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What will
pensions cost in
future?

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Introduction

The Pensions Policy Institute has constructed a suite of models to analyse long-term outcomes from the current UK pensions system and possible reforms. The development of the models has been funded by the Nuffield Foundation.

The models have been designed to allow different types of analysis under different pensions systems:

- The Individual Model projects future state and private pension income for hypothetical individuals.
- The Aggregate Model projects long-term government expenditure on pensions and contracted-out rebates, income from the private pensions system and the fiscal cost of tax relief.
- The Distributional Model projects forward the distribution of pensioner incomes consistently with the Aggregate Model.

A technical paper containing results from the Individual Model was published in November 2003 and the model has since been used in a number of PPI publications. This paper presents results from the Aggregate Model and the Distributional Model.

This paper concentrates on the long term. Detailed short-term transition costs and distributional impacts would be estimated using a different methodology.

Chapter 1 shows that the future cost of the current system is very uncertain, and could be higher than expected.

Chapter 2 shows that income from private pensions could decline over the long term if current trends continue, but even so, tax relief on private pensions is likely to remain a significant part of government spending on pensions.

Chapter 3 estimates what combinations of increasing state pension age and increasing taxes would be necessary to pay for some of the reforms being proposed.

Chapter 4 illustrates the distributional implications of some of these proposals.

The Appendices comprise detailed technical information about the methodology and assumptions used in this modelling work. They illustrate the complexity of the current pensions system. The models and results will be updated as new data becomes available and with further improvements in the modelling methodology.

What will pensions cost in future?

Summary of conclusions

The impact on today's older people of any reform of the pensions system will be carefully considered. But the desire for a stable system means it should be designed to be sustainable for tomorrow's older people too. This requires understanding the long-term costs and the implications for pensioner incomes of not only possible reform options, but also, for comparison, the continuation of current pension policy.

The future cost of the current pensions system is very uncertain. There is a wide funnel of doubt for the future cost of Pension Credit, which depends on how much private income older people have, and how many of them take up any entitlement to Pension Credit.

There is a significant risk that the current pensions system will cost more in future than anticipated by government. By 2050, it could reasonably cost 0.8% of GDP more than the government estimate of 5.8% of GDP, but there is a chance that it could cost still more.

The total income received by older people from private pensions is also uncertain. It could decline over the long term if the shift from Defined Benefit to Defined Contribution schemes means a reduction in total private pension contributions. Even if contributions do reduce, tax relief on private pension saving is likely to remain a significant cost to government.

All the proposals for state pension reform currently being discussed will cost more than the current system, because they seek to improve pension outcomes. Opinions will differ as to what combinations of increasing state pension age and increasing taxes would be acceptable ways of paying for this extra cost. This paper investigates the costs of different reform options and different ways of paying for them.

Opinions also differ as to what shape of income distribution the state pension system should try to achieve. This paper shows how the different reforms being proposed would benefit less well-off and more well-off older people differently.

Chapter 1: The cost of the current pensions system

The PPI's models have been designed to minimise artificial differences with the government's models. The two sets of models produce similar estimates for the future cost of the current pensions system, if the same assumptions on what could happen in future are used. The PPI's models are flexible enough to use different assumptions, so they can be used to show the uncertainty in the estimates.

The future cost of the current pensions system is very uncertain. There is a wide funnel of doubt for the future cost of Pension Credit, which depends on how much private income older people have, and how many of them take up any entitlement to Pension Credit.

There is a significant risk that the current pensions system will cost more in future than anticipated by government. By 2050, it could reasonably cost 0.8% of GDP more than the government estimate of 5.8% of GDP, but there is a chance that it could cost still more.

Validation of the models

The PPI's models produce similar estimates for the future cost of the current pensions system as the government's models, if the same assumptions on what could happen in future are used (Table 1). This cost includes BSP, SERPS/S2P, Pension Credit, other pension benefits such as Winter Fuel Allowances and the cost of contracted-out rebates.

Where differences exist in Table 1, they are a result of using slightly different methodologies or a different source of data. A more detailed comparison between government and PPI models is in Appendix 1.

Table 1: PPI and government estimates of the future cost of the current pensions system, as a percentage of GDP

	PPI	Government	Difference
2010	5.6%	5.9%	-0.3%
2020	5.2%	5.4%	-0.2%
2030	5.8%	5.7%	0.1%
2040	6.0%	5.8%	0.2%
2050	5.8%	5.8%	0.0%

The PPI models have a long-term focus. The government estimates may be more appropriate for the short-term (2010), because they can use a different methodology based on administrative data.

¹ The government produces long-term projections on an annual basis. The government estimates for the cost of state pension and Pension Credit are from DWP (2005 LTP) and are those underlying the 2005 Budget, the latest available. The government estimates of the cost of contracted-out rebates are from GAD (2004 QR). PPI estimates are based on the Aggregate Model and the Distributional Model. PPI estimates produce a lower estimate of cost in the short term because they are based on different, more recent, estimates of the amount of contracting-out.

PPI base case estimates use different assumptions to the government:

- For simplicity, the PPI assumes that inflation is 2.5% each year, and earnings growth is a constant 2.0% in excess of inflation. The government uses assumptions that vary over time.
- More importantly, the PPI makes different assumptions on the amount of income older people will have ‘taken into account’ for the calculation of their eligibility for Pension Credit in future². This leads to different estimates for the cost of Pension Credit, which has a large funnel of doubt.

More details on the assumptions used for the PPI base case scenario are given in Appendix 2. More technical details of the models are provided in Appendices 3 and 4.

Large funnel of doubt

Pension Credit is a means-tested benefit, so that the amount people receive, and therefore the amount the benefit costs, depends on:

- How much income older people have that is taken into account for Pension Credit. This will depend in future on the performance of the private pensions sector and to what extent older people work, and so cannot be known with certainty.
- How many people take up the benefit. Currently around 75% of people with some entitlement take it up³. In future, the relative size of entitlements will increase under current government policy, so more people might take up their entitlements.

Any single (‘point’) estimate of the future cost of the current pensions system must make assumptions on Pension Credit. For its long-term projections, the government assumes⁴:

- All income older people have taken into account for Pension Credit will grow with average earnings.
- Take-up remains at today’s levels.

Using these assumptions, the government estimates that the total cost of the state pensions system, including Pension Credit, is 5.8% of GDP (£180 billion) in 2050⁵.

If income grew more slowly than expected, or if take-up increased, then the cost of the current pensions system, including Pension Credit, could be significantly higher than 5.8% in 2050. This leads to the large ‘funnel of doubt’.

² Income taken into account includes state and private pensions, earnings above a certain level and notional income from some sources of capital

³ This is the assumption used in the latest set of DWP projections of the long-term cost of Pension Credit

⁴ DWP (2005 LTP)

⁵ Government estimates for the cost of state pension and Pension Credit are from DWP (2005 LTP) and are those underlying the 2005 Budget, the latest available. Government estimates of the cost of contracted-out rebates are from GAD (2004 QR).

Upside risk

Income from both state and private pensions is likely to grow more slowly than average earnings under current policy, and take-up of Pension Credit could increase. This means that the cost of the current pensions system could be higher than expected⁶.

Evidence points to state pension income taken into account for Pension Credit growing more slowly than average earnings in future:

- Spending on BSP and SERPS/S2P is projected to fall relative to GDP between now and 2050⁷, while a 50% increase in the number of people over state pension age is expected over the same time period⁸. This means that the average state pension will fall.
- The replacement of SERPS with S2P in 2002 means that state pension income is expected to grow faster at the lower end of the income distribution under current policy than at the higher end. But just under 50% of households are entitled to Pension Credit today, and current indexation policy means Pension Credit is likely to creep up the income distribution in future. So it is important to consider all income groups when setting the assumption.
- PPI Individual Modelling shows that for most people, state pension income is unlikely to grow as fast as earnings, with growth in S2P offset by reductions in BSP (Table 2). So it seems unlikely that state pension income taken into account for Pension Credit will rise as quickly as average earnings under current government policy.

Table 2⁹: Average annual growth in state pension income at age 65 received by successive cohorts of women and men reaching age 65 between 2020 and 2050, in excess of average earnings growth

Woman earning at the 10th percentile	+ 0.4%
Woman earning at the 30th percentile	- 0.1%
Woman earning at the 50th percentile	- 0.2%
Woman earning at the 70th percentile	- 0.5%
Woman earning at the 90th percentile	- 1.0%
Man earning at the 10th percentile	- 0.4%
Man earning at the 30th percentile	- 0.6%
Man earning at the 50th percentile	- 0.9%
Man earning at the 70th percentile	- 1.3%
Man earning at the 90th percentile	- 1.5%

⁶ See also PPI (2005 BN 26)

⁷ DWP (2005 LTP)

⁸ Based on the same set as population projections as used for the most recent set of government expenditure projections, see GAD (2004 P). The increase in the number of people over state pension age is slightly higher using the more recent 2004-based projections but this could also increase projected spending.

⁹ PPI analysis based on the Individual Model. "State pension income" is BSP and SERPS/S2P (including contracted-out equivalent) combined. Percentiles divide the earnings distribution into equal sections, so that, for example, 10% of people have earnings less than the 10th percentile. Percentiles refer to gender and age specific earnings distributions. The individuals are similar to those used in recent PPI publications, for example PPI (2005 SP) and PPI (2005 EEF). The women are assumed to each spend 11 years caring. The men mainly worked full-time but were unemployed for two years and worked part-time for five years. Assumes a continuation of current government policy and that average earnings grow by 2% a year faster than prices.

Future income from private pensions depends on how much working age people and their employers contribute in future, and what investment return is achieved on those contributions. PPI projections show that average income from private pensions is also set to grow more slowly than the growth in average earnings over the long term (see Chapter 2). There seems little reason to believe that it will increase any faster than average for those who will be entitled to Pension Credit.

Non-pension saving and earnings could make up some of the difference, but given the uncertainties surrounding how these sources of income will grow, it seems reasonable and prudent to assume that income from these sources will grow with average earnings¹⁰. The overall result is that income taken into account for Pension Credit will grow less slowly than average earnings.

There is also a case for assuming that under current government policy, take-up of Pension Credit will increase in future:

- Awareness could increase as more people will be entitled in future.
- Entitlements could increase in future, leading to an increase in take-up¹¹. Current policy is to increase the lower limit for Savings Credit with prices but the upper limit with earnings. This means that the maximum possible Savings Credit award increases faster than earnings, from 3% of National Average Earnings today to almost 9% by 2050¹².

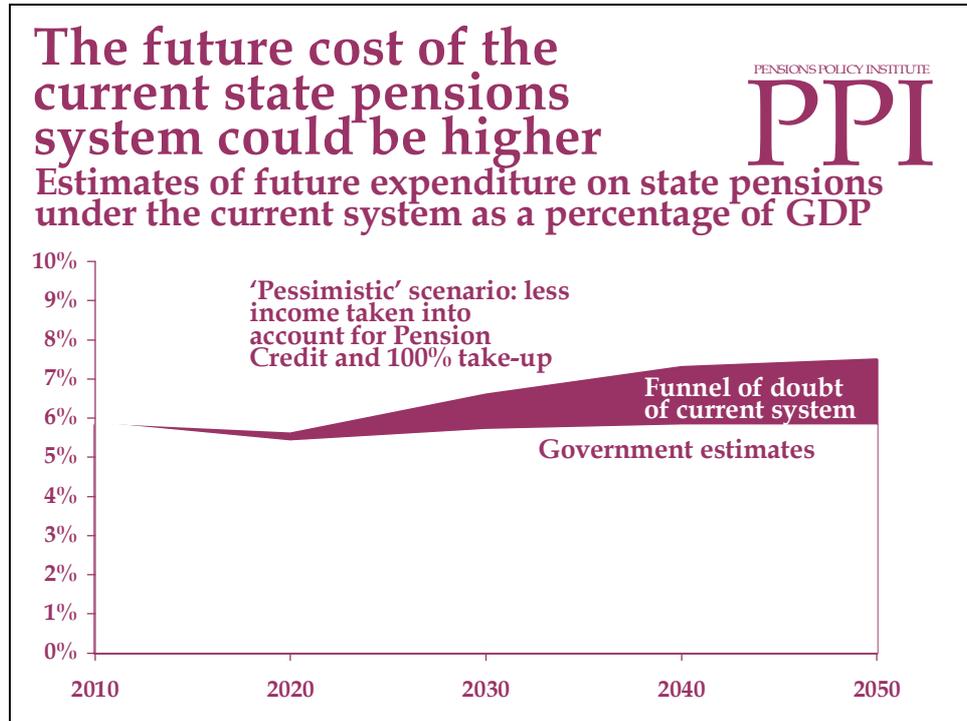
To illustrate the possible size of the funnel of doubt, a very 'pessimistic' set of assumptions is that state pension income taken into account for Pension Credit will grow at the rate implied by the PPI's internally consistent projections from the Aggregate Model (more slowly than average earnings) and private income taken into account increases with prices (also more slowly than average earnings). If take-up also increases to 100%, then the estimated cost under this set of assumptions in 2050 is 1.7% of GDP (£60 billion) higher than government estimates (Chart 1 and Table 3).

¹⁰ For example, see PPI (2005 PC) Paragraph 61

¹¹ There is evidence to suggest that people with larger entitlements are more likely to take up their entitlements than people with small entitlements. See Hancock et al (2004).

¹² PPI calculation assuming that average earnings grow by 2% a year faster than prices

Chart 1¹³



An alternative set of assumptions, which seems reasonable and is therefore used for the PPI base case scenario, is:

- Both state and private pension income taken into account for Pension Credit will grow at the rate implied by the PPI’s internally consistent projections of BSP, SERPS/S2P and private pensions (more slowly than average earnings).
- Other income taken into account, including earnings, will grow with average earnings.
- Take-up of the Guarantee Credit safety-net remains at current levels but take-up of Savings Credit increases from its current level of just under 40% to around 60% as the size of awards increase.

Under this scenario, the estimated cost in 2050 of the current pensions system is 0.8% of GDP higher than the government estimate of 5.8% of GDP (Table 3).

¹³ PPI estimates using the Aggregate and Distributional Models and government estimates. It is theoretically possible for the cost to be lower than the minimum or higher than the maximum shown, but this is unlikely.

Table 3¹⁴: Estimated expenditure on pensions under the current system, as a percentage of GDP and in £ billion in 2005/6 prices

	Government projections	PPI 'pessimistic' scenario	PPI base case scenario
Growth in income	All income with average earnings	State pensions as expected (less than earnings), all other income with prices	State and private pensions as expected, all other income with earnings
Take-up	Remains at current levels	Increases to 100%	Small increase for Savings Credit
2010	5.9%	5.8%	5.6%
2020	5.4%	5.6%	5.2%
2030	5.7%	6.6%	6.0%
2040	5.8%	7.3%	6.5%
2050	5.8%	7.5%	6.6%
2010	82	82	80
2020	95	100	95
2030	125	145	130
2040	150	190	170
2050	185	240	210

There are more sources of uncertainty than are shown in Table 3. For example, changes in the amount of private pension saving or investment returns would lead to changes in the cost of Pension Credit. The cost of tax relief on private saving would also be affected. This cost is not included in official government estimates of the future cost of the pensions system, and is considered separately in the next chapter.

¹⁴ PPI estimates using the Aggregate and Distributional Model. The government estimates for the cost of state pension and Pension Credit are from DWP (2005 LTP) and are those underlying the 2005 Budget, the latest available. The government estimates of the cost of contracted-out rebates are from GAD (2004 QR). Costs in £ bn are rounded to the nearest £1 bn for 2010 and to the nearest £5 bn for later years. Estimates can differ as a percentage of GDP but be the same in £ bn terms because the PPI uses simpler economic assumptions, leading to differences in GDP. PPI models produce a lower estimate of cost in the short term because they are based on different, more recent, estimates of contracting-out. See Appendix 1.

Chapter 2: Private pensions and tax relief

The total income received by older people from private pensions in future is uncertain. It could decline over the long term if the shift from Defined Benefit to Defined Contribution schemes means a reduction in total private pension contributions. Even if contributions do reduce, tax relief on private pension saving is likely to remain a significant cost to government.

The amount of private pension saving in future is uncertain

Although average contributions to private pensions have remained at around 8% of National Average Earnings since 1997¹⁵, there is evidence to suggest that levels of contributions could change:

- The shift from Defined Benefit (DB) to Defined Contribution (DC) schemes could lead to a reduction in contributions, if the DC schemes are less generous than the DB schemes they replace.
- Some contributions are being made to pay off deficits of DB schemes rather than to build up new pension rights. If deficits are reduced over the long term, then the amount being paid in could reduce.
- The impact of the state pension system on private saving is unclear. The disincentives in Pension Credit could encourage fewer people to save privately in the future, but on the other hand, the falling value of the state pension for many could encourage people to save more.
- Tax simplification and the other changes planned for April 2006 could encourage pensions saving.

The set of assumptions used to project the future cost of Pension Credit in the **base case scenario** of Chapter 1 is:

- Active membership of private sector DB schemes will halve between now and 2035. This is consistent with the assumption the government makes for estimating future spending on S2P and contracted-out rebates.
- All people who leave a DB scheme join a DC scheme at today's average contribution rate. In practice, leavers from DB schemes might receive a higher contribution rate which is more in line with what they were receiving in their former DB scheme. However, it is also possible that some leavers will not receive an alternative pension.
- There is no change to contribution rates being paid to DC schemes, which remain at about 8% of salary.

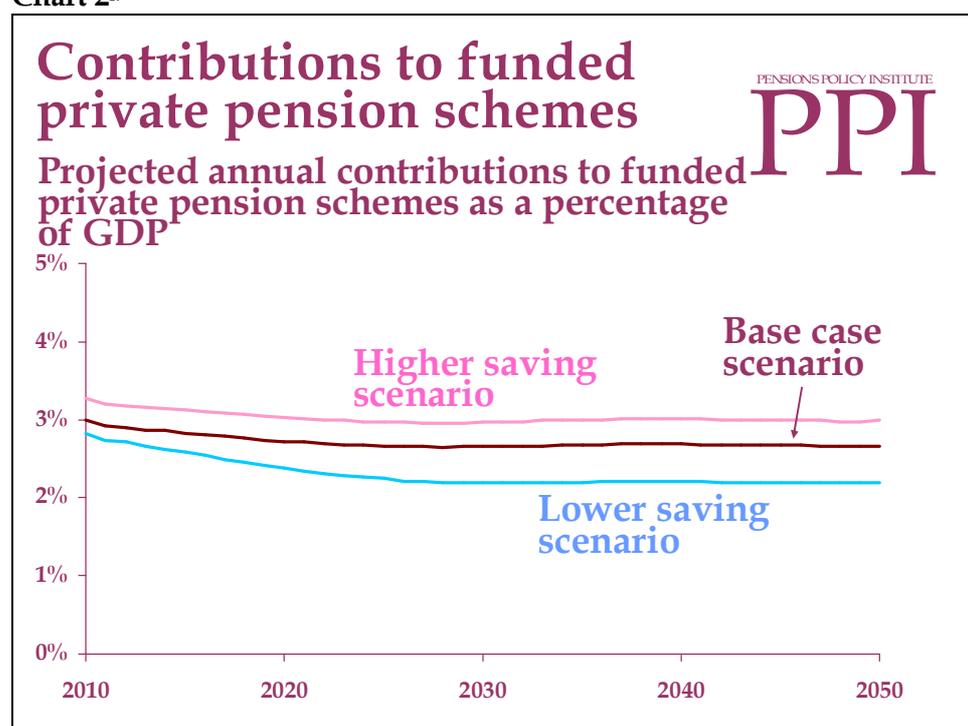
¹⁵ PPI calculations based on Penneck and Tily (2005). In this chapter, income from private pensions is taken to include any contracted-out pension, so this figure also includes contracted-out rebates. Average contributions have increased over the last two years to over 9% of National Average Earnings but it is too early to say whether this will be a sustained trend. The increase is due in large part to an increase in special contributions, and these may only be paid for a limited time.

The combination of these assumptions would mean that annual contributions to private pensions decrease from around 3% of GDP in 2010 to 2.7% of GDP by 2050¹⁶.

Given the uncertainty around future contributions, different scenarios are possible. For example, if average DC contribution rates gradually increase over the next ten years from 8% of salaries to 10%, then contributions to funded pensions would be held roughly level at 3% of GDP a year (Chart 2). Such an increase in contributions could be a natural consequence of the shift from DB to DC schemes if leavers from DB schemes are joining DC schemes with higher than average contribution rates, or it could be a consequence of individuals choosing to save more. In the rest of this chapter, this scenario is referred to as the **higher savings scenario**.

A **lower savings scenario** is that the decline in DB schemes is more complete than the government assumes for estimating future spending on State Second Pension and contracted-out rebates. In the extreme scenario that all DB schemes close for future accrual by 2035, and that all leavers join a DC scheme at today's average contribution rate, then contributions to funded pensions could decrease to around 2.2% of GDP a year by 2050.

Chart 2¹⁷



¹⁶ This is similar to the Pensions Commission's central estimate that contributions to funded pension schemes will be 2.9% of GDP after the maturing of the DB-DC shift. Pensions Commission (2004) Page 105.

¹⁷ PPI analysis based on the Aggregate Model

The rest of this chapter uses the Aggregate Model and Distributional Model to estimate, under each of these three scenarios for pensions saving, the:

- Amount of assets held by private pension funds.
- Income from private pensions.
- Net cost of tax relief on private pension saving.

Box 1 gives a brief outline of the methodology used, which is described in more detail in Appendix 3.

Note that in this report, **private pension contributions** is taken to mean contributions made to funded private pension schemes. Funded schemes are those in which contributions are invested and used to provide an income at a later date. The UK also has some unfunded pension schemes, including most public sector pension schemes, in which contributions by employers and employees are used to pay the income of current pensioners. As these contributions are not made to meet future consumption in the same way as funded schemes, they are not included as private pension contributions in this paper¹⁸.

¹⁸ Public sector employers do pay an amount to the government that is roughly equivalent to the contribution it would make if the pension scheme were funded but that contribution is not invested. See PPI (2005 OPPPS).

Box 1: Modelling private pension income

Five different types of private pensions are modelled separately:

- Funded DB schemes.
- Notionally funded and unfunded DB schemes¹⁹.
- Occupational DC schemes.
- Personal pensions for employees.
- Personal pensions for the self-employed.

The model works using a 'stock/flow' approach. The amount in each type of pension fund at the end of each financial year is calculated as:

- The estimated amount at the end of the previous financial year, *plus*
- The amount of new contributions made, calculated by applying the assumed contribution rates to an underlying projection of scheme memberships, *plus*
- The amount of investment income, calculated by applying assumed investment returns to an assumed equity/bond/cash asset mix, *less*
- Any lump sums paid out and the actuarial present value of any new pensions paid, assuming a certain proportion of members retire at each age between 55 and 72.

The amount of private pension income in each year is estimated by making an assumption about how long people live, whether pensions are increased when in payment, and whether a survivor's pension is payable. DB pensions are assumed to increase each year in line with inflation and come with a survivor's pension, while DC pensions are assumed to be mostly level and single-life.

The net cost of tax relief on private pension saving is then estimated on a fiscal basis using these projections of the private pension system, as:

- Tax relief granted on pensions saving, *plus*
- Tax relief granted on investment income, *less*
- Income tax paid on private pensions once they are in payment.

The amount of assets held by private pension funds

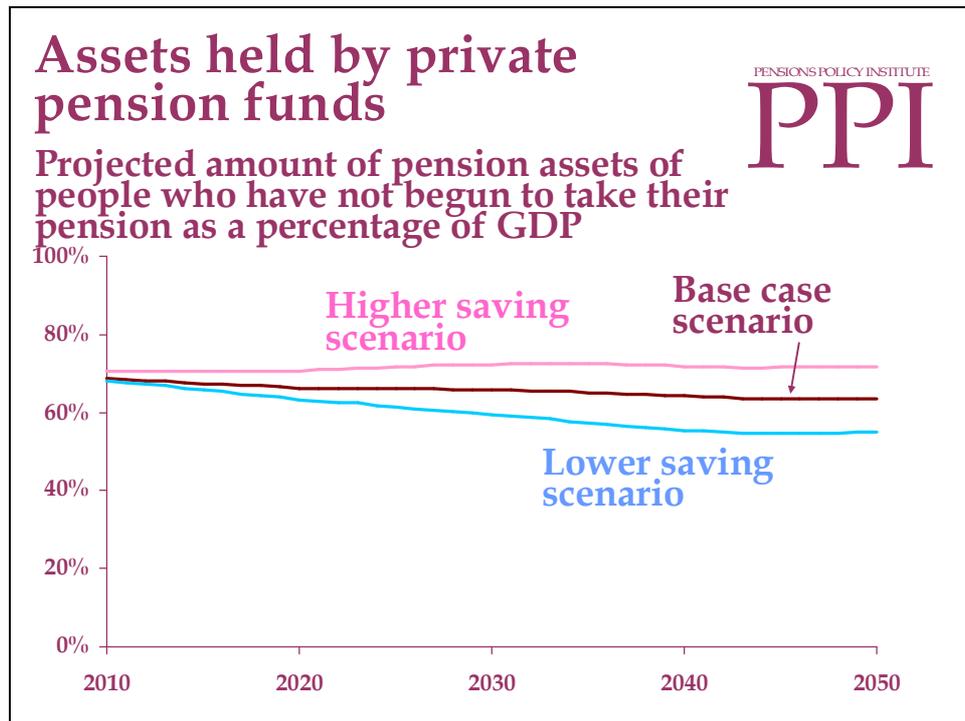
The total amount of assets held by private pension funds is one measure of the health of the UK private pensions sector. The amount of assets had been growing relative to GDP and reached over 140% of GDP in 1999 but has since fallen to just under 120% of GDP²⁰.

¹⁹ Unfunded pensions are not included in the total of private pension contributions in this paper (see page 12) but are included in the estimates of private pension income later in this chapter

²⁰ PPI analysis derived from ABI (2005)

These figures include assets held by all people, whether or not they are taking their pension. The Aggregate Model focuses on the amount of assets held by people who have not yet started to take their pension, so its estimates are lower. The results show that, in the base case scenario, the amount of assets held by pension funds is likely to continue to fall (Chart 3). The higher saving scenario could mean that the assets slightly increase over the period, but in the lower saving scenario, assets could fall further.

Chart 3²¹



Besides the amount of saving that is made in future, another key uncertainty is the investment returns that are earned by these assets in future. Chart 3 is based on equity returns of 7% a year and bond returns of 4% a year²². But investment returns fluctuate over time, and under different scenarios, the amount of assets held by private pension funds could be higher or lower (Table 4):

- If returns were **1% a year higher**, and if savings were as in the base case scenario, the amount of assets held in 2050 could be 73% of GDP rather than 64% of GDP.
- If returns were **1% a year lower**, and if savings were as in the base case scenario, the amount of assets held in 2050 could be 56% of GDP rather than 64% of GDP.

²¹ PPI analysis based on the Aggregate Model. The amount in funded pensions is projected to fall sharply over the next 5 years because it is assumed that a large proportion of the assets are held by people approaching retirement age. If the proportion held by older employees is smaller, the amounts in 2010 would be larger.

²² So that the average return earned on the assets held by pension funds is around 6.2% a year, before expenses, assuming that the pension funds invest 75% of their assets in equities. See Appendix 2 for more details of the assumptions used in the base case scenario.

Table 4²³: Estimated amount assets held by private pension funds in 2050, as a percentage of GDP

	Returns 1% lower	Equity returns of 7%, bond returns of 4%	Returns 1% higher
Lower saving scenario	48%	55%	63%
Base case scenario	56%	64%	73%
Higher saving scenario	63%	72%	82%

An increase or decrease in investment returns is likely to impact the amount that is contributed to private pensions. This impact is uncertain because it depends on how individuals react (and on their preferences). On one hand, higher investment returns could encourage more saving by making saving more attractive compared to current consumption; on the other hand, people could choose to save less because less saving would be necessary to reach any chosen target amount of income. Some care must therefore be taken when interpreting Table 4: all of the nine scenarios are plausible, but they are not equally likely.

Income from private pensions

Chart 2 showed that, in the base case scenario, private pension contributions decline from around 3% of GDP a year in 2010 to around 2.7% a year of GDP by 2050. This reduction in contributions leads to a reduction in the income received from private pensions.

In this report, **income from private pensions** means income from both funded and unfunded pensions, so income from public sector pensions has been added to the income calculated to be available from funded pensions. As income from public sector pensions is expected to grow, this reduces some of the impact lower contributions to funded pensions have on the total amount of income received.

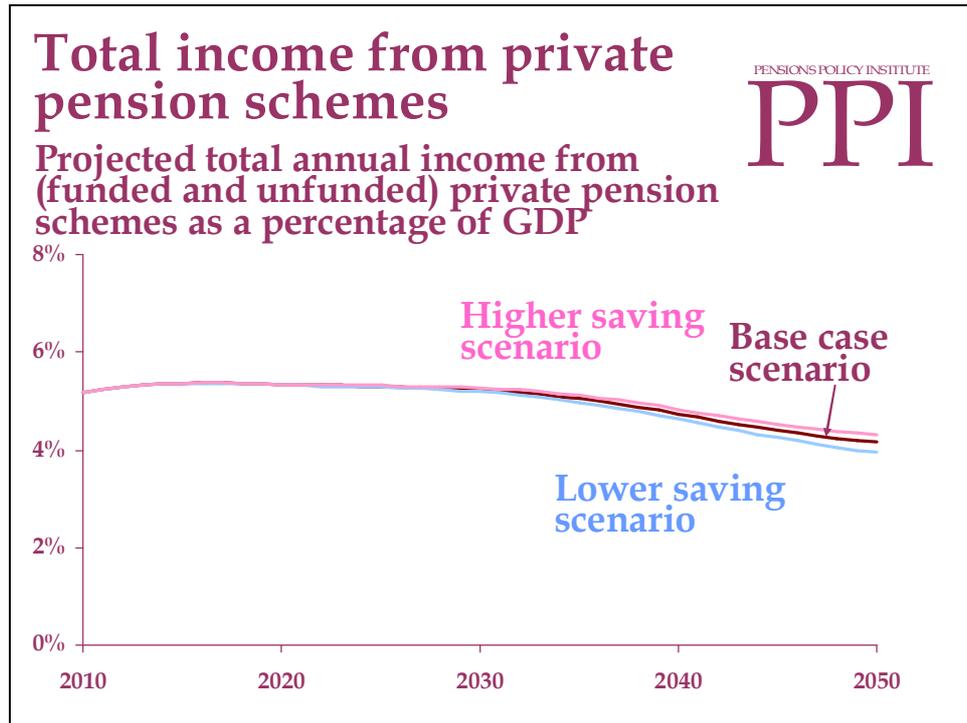
Annual income from private pensions would reduce from around 5.2% of GDP in 2010 to just over 4% of GDP by 2050 in the base case scenario, with the central investment returns (Chart 4). This reduction takes time to feed through, and most of the reduction happens after 2030:

- Private pension contributions do not reduce overnight as DB schemes are assumed to close gradually: they do not reach their final level of around 2.7% of GDP a year until around 2020.
- Even after private pension contributions have reached their assumed ultimate level in 2020, it takes time until the full effect on income is felt. A 40 year old in 2020 might not take his or her pension until 2040 or later.

²³ PPI analysis based on the Aggregate Model

Income as a percentage of GDP is a useful guide for macroeconomic policy planning, but also important is the amount available to each individual²⁴. As the number of older people is expected to increase rapidly over the next 50 years, the average income received per head by older people from private pensions will fall much faster than the figures for total income in Chart 4.

Chart 4²⁵



In all but the most optimistic of the scenarios, income from private pensions would fall from the level of 5.2% of GDP at which it is estimated to be in 2010 (Table 5).

Table 5²⁶: Projected total income from (funded and unfunded) private pension schemes in 2050, as a percentage of GDP

	Returns 1% lower	Equity returns of 7%, bond returns of 4%	Returns 1% higher
Lower saving scenario	3.2%	4.0%	4.9%
Base case scenario	3.4%	4.2%	5.1%
Higher saving scenario	3.5%	4.3%	5.3%

²⁴ See PPI (2005 SP) for a discussion of what should be the balance between state and private pensions

²⁵ PPI analysis based on the Aggregate Model and the Distributional Model

²⁶ PPI analysis based on the Aggregate Model and the Distributional Model

The net cost of tax relief on private pensions could reduce

Official government estimates of the future cost of the pensions system do not include the cost of tax relief, and this cost has not been included in the PPI base case figures in Chapter 1. However, the PPI believes the cost of tax relief should be more actively considered, as it is significant and is likely to remain so.

One important consideration in any estimate of the cost of tax relief is: to what should the current tax regime be compared? If tax relief on pensions were removed, the state would receive extra tax revenue, but exactly how much more it receives would depend on how people change their behaviour. They might choose to invest in pension schemes that are not tax advantaged, in other forms of tax advantaged saving such as Individual Savings Accounts (ISAs) or they might not save at all²⁷.

In this paper, the **net cost of tax relief on private pensions** is calculated by comparing the tax regime for private pensions to that for unapproved private schemes, which are not tax advantaged in any way. This is the approach used by HM Revenue & Customs in producing its annual estimates. The cost of tax relief on the unfunded public sector pension schemes is included for this paper as a notional figure, calculated as if they operated on a funded basis.

On this basis, the net cost of tax relief on private pensions in 2004/5 was around £12 billion. Contributions made by employers are exempt from National Insurance contributions, which was an additional cost of £7 billion. This brings the total cost up to £19 billion (Table 6), almost one third of the cost of paying state pensions (which was around £61 billion in the same year²⁸).

Table 6²⁹: The net cost of tax relief on private pensions in 2004/5

	£ billion	Percentage of GDP
Tax relief on contributions	17.8	1.5%
Tax relief on investment income	2.6	0.2%
Tax liable on pension payments	(8.6)	0.7%
Net cost of tax relief	11.8	1.0%
Cost of NI relief on employers' contributions	6.8	0.6%
Net cost of tax and NI relief	18.6	1.6%

²⁷ For a discussion of the current system of tax relief, see Curry and O'Connell (2004)

²⁸ DWP (2005 LTP)

²⁹ HMRC (2005). Figures are provisional and may be revised. The costs of tax relief granted on minimum contracted-out rebates to Appropriate Personal Pensions and on lump sums from unfunded schemes total around £0.5 billion but are not included in this table for simplicity.

Estimates of the cost of tax relief on pensions are more uncertain than estimates of other areas of state spending on pensions. The cost in any one year in the future depends on the returns achieved on investments, which can be very volatile, and on the amounts contributed. Nevertheless, a broad indication of likely future changes is possible.

It is useful to note that relatively little tax relief is counted as being awarded on investment income, so the pattern of tax relief over time depends on the relative balance between contributions being paid in, and pensions being paid out. One reason why the cost of tax relief on investment income is counted as being relatively low in Table 6 is that capital gains are not considered to be tax favoured in private pensions, because tax on capital gains can often be avoided on investments made outside a pension scheme.

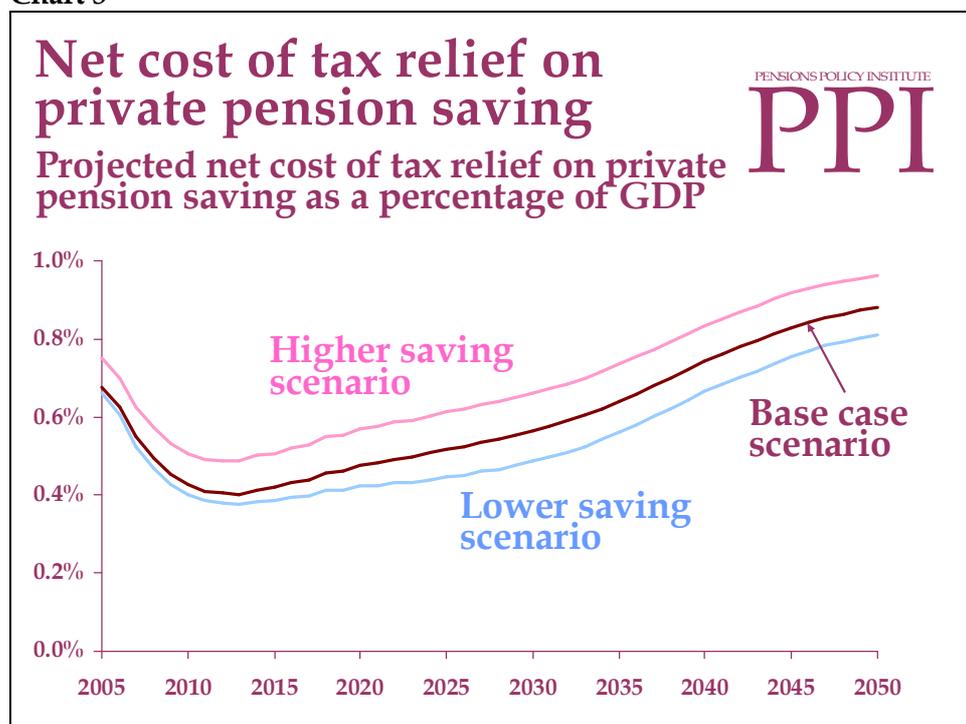
In the PPI base case scenario, private pensions contributions would fall, leading to a reduction in the net cost of tax relief in the short-term. But in the long term, income from private pensions would also fall, so that the amount of tax collected would fall, and the net cost of tax relief would start to increase. In the long term, the net cost of tax relief would return to more or less today's level (Table 7).

Table 7³⁰: Illustrative estimates of the future net cost of tax relief in the PPI base case scenario with the central set of investment returns, as a percentage of GDP

	Tax relief on contributions	Tax relief on investment income	Tax liable on pension payments	Net cost of tax relief
2005	1.2%	0.2%	0.8%	0.7%
2010	1.1%	0.2%	0.9%	0.4%
2020	1.1%	0.2%	0.8%	0.5%
2030	1.1%	0.2%	0.7%	0.6%
2040	1.2%	0.2%	0.6%	0.7%
2050	1.2%	0.2%	0.5%	0.9%

The higher and lower saving scenarios show a similar pattern to the base case scenario, with the net cost of tax relief falling over the next 10 years and then increasing to close to today's level (Chart 5).

³⁰ PPI analysis based on the Aggregate Model and the Distributional Model. This is the net cost of tax relief on private pension schemes, so that it excludes the cost of exempting employers' pension contributions from National Insurance contributions. The figures in each column have been rounded independently and so the final column may not equal the total tax relief less income tax paid because of rounding.

Chart 5³¹

The reduction in the amount of income tax paid on private pensions in the base case scenario from around 0.8% to 0.5% of GDP by 2050 (Table 7) is a consequence of a changing state pensions system as well as changes to private pensions:

- Personal allowances and income tax thresholds are assumed to be increased with average earnings from 2010³².
- State pensions will increase more slowly than average earnings under current policy (see Table 2 in Chapter 1), so some income from private pensions would be taxed at a lower rate³³. In the base case scenario, the average rate of income tax paid on income from private pensions falls from around 20% now to around 13% by 2050.

One consequence is that if the state pensions system were reformed, then the future net cost of tax relief on private pensions could be reduced. These savings are taken into account in the estimates of the future cost of alternative pensions systems in Chapter 3 and can be significant. For example, holding the average rate of tax paid on income from private pensions level at 20% could mean the net cost of tax relief is 0.2% of GDP lower by 2050 (at 0.7% rather than 0.9% of GDP).

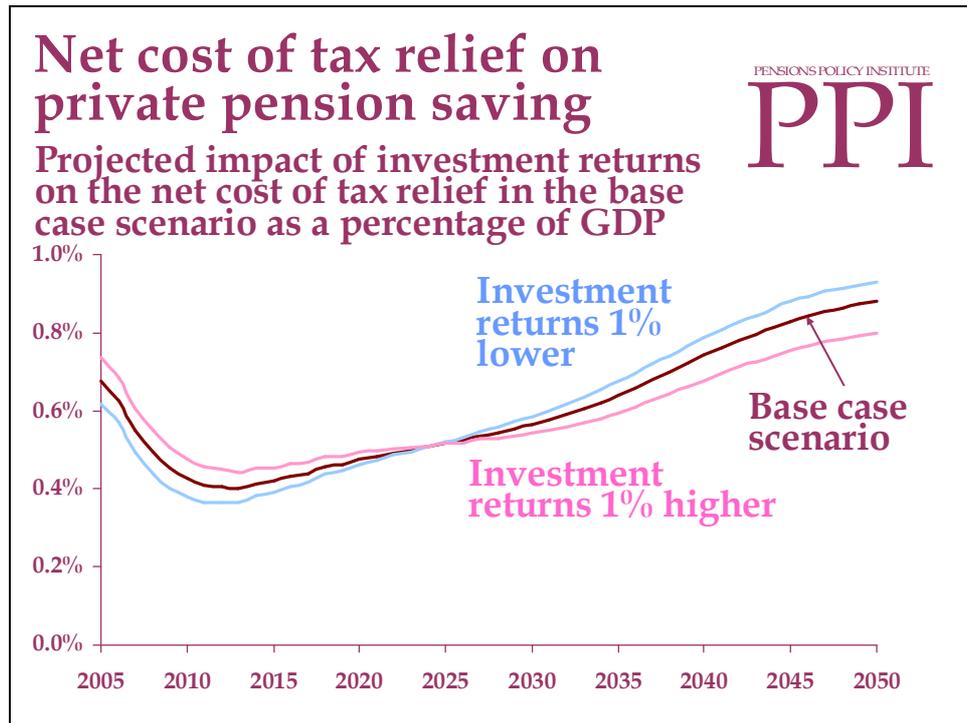
³¹ PPI analysis based on the Aggregate Model and the Distributional Model. This is the net cost of tax relief on private pension schemes, so that it excludes the cost of exempting employers' pension contributions from National Insurance contributions.

³² This is consistent with the assumptions used by the Treasury for its long-term projections. See Appendix 2 for more details on the assumptions used in the base case scenario.

³³ Income from private pensions is treated as being the top slice of income for consistency with the annual estimates published by HM Revenue & Customs. See HMRC (2005).

The net cost of tax relief on private pension saving can fluctuate from year to year if investment returns are particularly large or small. But because investment returns make up relatively little of the total cost, the main impact of a sustained period of higher investment returns is likely to be the lower net cost in the long term, when income from private pensions is higher (Chart 6).

Chart 6³⁴



³⁴ See footnote to Chart 5. Assumes contributions as in the base case scenario.

Chapter 3: The cost of alternative pensions systems

All the proposals for state pension reform currently being discussed will cost more than the current system, because they seek to improve pension outcomes. Opinions will differ as to what combinations of increasing state pension age and increasing taxes would be acceptable ways of paying for this extra cost. This chapter investigates the costs of different reform options and different ways of paying for them.

The proposed reforms

All of the reforms being proposed change one or more of these three dimensions to the Basic State Pension (BSP)³⁵:

- Its level, which is currently £82 a week.
- Its indexation, which is currently to prices.
- Its coverage, which is currently based on accumulating a number of contributions or credits.

In addition, some of the reform proposals abolish State Second Pension (S2P), rolling it into a higher BSP. Other proposals retain S2P.

Changing any of these variables will have consequences for the number of people on Pension Credit. The general intent is to reduce the extent and spread of means-testing.

The options modelled in this paper are described in Box 2. The Aggregate and Distributional Models can be used to estimate how much these typical reforms could cost in future (see Box 3 for details of the methodology used).

³⁵ For a concise summary of the state of the pension reform debate, see PPI (2005 C)

Box 2: Reform options modelled

The PPI does not make policy recommendations. These reforms have been chosen as being typical of the proposals currently being made by other organisations connected to pensions and are based on a recent survey³⁶. For this analysis, reforms are assumed to be introduced in 2010.

Current system: A Basic State Pension at £82 a week increased each year with prices, an earnings-related State Second Pension (S2P), and Pension Credit.

Restore earnings link to BSP, retain S2P: A Basic State Pension at £82 a week increased each year with average earnings. S2P is retained in its current form.

UP at £82 a week, with earnings, retain S2P: A Universal Pension at £82 a week increased each year with average earnings, received by everyone fulfilling a residency criterion. S2P is retained in its current form.

BSP at £109 a week, retain S2P: A Basic State Pension at £109 a week (the Guarantee Credit level) increased each year with average earnings. S2P is retained in its current form.

UP at £109 a week, abolish S2P: A Universal Pension at £109 a week increased each year with average earnings, received by everyone fulfilling a residency criterion. New accruals to S2P (and contracting-out) are abolished but existing accruals are paid in full. Transition to the UP is assumed to use the 'offset' method, so the amount of pension received is the maximum of the UP and the total of BSP and SERPS/S2P that was accrued before the UP was introduced³⁷.

Guarantee Credit (GC) is retained for all of the reforms and continues to be uprated with average earnings. There would be some GC even under the more generous reforms because the level of the GC is higher for the severely disabled and for carers.

Savings Credit (SC) is retained for the current system and for the three options where the flat-rate pension (the BSP or the UP) is set at £82 a week. For these options, the lower income threshold for SC continues to be linked to the level of the flat-rate pension. SC is assumed to be abolished for the other reforms, but existing awards are protected so that no-one loses out in transition. All of the projections assume that after 2010 the Lower Earnings Limit (LEL) continues to be uprated in line with prices.

Winter Fuel Allowances, the Christmas Bonus and the 25p per week addition for the over 80s are assumed to be retained in all of the options. Abolishing these benefits would make little difference to the overall cost.

³⁶ See PPI Briefing Note 18 for more details

³⁷ For a description of the offset method, see NAPF (2004) chapter 2 or NAPF (2005)

Box 3: Details of the costings

The costings include the cost of paying BSP, SERPS/S2P, Pension Credit, other pension benefits such as Winter Fuel Allowances, and contracted-out rebates.

The costings are consistent with the base case scenario for the future cost of the current system in Chapter 1. So:

- State and private pension income taken into account for Pension Credit is assumed to grow at the rate implied by the PPI's internally consistent aggregate projections.
- Other income taken into account, including earnings, is assumed to grow with average earnings.
- Take-up of Guarantee Credit is assumed to remain at current levels. Take-up of Savings Credit (where it is retained) is assumed to increase from its current level of just under 40% to around 60% as the size of awards increase.

The costings include an allowance for:

- Savings in Housing Benefit and Council Tax Benefit entitlements resulting from an improvement in state pension provision³⁸.
- Savings through an increase in income tax paid by pensioners. This saving is based on the assumption that tax thresholds will continue to be uprated with prices until 2010 but thereafter will be uprated with average earnings. This is consistent with the assumption used in long-term government projections³⁹. If tax thresholds continued to be uprated with prices in the long term, then many more pensioners would pay income tax at the higher rate.
- Extra Incapacity Benefit costs when state pension age is increased.

The Universal Pension is assumed to be payable to some persons overseas but not to UK residents who fail the residency criterion. It has been assumed that the residency criterion is such that these effects are broadly equal. UK residents who fail the residency criterion are assumed to have sufficient income (for example, from state pension accrued in their previous country of residence) to be above the threshold for Guarantee Credit.

³⁸ See Appendix 2 for more details

³⁹ HMT (2004) Page 51

Key points from this analysis on the cost of state pensions include (Table 8)⁴⁰:

- All of the proposals involve an increase in spending in the long term, of between 1.7% to 3.2% of GDP in 2050 (£55 to £100 billion).
- In the long term, the design features of the BSP that affect cost most are its level and indexation. Whether entitlements to the BSP are based on a contributory or residency criterion does not significantly alter the cost in the long term.
- Retaining S2P on top of increasing the level of the first-tier pension is very expensive. So retaining S2P is likely to come at the cost of a lower BSP. Other PPI research has shown how this weakens the state’s ability to protect against poverty, with people earning less than about £10,000 a year losing out⁴¹.
- The options that involve the abolition of S2P are more affordable in the short term. Contracting-out would also be abolished and the resulting short-term surplus could be used to finance reform.

In the short term, the cost of the reform proposals can be compared to government estimates for the current system rather than the PPI estimates. The PPI models have a long-term focus. The government estimates may be more appropriate for the short term (2010) because they can use a different methodology based on administrative data.

Table 8⁴²: Estimated expenditure on state pensions, as a percentage of GDP and in £ billion, 2005/6 prices

	Current system: gov’t estimate	Current system: PPI base case	Restore earnings link to BSP, retain S2P	UP at £82 a week, with earnings, retain S2P	BSP at GC level, retain S2P	UP at GC level, scrap S2P
2010	5.9%	5.6%	5.7%	6.4%	6.5%	6.0%
2020	5.4%	5.2%	5.8%	6.4%	6.8%	6.1%
2030	5.7%	6.0%	7.1%	7.5%	8.3%	7.4%
2040	5.8%	6.5%	8.0%	8.3%	9.4%	8.2%
2050	5.8%	6.6%	8.3%	8.6%	9.8%	8.3%
2010	82	80	82	91	93	84 ⁴³
2020	95	95	105	115	125	110
2030	125	130	155	165	180	160
2040	150	170	210	215	245	215
2050	185	210	265	270	310	265

⁴⁰ See also, for example, PPI (2005 C) or NAPF (2005)

⁴¹ PPI (2005 ER)

⁴² Estimates based on the Aggregate and Distributional Models. See Boxes 2 and 3 for further details. The BSP at £82 costs more than the current system in 2010 because the pension is set at £82 a week in 2005/6 earnings terms, which would be higher than the BSP would be under the current system in 2010. Figures in £ billion are rounded to the nearest £1 billion for 2010 and to the nearest £5 billion for the later years.

⁴³ Based on a methodology that is more accurate in the short-term. See NAPF (2005) Chapter 3.

An illustration of how these proposals could be paid for by increasing state pension age and National Insurance contributions

Two possible ways of paying for reform are increasing the age from which state pensions are payable (State Pension Age, or SPA) and increasing the level of National Insurance Contributions (NICs).

Opinions will differ as to what is an acceptable mix but some combination is likely to be preferred over relying on just one way.

The Aggregate and Distributional Models can be used to estimate what combinations of increasing SPA and NICs can be used to pay for reforms to the pension system:

- The increases in NICs shown are those required to finance the reforms on a pay-as-you-go basis in 2050, on top of the cost of the PPI base case scenario. As the reforms cost less in earlier years, it may be that the required increase in 2050 could be less, if the increases were introduced straightaway and the funds collected in earlier years were put in a reserve fund and used to offset the cost in the long term.
- Any detailed analysis of any of the proposals would have to consider what might be a reasonable trade-off between increasing SPA and NICs in earlier years. Since any increase in SPA would have to be announced well in advance it may be that the reforms would have to be financed to a greater extent by an increase in NICs in earlier years.
- The figures assume that the extra NICs are levied on all earnings above the Primary Earnings Threshold (currently £94 a week), as for the recent 1% NHS increase.
- If S2P is abolished, then the self-employed would be in the state pensions system on the same terms as employees. So for these options, the self-employed are assumed to have their contributions increased to the same level as for employees. This means the options where S2P is abolished appear to be relatively cheaper. For the other options, the self-employed are assumed pay the same proportion of the costs as they do now.

Key points from this analysis include (Table 9)⁴⁴:

- Opinions will differ as to what would be an acceptable way of paying for the cost of any of these reform proposals. One option is to increase state pension age without increasing NICs or paying for the reforms in any other way. If this approach were taken then SPA would have to increase to 69 or 70 by 2050.
- Another option is to keep state pension age at age 65, but increase NICs to cover the extra cost. If this approach were taken then, depending on which reform were introduced, NICs would have to increase by around 2.5% to 4.5% of earnings for each of employers and employees.
- A more acceptable combination might be to increase both SPA and NICs. For example, if SPA were increased to 67, then for some of the options NICs would only have to be increased by 1.5%.
- The most generous option of those considered, of a first-tier set at £109 a week and keeping S2P on top, is likely to involve both a large increase in state pension age and NICs.

Table 9⁴⁵: Illustrative increase in National Insurance contribution rates for each of workers and employers (as % of all earnings above the Earnings Threshold) required to pay for the cost of reforms on top of the cost of the current system in 2050 for different increases in State Pension Age (SPA)

SPA	Restore earnings link to BSP, retain S2P	UP at £82 a week, with earnings, retain S2P	BSP at GC level, retain S2P	UP at GC level, scrap S2P
65	2.5%	3.0%	4.5%	2.5%
66	2.0%	2.5%	4.0%	2.0%
67	1.5%	2.0%	3.5%	1.5%
68	1.0%	1.5%	3.0%	1.0%
69	0.5%	1.0%	2.5%	-
70	-	-	2.0%	-

⁴⁴ See also, for example, NAPF (2005)

⁴⁵ Estimates based on the Aggregate and Distributional Models. Assumes that the increases in State Pension Age are made before 2050. See Boxes 2 and 3 for further details. Estimates of less than 0.5% of earnings are marked "-". All other figures are rounded up to the higher 0.5% of earnings.

Chapter 4: The distributional impact of alternative pensions systems

Opinions differ as to what type of income distribution the state pensions system should try to achieve. This chapter shows how the different reforms being proposed would benefit less well-off and more well-off older people differently.

Background to the distributional analysis

The Distributional Model can be used to show how the distribution of pensioner incomes could be affected by different reform proposals, and how many people might be on Pension Credit (Box 4).

Distributional analyses are presented for the current system and the two options with a Universal Pension. The distribution of incomes would be similar if the coverage of the BSP were not improved, except that not everyone would be entitled to the full amount of BSP. This would mean some people would have less income than in the Universal Pension options, most likely those at the lower end of the income distribution.

Distribution of incomes

Key points from this analysis include (Tables 10, 11 and 12)⁴⁶:

- Restoring the earnings link has little impact on pensioner incomes in the short term unless the level of the first-tier pension is also increased.
- The offset method of transition, in which existing accruals of S2P are offset against the level of the flat-rate pension, rather than paid in addition to it (see Box 2), makes the transition progressive. This model of a Universal Pension is the most progressive of the options investigated.
- If retaining S2P means that the flat-rate pension has to be kept at a lower level for cost reasons (see Chapter 3), then poverty prevention is not guaranteed.
- Imperfect take-up of Pension Credit means that some older people will have income below the GC level of £109 a week under the current system.
- Retaining S2P means the state pays more to better-off pensioners. The benefit accrued continues to be higher for higher earners until about 2050 when it becomes flat-rate⁴⁷.

⁴⁶ See also, for example, PPI (2005 C) or NAPF (2005)

⁴⁷ Under current government policy, S2P will become flat-rate when the Lower Earnings Threshold (LET) catches up to the Upper Earnings Limit (UEL) around 2050. From this point, the size of accruals to S2P will not depend on earnings (provided enough is earned to qualify). It would take a further period of time until people retire with a pension that does not depend on earnings.

Box 4: Details of the distributional analysis

Some factors need to be borne in mind when interpreting distributional results.

- Distributional charts cover all pensioners, comparing singles and couples on a comparable basis. For universal pension options, this means that a high income couple (towards the top of the income distribution) can receive an increase in income if one of the partners currently has a low individual income.
- Receipt of disability benefits moves individuals up the income distribution⁴⁸. As Pension Credit has more generous income limits for disabled people, it is possible to be in receipt of Pension Credit even though income is relatively high and individuals are in the top part of the income distribution.
- When comparing the income distribution under different options, individuals will change positions in the income distribution. For example, the people with the lowest incomes in the current system may not be in the lowest income group after a reform.

Because of data limitations, simplifications are necessarily used in distributional modelling. These simplifications can create some distortions in the distributional results, but they tend to work in opposite directions and so cancel each other out. Therefore, the final results are not overly distorted, but should be interpreted as an overall picture rather than a detailed prediction.

- The data used is based on the Family Resources Survey, which is known to include mis-reporting of state pension income. All state pension income is reported as one number, including both Basic State Pension and State Second Pension. Guarantee Credit can also be mis-reported as state pension income. This will lead to over-estimates of the amounts of Basic State Pension and State Second Pension for low income pensioners.
- Estimates of the amount of Basic State Pension received are adjusted so that the total amount received across the population matches the total amount projected by the Aggregate Model. In practice, as the adjustment is applied across all individuals, this leads to some individuals being counted in the calculations as if they receive more than 100% of the full rate of Basic State Pension. This will result in an over-estimate of the amount of Basic State Pension for individuals with full basic state pension entitlement, and an under-estimate for those with less than a full BSP.

For more information on how the Distributional Model works, see Appendix 4.

⁴⁸ Although receipt of disability benefits moves individuals up the income distribution, the extra cost of disability may mean they do not have the same standard of living as other individuals at the same point of the income distribution

Table 10⁴⁹: Illustrative weekly after tax income of people over SPA in 2010 by decile of the income distribution, £ per week in 2005/6 prices

	Current system	UP at £82 a week, with earnings, retain S2P	UP at GC level, scrap S2P
1st	110	120	130
3rd	135	145	160
Median	165	175	190
7th	215	225	225
9th	315	325	325

Table 11⁵⁰: Illustrative weekly after tax income of people over SPA in 2030 by decile of the income distribution, £ per week in 2005/6 earnings

	Current system	UP at £82 a week, with earnings, retain S2P	UP at GC level, scrap S2P
1st	105	115	115
3rd	135	140	140
Median	165	175	170
7th	210	220	205
9th	330	350	325

Table 12⁵¹: Illustrative weekly after tax income of people over SPA in 2050 by decile of the income distribution, £ per week in 2005/6 earnings

	Current system	UP at £82 a week, with earnings, retain S2P	UP at GC level, scrap S2P
1st	100	115	115
3rd	130	140	135
Median	155	170	160
7th	195	205	190
9th	280	300	275

The incomes shown are the total of state and private income⁵². Private saving is assumed at a level consistent with the base case scenario in Chapter 2. For the option with the UP at the GC level, it is assumed that contracted-out rebates (which are abolished along with S2P) are not replaced by additional private saving. If instead private saving increased, then pensioner incomes would be higher than shown in Tables 11 and 12⁵³.

⁴⁹ PPI analysis based on the Aggregate Model and the Distributional Model. There is a gain under the BSP at £82 because the pension is set at £82 a week in 2005/6 earnings terms, which would be higher than the BSP would be under the current system in 2010. All figures have been rounded to the nearest £5.

⁵⁰ See footnote to Table 10

⁵¹ See footnote to Table 10

⁵² Including BSP, SERPS/S2P, Pension Credit, other pension benefits such as Winter Fuel Allowances, disability benefits, private pensions, earnings and investment income

⁵³ For a discussion of the likely impact an increase in voluntary saving would have on pensioner incomes, see the Appendix to NAPF (2005) page 7

Means-testing

The reforms have implications for the prevalence of means-testing. Key points from this analysis include (Table 13)⁵⁴:

- Under the current pensions system, means-testing will grow rapidly. The government estimates that the number entitled to Pension Credit will more than double from around 5 million in 2010 to over 11 million people by 2050⁵⁵.
- The future number of people entitled to Pension Credit is uncertain because it depends on how much private income people have, and could be higher (see Chapter 1). In the PPI base case scenario for the current system, the number entitled to Pension Credit would almost triple to 14 million by 2050, 80% of people then over state pension age.
- There would always be some people on Pension Credit under all of the reforms analysed. People who are severely disabled and carers are entitled to a higher level of Guarantee Credit.
- The most effective ways to reduce the number of people on Pension Credit are to improve the level and the indexation of the BSP.
- Increasing the coverage of the BSP but not the level could mean there are more people on Pension Credit rather than fewer. Entitlements to Savings Credit build up on income above the BSP level, so improving coverage would mean that more people would be entitled to Savings Credit.

Table 13⁵⁶: Estimated number of people entitled to Pension Credit

	Current system	Restore earnings link to BSP, retain S2P	UP at £82 a week, with earnings, retain S2P	BSP at GC level, retain S2P	UP at GC level, scrap S2P
2010	5.0m	4.5m	4.5m	1.5m	0.5m
2020	7.0m	5.5m	5.0m	1.5m	0.5m
2030	10.5m	6.5m	7.0m	1.5m	1.0m
2040	13.0m	8.0m	8.5m	1.5m	1.0m
2050	14.0m	8.0m	8.5m	1.5m	1.0m

⁵⁴ See also, for example, NAPF (2005)

⁵⁵ DWP (2002)

⁵⁶ Estimates based on the Aggregate and Distributional Models. For the Universal Pension, these figures are estimates of the number entitled to additional Pension Credit because of severe disability or caring. The additional number of people who are entitled to Pension Credit because they do not pass the residency criterion and do not have other sources of income to take them above the Guarantee Credit level has not been estimated because of lack of data but is expected to be relatively small (around 0.5 to 1.0 million). Figures have been rounded to the nearest 0.5m. Excludes those who receive Savings Credit because of transitional protection from the current system (see Box 2).

Appendix 1: Detailed comparison with government estimates

Different sets of projections of the future cost of the pensions system could differ because of different assumptions on what could happen in the future, or because of different methodologies or data underlying the projections. This appendix compares PPI projections with government projections using, as much as possible, the same assumptions that the government adopted for the 2005/6 Budget.

The comparison shows that the two sets of figures are similar. Where differences exist, they are a product of using slightly different methodologies or necessarily using a different source of data.

The base case scenario estimates used throughout the rest of this paper differ from those in this appendix because different assumptions are adopted: they use simpler economic assumptions and different assumptions on Pension Credit.

The PPI's models produce similar estimates of the future cost of the current pensions system as government models, if the same assumptions are used (Table 14):

- Estimates for BSP are broadly similar
- Estimates for SERPS/S2P are higher in the long term
- Estimates for contracted-out rebates are lower in the short term
- Estimates for Pension Credit are very similar

Table 14⁵⁷: PPI and government projections of the future cost of the pensions system, as a percentage of GDP

	PPI	Government	Difference
2010	5.6%	5.9%	-0.3%
2020	5.2%	5.4%	-0.2%
2030	5.8%	5.7%	0.1%
2040	6.0%	5.8%	0.2%
2050	5.8%	5.8%	0.0%

⁵⁷ All PPI estimates in this Appendix are based on the Aggregate Model and the Distributional Model. Government estimates for the cost of state pension and Pension Credit are from DWP (2005 LTP) and are those underlying the 2005 Budget, the latest available. Government estimates of the cost of contracted-out rebates are from GAD (2004 QR). Costs include BSP, SERPS/S2P, Pension Credit, other pension benefits such as Winter Fuel Allowances, and the cost of contracted-out rebates.

Estimates for BSP are broadly similar

PPI and government projections are compared in Table 15:

- PPI estimates are based on administrative records of the amount of BSP that is currently being paid.
- The PPI models entitlements separately for women with different marital statuses: for widows, divorcees, married women and women who have never been married. Men usually receive the full BSP and so there is less need to model how men’s entitlements vary by marital status. The numbers of women of each marital status are assumed to vary in line with government projections.
- The government uses a different approach and models separately the amount that married women have from their own National Insurance records and the amount they have from their husbands’ records.

Table 15: PPI and government projections of the future cost of Basic State Pension, as a percentage of GDP

	PPI	Government	Difference
2010	3.4%	3.4%	0.0%
2020	2.9%	3.1%	-0.2%
2030	3.1%	3.1%	0.0%
2040	3.1%	2.9%	0.2%
2050	2.7%	2.5%	0.2%

Estimates for SERPS/S2P are higher in the long term

PPI and government projections are compared in Table 16:

- PPI models estimate the amount of SERPS and S2P that has already been accrued using administrative records of earnings from 1978 when SERPS was introduced.
- The amount of SERPS in payment today is calculated by applying assumed mortality rates to the estimated accruals once they are in payment. If people with large SERPS pensions live longer than assumed, then the PPI’s methodology would result in an estimate of the amount of SERPS in payment today that is lower than what is actually being paid.
- One approach is to correct for this possible discrepancy by comparing the amount the model estimates is in payment with the amount that is being paid out of the National Insurance Fund. PPI models do not follow this approach because it is not clear how SERPS accruals that have been built up but are not yet in payment should be adjusted, and because the focus of the PPI’s models is in the long term, when this discrepancy is less significant.

- PPI data on the labour market and contracting-out are based on the most recent version of the Lifetime Labour Market Database (LLMDB), the 2002/3 version. The government prefers to use an older version because delays in Defined Benefit schemes reporting closures mean that an older dataset is more likely to be fully accurate, and then applies an assumption to bring the amount of contracting-out assumed up to date. If this adjustment means that the government assumes a higher amount of contracting-out, then PPI estimates of SERPS/S2P would be higher in future because of the extra build up of contracted-in rights.
- In the long term, this difference is less significant, as the PPI and government projections use the same assumption on the decline in contracting-out, so that the amount of contracting-out is less significant.

Table 16: PPI and government projections of the future cost of SERPS and State Second Pension, as a percentage of GDP

	PPI	Government	Difference
2010	0.7%	0.8%	-0.1%
2020	1.0%	1.0%	0.0%
2030	1.3%	1.1%	0.2%
2040	1.4%	1.3%	0.1%
2050	1.6%	1.6%	0.0%

Estimates for contracted-out rebates are lower in the short term

PPI and government projections are compared in Table 17:

- The differences could be explained by a different assumption on the amount of contracting-out. Assuming a lower amount of contracting-out would mean that PPI estimates for contracted-out rebates would be lower than the government's, but more similar in the long term.
- PPI calculations of actuarially fair contracted-out rebate rates, as a percentage of salary, are very similar to the amounts calculated by the Government Actuary, if the same assumptions are used.

Table 17: PPI and government projections of the future cost of contracted-out rebates, as a percentage of GDP

	PPI	Government	Difference
2010	0.6%	0.8%	-0.2%
2020	0.5%	0.6%	-0.1%
2030	0.4%	0.5%	-0.1%
2040	0.4%	0.4%	0.0%
2050	0.4%	0.4%	0.0%

Estimates for Pension Credit are very similar

PPI and government projections for Pension Credit are very similar if the same assumptions are used (Table 18). The future cost of Pension Credit is one of the key uncertainties for pension spending in the future, and if different assumptions are adopted, the cost would be much higher (see Chapter 1).

Table 18: PPI and government projections of the future cost of Pension Credit, as a percentage of GDP

	PPI	Government	Difference
2010	0.7%	0.7%	0.0%
2020	0.7%	0.7%	0.0%
2030	0.9%	0.9%	0.0%
2040	1.1%	1.1%	0.0%
2050	1.2%	1.2%	0.0%

Appendix 2: Assumptions used for the base case scenario for the current system

This appendix summarises the assumptions used for the base case scenario for the current pensions system that is presented in this paper.

Any modelling of state and private pensions requires:

- Assumptions to be made on future pensions policy.
- Data and assumptions on the economy and pensions system as a whole to use as a starting point for the calculations involved.

Different assumptions are used to model other pensions policies and to show the effect that making different assumptions would have on the results.

Assumptions on the current pensions system

The projections for the current system in this paper assume that the current state pension system continues, with the same uprating conventions as are used today:

- The Basic State Pension and State Second Pension when in payment are assumed to be increased in line with prices. The Basic State Pension is assumed to remain the minimum level of entitlement to Savings Credit.
- The Guarantee Credit is assumed to be increased in line with average earnings.
- The Lower and Upper Earnings Limits for State Second Pension are assumed to increase in line with prices. The Lower Earnings Threshold (the LET – the ‘flat-rate’ part of State Second Pension) is assumed to increase in line with average earnings. The Upper Earnings Threshold is assumed to increase to reflect the changes in the LET, ensuring that higher earners receive the same in State Second Pension as they would have received in SERPS. When the Upper Earnings Threshold overtakes the Upper Earnings Limit, it is assumed to be uprated in line with prices.
- In the base case scenario, Pension Credit take-up⁵⁸:
 - Remains at 85% for people who are entitled to both the Guarantee Credit and Savings Credit components.
 - Remains at 74% for people who are only entitled to the Guarantee Credit component.
 - Increases from the current level just under 40% to around 60% for people who are only entitled to the Savings Credit component, as Savings Credit becomes a more significant part of older people’s income.

⁵⁸ PPI (2004). The PPI only updates its modelling assumptions annually to allow different pieces of modelling work to be compared. Early indications are that Pension Credit take-up may have increased since these assumptions were set, which would lead to a greater cost of the current system in Chapter 1.

Data and assumptions on the economy and pensions system as a whole

General economic assumptions:

- Inflation is 2.5% each year.
- Earnings grow by 2.0% each year in excess of prices.
- The Rossi index, used to increase the additional amount of Guarantee Credit to which carers are entitled, grows by 2.1% each year.
- GDP grows broadly with the size of the working age population and growth in average earnings.
- The age, gender and marital structure of the population follows the Government Actuary's Department's principal 2003-based projections for the United Kingdom.

Previous PPI modelling work has used an assumption of nominal investment returns of 7% a year for equities and 4% a year for bonds before expenses⁵⁹. This assumption is still reasonable and so has been retained for this paper for consistency with other work. Investment returns are uncertain and assumptions vary, so the impact of assuming different assumptions has been shown where appropriate.

The most useful measure for investment returns to compare between sets of projections is the average rate of return assumed on private pension funds in excess of prices and after management expenses. The central assumption used in this report is equivalent to a figure of 2.7% a year for DC schemes and 3.7% for DB schemes⁶⁰. The assumptions used by the Pensions Commission in their interim report were similar: 3.3% a year for personal pensions and 3.8% for occupational DB and DC schemes⁶¹.

Additional data and assumptions for the Aggregate Model:

- The current distribution of employees' earnings is based on the 2002/3 Lifetime Labour Market Database (LLMDB), which is a 1% sample of National Insurance records.
- The current distribution of the earnings of the self-employed is based on the 2002/3 Family Resources Survey.
- Employment rates are derived from the most recent ONS projections of activity rates⁶², modified to reflect more recent estimates from the Labour Force Survey. Employment rates are assumed to increase for women over age 50 to become more in-line with today's employment rates for younger women as state pension age increases between 2010 and 2020. Otherwise, employment rates are assumed to remain constant after the end of the ONS projections in 2011.
- No change in the prevalence of self-employment is assumed.

⁵⁹ See PPI (2003) Page 25

⁶⁰ Assuming 75% of pension funds are invested in equities, inflation of 2.5% per year, and management expenses are 1% a year for DC schemes. Expenses for DB schemes are typically smaller than other schemes and have instead been allowed for in the calculation of their contribution rates.

⁶¹ Pensions Commission (2004) Appendix C Page 80

⁶² ONS (1998)

- Around 45% of employees are assumed to be contracted-out in 2002/3. Contracting-out is assumed to halve in the private sector by 2035 as Defined Benefit schemes are closed and some holders of personal pensions contract back in. Public sector pension schemes are assumed to remain contracted-out.
- Current entitlements to Basic State Pension are based on a 5% sample of administrative records held by the Department for Work and Pensions.
- Entitlements to Basic State Pension improve over time as assumed by the Government Actuary's Department: by 2035, 99% of new female pensioners have some entitlement, on average at 90% of the full rate.
- Estimates of the amounts of SERPS accrued before 2002/3 are based on records of historical earnings reported from 1978/9 to 2001/2 from the 2002/3 LLMDB.
- Estimates of the amounts of S2P accrued through credits in 2002/3 are based on the 2002/3 LLMDB. The number qualifying for S2P credits is assumed to remain fixed in future relative to the age and gender structure of the working age population.
- The assumptions used in setting contracted-out rebate rates are consistent with PPI macroeconomic assumptions in the long term.
- The current stock of private pension funds is based on ONS estimates, with an age profile superimposed by back-simulation.
- Estimates of the amounts of private pensions in payment are based on the 2002/3 Family Resources Survey.
- Current levels of private pension saving are based on the latest ONS estimates of the amount of contributions that are currently being paid to funded pensions that were available⁶³.
- Contribution rates to DB schemes are calculated as the actuarially fair rate to match typical benefits accruing in DB schemes, on the investment and mortality assumptions used in the projection⁶⁴.
- Given the current uncertainty regarding public sector pension schemes, this analysis assumes that they retain their present form indefinitely.
- 75% of the assets of funded pension schemes are invested in equities.
- Members of private pension schemes gradually take their pensions between ages 55 and 72.
- All individuals take 25% of their pension fund as a tax-free lump sum.
- Pensions from Defined Benefit schemes are assumed to increase each year in line with inflation and come with a spouses' pension. Most pensions from Defined Contribution schemes are assumed to be level and single-life.

⁶³ Forrest et al (2004). More recent estimates have since been published in Penneck and Tily (2005), which show that average contributions have increased over the last two years. It is too early to say whether this increase will be a sustained. The increase is due in large part to an increase in special contributions, and these may only be paid for a limited time.

⁶⁴ For a description of the typical benefits assumed, see PPI (2005 OPPPS) Page 18

- Annuity rates are calculated consistently with the assumed investment return and the mortality underlying current market annuity rates, adjusted to allow for future expected mortality improvements.
- The average rates of tax relief granted on contributions to private pensions and on the investment income of pension funds remain at today's levels.
- Savings in Housing Benefit and Council Tax Benefit resulting from pension reform are taken into account on the basis that savings will be proportional to the gross cost of the reform.

Additional data and assumptions for the Distributional Model:

- The current distribution of pensioner incomes is from the dataset underlying the 2003/4 Pensioners' Incomes Series publication by the Department for Work and Pensions.
- The average amount received in BSP, SERPS/S2P and private pensions by each cohort is updated from year to year in line with Aggregate Model projections of the aggregate amount received. The average amount received from earnings and other sources is updated from year to year in line with average earnings growth.

Appendix 3: The PPI Aggregate Model

At the heart of the Aggregate Model is a projection of the labour market. Based on this projection, the model projects expenditure on Additional Pension (SERPS / S2P), contracted-out rebates and tax relief. Basic State Pension is projected separately.

Methodology

The Aggregate Model projects long-term government expenditure on pensions and contracted-out rebates, the private pension system and the fiscal cost of tax relief:

1. At the heart of the Aggregate Model is a projection of the labour market
2. Basic State Pension is projected by making an assumption on how entitlements improved.
3. Future expenditure on SERPS and S2P is estimated based on the projection of the labour market.
4. Future expenditure on contracted-out rebate rates is estimated based on the projection of the labour market.
5. Private pensions and cost of tax relief are projected.

1. Projection of the labour market

At the heart of the Aggregate Model is a projection of the number of people in work and what they earn. Based on this projection, the model projects expenditure on the State Earnings Related Pensions Scheme, the State Second Pension, contracted-out rebates and tax relief.

The Aggregate Model is an aggregate, cell-based model. This means that rather than modelling the work history of each member of the population at an individual level, it projects the total numbers of workers falling into several different groups, or cells. Each cell is defined by certain characteristics. For example, there are different cells for age and earnings band. As an illustration, a snapshot of the projection in the year 2020 might look like Table 19.

Table 19: Number of employees in 2020 by age and annual gross earnings (000s): an illustration

	£0 – £1,000	£1,000 – £2,000	£2,000 – £3,000	...
...
64	1.1	1.2	2.0	...
65	1.0	1.1	1.5	...
...

The cell-based approach is an ideal aggregate modelling approach for State Second Pension and private pensions as the model can add up accruals for all individuals in each year. But for BSP, the amount paid depends on who has the entitlement, so a different approach is needed (Box 5).

Box 5: An example of why the cell-based approach is not used for modelling Basic State Pension

Tina works above the qualifying earnings threshold⁶⁵ for Basic State Pension for 10 years before the age of 65, in year 2020. The “25% rule” means that if Tina earns over the qualifying earnings threshold in the following year, he will receive 25% of the full amount; otherwise, will receive nothing.

From Table 19 the Aggregate Model can calculate how many 65 year olds work over the qualifying earnings threshold in 2020. However, it does not know how many of these are people like Tina and how many are people who are already over the 25% limit. This balance will affect aggregate Basic State Pension expenditure in future years. Therefore, Basic State Pension is modelled separately.

The Aggregate Model models many more cells than are shown in Table 19. There are separate cells for each single year of age from 16 to 75 and for a total of 49 earnings bands. There are also separate cells for males and females, and for the employees and the self-employed. The employees are split further: into those who are contracted-in to State Second Pension and, for those who are contracted-out, the five different methods of contracting-out.

The projection of the number in each cell:

- A. Starts with a projection of the future number of employees and self-employed in the UK, then
- B. The employees are split by whether they contract out and, if so, how they contract out, and finally
- C. An earnings distribution is superimposed.

A. A projection of the number of employees and self-employed in the UK

The Aggregate Model estimates the number of employees and self-employed based on population projections, such as those published by the Government Actuary’s Department⁶⁶, and employment rates. The model assumes that employment rates remain constant after the end of the most recent projections, except for when state pension age is increased.

⁶⁵ The Lower Earnings Limit (LEL)

⁶⁶ In this paper, the GAD 2003-based population projections are used. See Appendix 2 for a description of the data used in the PPI base case scenario.

B. An assumption on contracting-out is made

Trends in contracting-out have been a matter of recent debate and are uncertain. What happens to contracting-out is an assumption that is largely set by the user of the models. The base case scenario is based on the same assumptions as used by the Government Actuary's Department for estimating the future spending on State Second Pension and contracted-out rebates (see Appendix 2).

C. An earnings distribution is superimposed

Finally, the model divides the population of each of these groups into earnings bands. The overall distribution of earnings is based on recently observed data, which is an input into the model. The model takes account of the different earnings distributions observed for males and females, people of different ages, the self-employed and employees, and the different methods of contracting-out. Earnings growth is allowed for by assuming that all parts of the earnings distribution experience earnings growth at the same rate.

2. Projecting future expenditure on BSP

Basic State Pension is modelled by:

- A. Ageing the existing generation of older people.
- B. Simulating the entitlements of new pensioners.

A. Ageing the existing generation of older people

The entitlements of current pensioners is based on a 5% sample from government administration records⁶⁷. Current pensioners are 'aged', so that the amount of pension paid to the people who are currently over state pension age reduces over time in line with a mortality assumption.

B. Simulating the entitlements of new pensioners

As the people age, they are replaced by new pensioners. An assumption is made on how entitlements will change over time. For this paper, the assumption is similar to the assumption that the government makes when estimating future spending on BSP⁶⁸. Entitlements are assumed to:

- Fall slightly for men.
- Rise for married women as a consequence of greater employment and the abolition of the married women's stamp.
- Rise slightly for non-married women.

⁶⁷ Aggregated data from the IAD 5% sample 31 March 2003

⁶⁸ GAD (2004 QR)

3. Projecting future expenditure on SERPS and S2P

Expenditure on SERPS and S2P is modelled by considering the underlying accruals in each year. So, for example, the aggregate amount of SERPS/S2P that will come into payment in 2020 will be the sum of what has been accrued by 64 year olds in 2019, 63 year olds in 2018, and so on:

- The Aggregate Model estimates future accruals by applying the rules of the pension system to the projection of the labour market. Past accruals are calculated using data derived from government administration records.
- The accruals are revalued from the year in which they are earned to the year in which they come into payment in line with growth in average earnings, allowing for the fact that some people will die before they receive their pension.
- Once a pension for a cohort is modelled to have come into payment, it is increased in each year in line with an assumed level of inflation and tapered out slowly as the cohort dies.
- When an individual dies the Aggregate Model applies the rules of the pension system to determine how much of his pension may be inherited by his spouse.

The calculation of SERPS/S2P accruals is made more complicated by contracting-out. With contracting-out, an employee can choose to waive part of his Additional Pension, an amount called the Contracted Out Deduction (COD), in return for receiving a contribution into a private pension scheme.

The Aggregate Model calculates separately the aggregate amount of SERPS/S2P that would be in payment if nobody contracted-out and the aggregate amount of Contracted Out Deduction in each year, allowing for their separate rules. The difference is state expenditure on SERPS/S2P.

4. Projecting future expenditure on contracted-out rebate rates

The Aggregate Model produces its own estimates of future contracted-out rebate rates⁶⁹. These rebate rates are applied to the underlying projection of the labour market to estimate future state spending on contracted-out rebates.

⁶⁹ The calculation of actuarially fair contracted-out rebate rates depends on a set of assumptions which are set by the user and will alter the generosity of contracted-out rebates. The base case scenario in this paper uses the assumptions adopted for the contracted-out rebate rates for 2002 to 2006.

There are five different methods of contracting-out in the UK (Table 20). The methods differ by the amount of the state benefit they aim to replace, and how they depend on age⁷⁰:

- Occupational schemes (money purchase and salary related) are only contracted-out of the equivalent of SERPS and not the more generous S2P.
- Members of appropriate personal pension and money purchase schemes receive rebates that depend on their age, while members of salary related schemes receive a rate that does not depend on their age.

Table 20: The different methods of contracting-out in the UK

	Age-related rebate	Non age-related rebate
SERPS benefit	Money Purchase Mixed Benefit ⁷¹	Private Sector Salary Related Public Sector Salary Related
S2P benefit without top-up to LET	Appropriate Personal Pension	

Because of these complexities, different types of contracted-out employees receive different rebates. The Aggregate Model therefore models the five different types of employees in Table 20 separately.

An objective of the Aggregate Model is to evaluate different options for state pension reform. Reforms are likely to affect the National Insurance rebates given for contracting-out of State Second Pension, if they continue to be calculated on a cost-neutral basis. For example, an increase of the state pension age would decrease the rates, leading to lower expenditure on contracted-out rebates. The Aggregate Model therefore calculates the rebate rates itself on an actuarially fair basis, rather than use the Government Actuary's Department's projections, which assume no change to the state pension system.

To calculate rebate rates the Aggregate Model must make a series of assumptions, the most important of which being:

- Mortality, which tends to be lighter for contracted-out employees than for the population as a whole.
- Investment returns.
- Inflation.
- Real growth in average earnings.
- Annual management charges and annuity expenses.

⁷⁰ A further complication is that salary related rebates are delivered by paying reduced National Insurance contributions while in other methods full National Insurance contributions are paid to the Inland Revenue, who then refund some of the contributions separately, up to 12 months later.

⁷¹ In Mixed Benefit schemes, Defined Benefit and Defined Contribution pension are accrued concurrently. The Aggregate Model assumes that individuals contracted-out into Mixed Benefit Schemes are all accruing money purchase benefits in respect of their contracted-out rebates. This is a simplification which is justified by the small size.

In this paper, the base case scenario uses the same assumptions as the Government Actuary used for the current set of rebate rates (for contracting-out in tax years 2002/3 to 2006/7). The rebates for 2007/8 to 2011/2 will be announced during 2006.

5. Projecting private pensions and the cost of tax relief

Official government estimates of the future cost of the pensions system do not include the cost of tax relief. However, the PPI believes the cost of tax relief should be more actively considered, as it is significant and is likely to remain so.

The Aggregate Model projects tax relief by first modelling private pensions. The Aggregate Model models private pension income using a stock/flow approach. It models five aggregated pension funds:

- Funded Defined Benefit (DB) schemes.
- Notionally funded and unfunded DB schemes⁷².
- Occupational Defined Contribution (DC) schemes.
- Personal pensions for employees.
- Personal pensions for the self-employed.

Inflows

The flows into each pension fund consist of contributions and investment returns.

Contributions are calculated by applying assumed contribution rates to a projection of scheme membership. Scheme membership is based as much as possible on the labour market projections of contracting-out:

- Most members of funded DB schemes are contracted-out, so that the membership of funded DB schemes is taken from the projection of the people who are contracted-out using the private sector Salary Related method.
- Similarly, all public sector DB schemes are contracted-out, so the membership of notionally funded and unfunded DB schemes can be closely based on the labour market projections.
- The membership of DC schemes and personal pensions consists of people who are contracted-out into either a DC scheme or a personal pension, plus contracted-in members.

⁷² In this paper, unfunded pension schemes, including the public sector pension schemes, are not included in the measure of pension contributions but are included as part of the total of income from private pensions. See Chapter 2.

In the base case scenario, average contribution rates (the amount contributed by the employee and employer combined, including contracted-out rebates, as a percentage of the employee's gross salary) are assumed to be:

- 8% for DC schemes.
- 12% for personal pensions.
- 17% for the self-employed.
- For DB schemes, the required rate to meet the pension promise made the typical DB scheme in full⁷³.

DB schemes are assumed to meet their benefit promises in full. This required contribution level is calculated using the assumptions on inflation, salary growth and mortality that are used to project the assets of DB schemes, so that the promise is assumed to be met in full. In the short-term, the difference between the calculated contributions and the contributions being made are counted as being deficit contributions, and are smoothed out over 10 years.

Investment returns include equity dividends, equity capital growth, bond interest payments, bond capital growth and returns on cash. Holdings of equities, bonds and cash are modelled separately to allow for their different tax treatments.

Outflows

The flows out of each pension fund are new pensions and tax-free lump sums and pensions.

Pensions are paid out through an 'annuitisation' process, like in a DC scheme. DB pensions are assumed to increase each year in line with inflation and come with a survivors' pension, while DC pensions are assumed to be mostly level and single-life.

All individuals are assumed to take 25% of their pension as a tax-free lump sum.

Tax relief

The net cost of tax relief on private pension saving is then estimated on a fiscal basis using these projections of the private pension system, as:

- Tax relief granted on pensions saving, *plus*
- Tax relief granted on investment income, *less*
- Income tax paid on private pensions once they are in payment.

⁷³ For a description of the typical benefits assumed, see PPI (2005 OPPPS) Page 18

Tax relief granted on pensions saving is calculated using an assumption on what the average rate of tax relief on pensions saving will be in the future. In this paper, this average rate is assumed to remain at its current level of around 30%. The calculation treats contracted-out rebates as not being tax advantaged, except for the basic rate relief available on the non age-related part of rebates to personal pensions.

Tax relief on investment returns is calculated in a similar way, assuming an average rate of tax relief of 20%. Some types of investment returns are counted as not being tax advantaged for the calculation:

- Capital gains are counted as not being tax advantaged, because tax on capital gains can often be avoided on investments made outside a pension scheme.
- Equity dividends are counted as not being tax advantaged, since pension schemes are no longer able to reclaim the tax that has been paid on the dividends by the issuing company.

Income tax paid by people over state pension age is calculated using the Distributional Model so that it can take into account any changes in the average rate of income tax paid caused by changes to the state pension system (see Appendix 4).

Appendix 4: The PPI Distributional Model

The Distributional Model allows the distributional impact of possible reforms to be analysed and is used to produce the analysis in Chapter 4. The projected distribution of pensioner incomes from the model is also the starting point for estimates of the future cost of Pension Credit and revenue from income tax.

Methodology

The Distributional Model projects forward the distribution of pensioner incomes:

1. A sample of people currently over state pension age is the starting point.
2. Incomes are uprated in line with Aggregate Model estimates.
3. Income tax liabilities are calculated for each member of the sample.
4. Pension Credit entitlements are calculated for each member of the sample.
5. A weight is attached to each member of the sample so that the balance between ages, gender and marital status matches long-term projections.

1. A sample of people currently over state pension age

The Distributional Model is based on the dataset underlying the 2003/4 Pensioners' Incomes Series (PIS) publication, which has been provided by the Department for Work and Pensions for this analysis.

The PIS dataset has been designed to give an accurate picture of the current distribution of pensioner incomes, and so it is a natural choice to use to project the distribution forward. The PIS dataset is based on the Household Below Average Incomes (HBAI) dataset, which is derived from the Family Resources Survey (FRS). The HBAI should be more representative than the FRS because it makes an adjustment for households with very high incomes, which are known to be under-recorded in the FRS.

An important strength of the PIS dataset is its size: it is a large sample of over 8,000 benefit units, and contains comprehensive data on the sources of income pensioners have, as well as age, gender and marital status. The PIS dataset is on a benefit unit rather than an individual basis and this has the advantage that the future incomes distribution can be analysed separately for singles and couples. Many aspects of the current pensions system work differently for singles and couples, for example, Pension Credit.

The PIS dataset only contains records for single people over SPA and married or cohabiting partners where the man is over SPA, and so excludes some younger pensioners. Most of the applications of the Distributional Model focus on those over SPA but some outputs such as the aggregate cost of Pension Credit require information for younger pensioners⁷⁴. Where necessary, it has been possible to take younger pensioners into account using an off-the-model adjustment.

Because of data limitations, simplifications are necessarily used in distributional modelling. These simplifications can create some distortions in the distributional results, but they tend to work in opposite directions and so cancel each other out. Therefore, the final results are not overly distorted, but should be interpreted as an overall picture rather than a detailed prediction.

One such distortion is caused by a known draw-back with the FRS (and therefore the HBAI and the PIS): the mis-recording of state pension income. All state pension income is reported as one number, including both Basic State Pension (BSP) and State Second Pension (S2P). Minimum Income Guarantee and Pension Credit can be mis-reported as state pension income. This will lead to over-estimates of the amounts of BSP and S2P for low income pensioners.

Although the FRS records BSP and S2P together, it is useful for the Distributional Model to be able to model them separately. To allow this, the model splits the state pension reported in the dataset by counting everything up to the maximum possible BSP level (£82 a week for single pensioners in 2005/6) as BSP, and everything above that level as S2P. This may mean that some income is counted for the modelling as being BSP when it is really S2P, but this is not expected to distort the results significantly. Those with much less than the full BSP are likely to be the less well-off pensioners, and these are expected to currently be receiving only small amounts of S2P⁷⁵.

2. Incomes are uprated in line with Aggregate Model estimates

The Distributional Model is a static model: the same dataset is used throughout the projection period, with no individuals added and none taken away. So for example, the collection of 70 year-old women in the dataset is used as the basis for modelling tomorrow's 70 year-old women, after making an explicit adjustment for the expected change in the incomes of the successive cohorts of 70 year-old women.

⁷⁴ The minimum age for Guarantee Credit is currently age 60 so men can receive Guarantee Credit before SPA

⁷⁵ As at 30 September 2004, the average amount received in S2P and SERPS (the predecessor to S2P) was just over £12 a week, which is much less than the average amount of BSP received. It is reasonable to treat for modelling purposes the amount of SERPS and S2P currently being received by today's less well-off pensioners as negligible as the pensions are earnings-related. DWP (2005 SPSS).

This contrasts with a dynamic approach, which explicitly ages the 70 year-old single women in the dataset from year to year. Today's 70 year-old women are taken as being representative of next year's 71 year-old women, and so on until the cohort gradually dies out. New cohorts of individuals need to be added to replace those who leave the dataset. This approach requires more assumptions to be made on how the individuals age: not only regarding the mortality they experience but also regarding the onset of disability, changes in work patterns, and how they access their private pensions and other sources of capital. The need to make these assumptions adds to the complexity of the model and, given the lack of good data on which to base these assumptions, may not add to its reliability.

The aim of the Distributional Model is to give an insight into how the distribution of incomes may vary in one particular year under a variety of different pension reforms, and for this the static approach is appropriate. A static approach is consistent with other models current being used in policy analysis, for example the Department for Work and Pensions' Policy Simulation Model, which is used for official estimates of the future cost of Pension Credit.

The cohort adjustments, which adjust the income received by the individuals in the sample to take into account the likely changes from one cohort to the next, are made separately for each age and gender, and also vary from year to year. For couples, an adjustment is made to the income of each partner separately, after first notionally splitting the couples' income into that attributable to each partner, using the latest estimated split between each partner⁷⁶.

The Distributional Model is flexible enough to derive the cohort adjustments using different assumptions. In the PPI base case scenario presented in this paper, adjustments are based as much as possible on Aggregate Model projections, as this ensures that the suite of models is internally consistent. One alternative is to assume that incomes received by successive cohorts of older pensioners increase by an assumed factor in each year, for example, with inflation or average earnings growth.

In the base case scenario, the amounts of BSP received by the individuals are adjusted so that the average amount received matches the average amount projected by the Aggregate Model. In practice, as the adjustment is applied across all individuals of each gender and age, this leads to some individuals being counted in the calculations as if they receive more than 100% of the full rate of BSP. This will result in an over-estimate of the amount of BSP for individuals with full BSP entitlement, and an under-estimate for those with less than a full BSP. This distortion acts in the opposite direction to the distortion caused by the mis-reporting in the FRS, and so these distortions tend to cancel each other out.

⁷⁶ WEU (2005)

Estimates of the amounts of State Second Pension (and private pension) are adjusted in a similar way. Estimates of growth in expenditure from the Aggregate Model are applied across the pensioners' income distribution. This will result in an over-estimate of S2P for higher earners and an under-estimate for lower earners. The Aggregate Model does not model earnings of people over SPA and other non-pension income, and so constant factors are applied. For the base case scenario, earnings and other non-pension income are assumed to increase from year to year in line with growth in average earnings.

The assumptions used in the base case scenario mean that when different state pension reforms are modelled, their impact largely feeds through automatically from the Aggregate Model. If, for example, an increase in the level of the BSP is being modelled, then the higher level is reflected in the Aggregate Model estimates of the average amounts of BSP received that are used to derive the cohort adjustments. Reforms which could alter the distribution of incomes within an age and gender group, such as increasing the coverage of the BSP, can be taken into account in the Distributional Model itself.

3. Income tax liabilities are calculated

The next step in the methodology is to calculate how much income tax is paid by each representative benefit unit in future. The model uses the income tax paid by the benefit units to calculate income taken into account for Pension Credit and to estimate the aggregate amount of income tax paid on private pensions in future.

In the PPI base case scenario, it is assumed that personal allowances and income tax thresholds will be uprated in line with average earnings from 2010. This is not current government policy but is consistent with assumptions used by HM Treasury⁷⁷. If tax thresholds continued to be uprated with prices in the long term, then many more pensioners would pay income tax at the higher rate because of fiscal drag.

4. Pension Credit entitlements are calculated

Pension Credit entitlements are calculated by applying the current rules of pensions system, unless the impact of a change in rules is being modelled.

⁷⁷ See, for example, HMT (2004) page 51

Not everyone who is entitled to Pension Credit claims their benefit, and so the model requires an assumption on what proportion of them claim. The assumption can differ by type of entitlement (whether the benefit unit is entitled to only Guarantee Credit, only Savings Credit or both Guarantee Credit and Savings Credit), marital status, age and gender, and can also change over time. The assumption used in the PPI base case scenario is that take-up⁷⁸:

- Remains at 85% for people who are entitled to both the Guarantee Credit and Savings Credit components.
- Remains at 74% for people who are only entitled to the Guarantee Credit component.
- Increases from the current level just under 40% to around 60% for people who are only entitled to the Savings Credit component, as Savings Credit becomes a more significant part of older people's income.

The model chooses which individuals claim randomly, so that if, for example, 75% of people were assumed to claim their Pension Credit, and 1,000 representative individuals have some entitlement, the model would pick 750 of the 1,000 representative individuals at random and they would be treated as claiming their benefit. Although the Distributional Model does not explicitly make a distinction between the size of entitlements when choosing which of the individuals claim, it can allow for the observed higher take-up of those who are entitled to the Guarantee Credit component.

The severely disabled and carers have a higher Guarantee Credit threshold, and the Distribution Model takes this into account. The current version of the model does not explicitly take into account the higher threshold for those with qualifying housing costs, as the extra amount of Pension Credit awarded in this way is relatively small.

The model therefore requires characteristics such as severe disability and caring to be recorded in the dataset. Because these characteristics are not included as part of the PIS dataset, they are matched from the original FRS dataset. The base case scenario assumes that the proportion of people of each age and gender who are disabled or who care does not change over time.

5. A weight is attached to each member of the sample so that the balance between ages, gender and marital status matches long-term projections

The final step in the calculations is to attach a weight to each benefit unit in the dataset so that the number of people of each age, gender and marital status matches long-term projections.

⁷⁸ PPI (2004). The PPI only updates its modelling assumptions annually to allow different pieces of modelling work to be compared. Early indications are that Pension Credit take-up may have increased since these assumptions were set, which would lead to a greater cost of the current system in Chapter 1.

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The Pensions Policy Institute takes responsibility for remaining errors.
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