earnings information. The earnings profiles, estimated from the Labour Force Survey, are based on an earnings distribution with an average around 10% lower than the NES figure - £439 per week from the LFS compared to £476 per week from the NES. While this might reduce the apparent level of pension income received as a proportion of NAE, the change in pension income due to changes in characteristics is not significantly altered.

Table A1: IM Results for the policy stereotype (in 2003 price terms)

		Year of retirement		
		2003	**2028**	**2048**
At retirement	Real income	£202	£302	£455
	% average earnings	42%	39%	39%
	Replacement rate	68%	63%	64%
At age 75	Real income	£201	£339	£509
	% average earnings	35%	36%	36%
At age 85	Real income	£228	£384	£576
	% average earnings	32%	33%	33%
Age of eligibility for Pension Credit		76	65	65

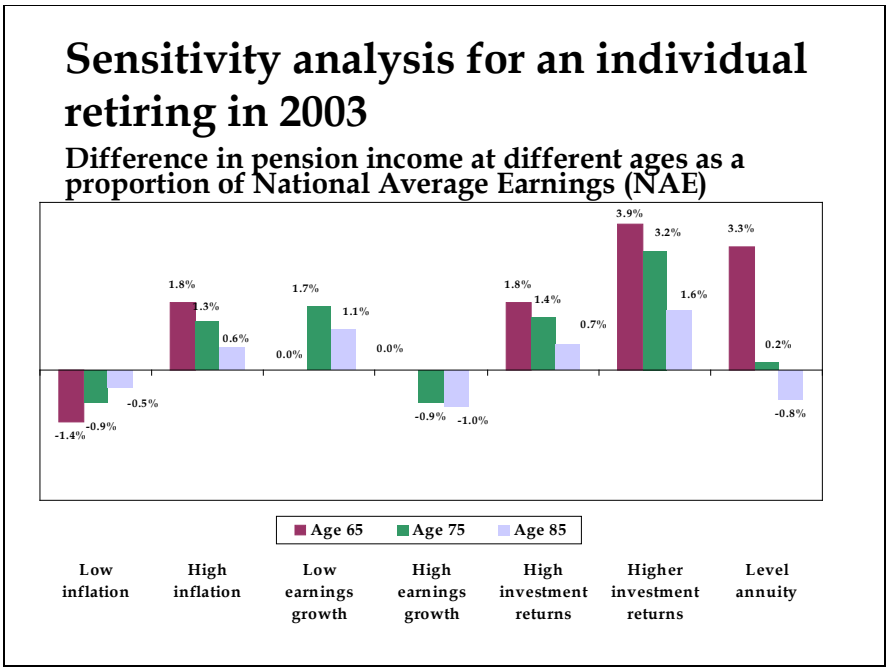
Appendix 3: Sensitivity analysis

The results for the reference individual are based on a specific set of economic and pension assumptions. This appendix illustrates how estimated pension incomes change if alternative assumptions are used. In particular (changing each assumption one at a time):

- Lower inflation (1.5% a year)
- Higher inflation (3.5% a year)
- Lower real earnings growth (1.5% a year)
- Higher real earnings growth (2.5% a year)
- Higher real investment returns (4.0% a year)
- Much higher real investment returns (5.0% a year)
- Life expectancy – using female annuity rates instead of male
- A level annuity instead of an indexed annuity

The level annuity rate has a high positive impact at age 65, but the impact becomes negative by age 85. Higher investment returns, and lower real earnings growth both increase income relative to national average earnings (NAE). Price inflation has a larger impact on results for those retiring in 2003 (Chart A3), than those retiring in future years (Chart A4 and Chart A5). This is largely due to the impact of Pension Credit, which helps protect pension income. In future years the policy stereotype is entitled to the Pension Credit from age 65.

Chart A3[45]



[45] PPI calculations based on the IM. Sensitivity to female annuity rates is not shown, due to the different retirement age for men and women in 2003 which skews results.

Chart A4[46]

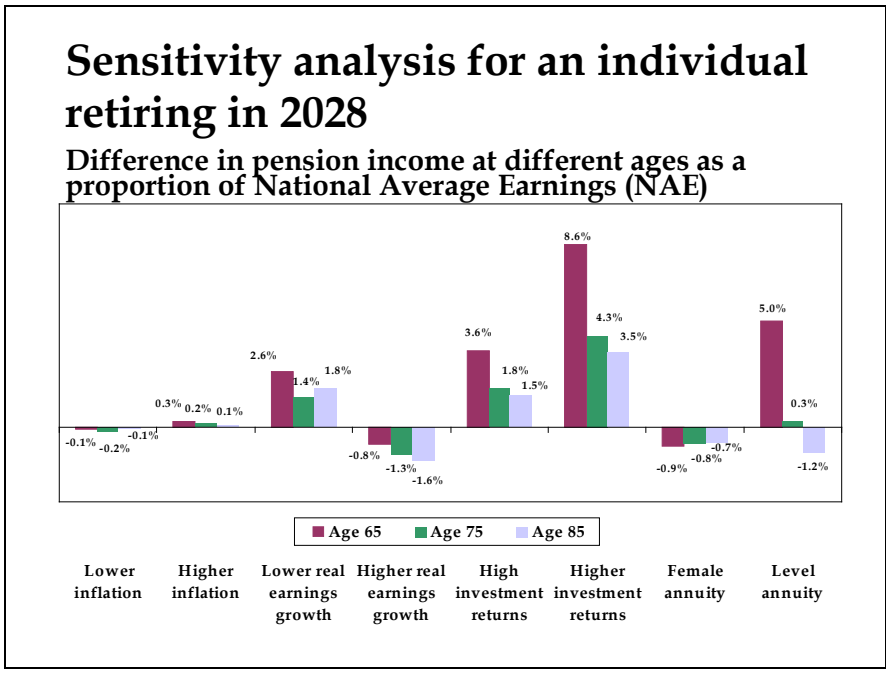
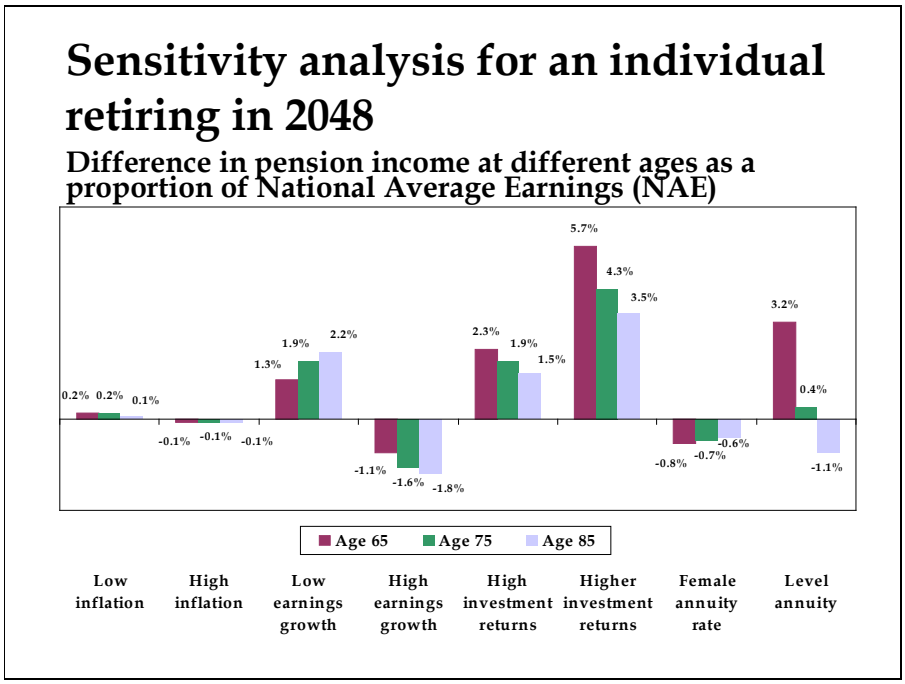


Chart A5[47]



[46] PPI calculations based on the IM

[47] PPI calculations based on the IM

Glossary

***The Pensions Primer*, available at www.pensionspolicyinstitute.org.uk contains more details on some of the pension terms used in this working paper**

State Pension Age (SPA)
State pension age is the age from which state pensions are normally payable. This is currently 65 for men, and 60 for women. SPA for women will increase from 60 to 65 between 2010 and 2020.

Basic State Pension (BSP)
BSP is the flat-rate state pension paid to all people who have met the necessary National Insurance (NI) contribution conditions. It is payable from state pension age, although claims can be delayed in return for an increased level of benefit. The full amount of BSP for those with a sufficient NI contribution record is £77.45 per week for a single person from April 2003. For a married couple, based on husband's contributions, the rate is £123.80 per week.

Graduated Retirement Pension (GRAD)
The Graduated Retirement pension (GRAD) is a state earnings related pension. Benefit is calculated from the earnings-related contributions paid between April 1961 and April 1975. It is paid in addition to the basic state pension, and is payable from state pension age.

State Earnings Related Pension Scheme (SERPS)
SERPS is a state earnings related pension. Benefit is calculated from the earnings-related contributions paid between April 1978 and April 2002. It is paid in addition to the basic state pension, and is payable from state pension age.

State Second Pension (S2P)
S2P replaced SERPS from 6 April 2002. Compared to SERPS, S2P will pay enhanced benefits to those with earnings below £25,592 per year, with the largest enhancements directed at those earning less than £11,200 per year, those caring for the disabled or young children, and those with a long-term illness or disability. It is payable from state pension age.

Minimum Income Guarantee (MIG)
MIG is the main means-tested benefit for pensioners, payable to those aged 60 and above. From April 2003, the minimum income will be £102.10 per week for a single person, and £155.80 per week for a couple. The state pension actually receivable by a person is taken into account (along with other income) in calculating the amount of MIG received.

Pension Credit (PC)
PC is a new means-tested benefit to be introduced in October 2003. PC combines a guarantee credit for those aged 60 and above (which in many respects is the minimum income guarantee renamed), with a new savings credit for those 65 and above. The savings credit provides an additional amount related to how much other income is being received on top of the level of the full amount of BSP. The maximum top-up is expected to be £14.80 per week for a single person and £19.20 for a couple.

Housing Benefit (HB), Council Tax Benefit (CTB)
People on low incomes may be eligible for some or all of their rent and council tax to be paid by means of housing benefit and council tax benefit. Generally, people receiving the MIG receive the full amounts of HB and CTB, though they must be claimed.

Home Responsibilities Protection (HRP)
HRP was introduced in 1978 and gives protection where an individual is caring for children, the elderly or disabled by reducing the number of years of contributions required to secure full BSP.

Defined Benefit (DB) Occupational Pension
A DB occupational pension scheme will provide a pension that is expressed as a proportion of earnings - for example 1/60th - for each year of membership. Earnings are usually based on an individual's salary at, or close to, retirement, but can also be based on an average across the length of time spent working.

Defined Contribution (DC) Occupational Pension
A DC occupational pension scheme is based on contributions that are invested on behalf of the employee. At retirement the pension will depend on the accumulated fund and the annuity rates available at that time. The employer makes no guarantees regarding the level of benefits that the accumulated fund will provide – as investment returns or annuity rates worsen the resultant pension reduces; conversely if they improve the pension will be higher.

Personal Pension
Personal pensions are arranged by an individual. Contributions are invested and at retirement the accumulated fund will be used to purchase an annuity.

Stakeholder Pension
Stakeholder pensions, which were introduced in April 2001, are a form of personal pension with charges limited to a maximum fund management charge of 1% per year, among other requirements.

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