



1. Overview of the UK pension system

1.1 Description

1.1.1 The Current State Pension System

In the UK, the statutory state pension system consists of a basic state pension and an earnings-related additional pension known as the state second pension. These are financed through earnings-related National Insurance contributions (NICs). Participation in the state pension system is mandatory.

Currently men can claim their state pension from 65 whilst women's state pension age (SPa) is increasing from 60 (currently at 62 and 6 months) to equalise with men's SPa at 65 by 2018. Both will then increase gradually to 66 by 2020 and to 67 between 2026 and 2028. A full basic state pension of £113.10 (2014/15) currently requires 30 years of NICs (which can include National Insurance credits) for both men and women. Each year of NICs gives entitlement to 1/30th of the full basic state pension. State Pension cannot be taken up before the State Pension age, but may be deferred in return for a higher State Pension (10.4% per year of deferral) or a one-off lump sum payment with interest (annually at 2% above the Bank of England base rate).

Legislation requires that the basic state pension be uprated annually at least in line with average earnings, however the government has discretion to uprate by a different index. Since 2011 the government has chosen to increase the state pension by the "triple lock" - the highest of average earnings, CPI or 2.5%. Although this has been done each year since 2011, the triple lock is not enshrined in law, and therefore does not meet the 'constant policy' criteria to be included in these projections. Additional state pension has to be uprated annually at least in line with prices, and the guaranteed minimum level of Pension Credit, by at least earnings.

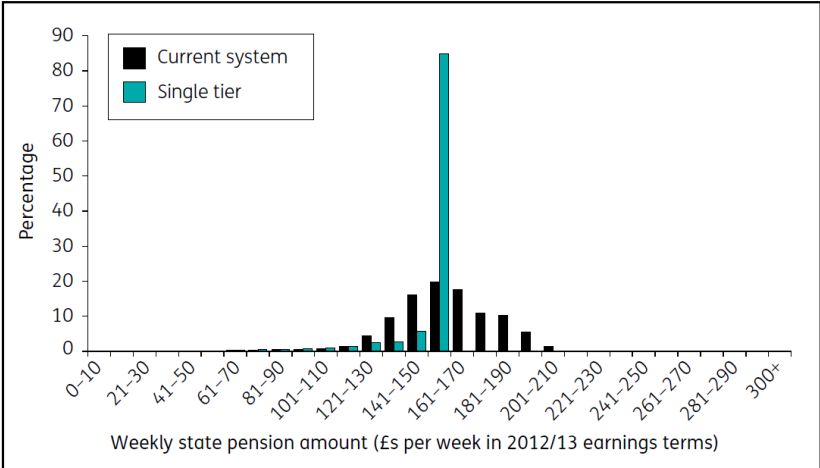
Individuals of SPa have access to Pension Credit, a means-tested benefit comprising Guarantee Credit, a 'top-up' based on a weekly minimum income, and Savings Credit, for those aged 65 or over who are rewarded for making some savings towards their retirement. Pensioners also receive a range of related benefits including healthcare, travel and fuel payments.

There is no separate disability pension in the UK – state benefits are provided to those unable to work due to a disability, and this is classified separately from the state pensions system.

Legislated Reforms to the State Pension System

The new state pension (formerly known as 'single tier') will be introduced from April 2016. It is a simpler, fairer pension which will be set above the standard minimum guarantee of the means test, providing people with more certainty concerning how much they can expect to receive from the state upon retirement. It will be based on the own individual's contributions, rather than relying on the NI contribution record of their spouse or civil partner.

The new state pension is designed to simplify the old system of a single state pension with an additional pension, and thus over time will eliminate the additional pension altogether. As seen in the diagram below, this will mean that instead of a wide spread of different pension amounts being received at State Pension Age, most pensioners will receive exactly the same pension.



The new state pension will require a minimum of 10 qualifying years to be eligible and 35 years of contributions or credits will be required to receive the full amount. The full amount of new state pension will be finalised closer to implementation. The new deferral rate will be set at 5.8% for each full year the new state pension is not claimed, which is considered to be broadly actuarially fair. These reforms will apply to future pensioners only, and those reaching SPa before the reforms are introduced will continue to receive their state pension in line with the current rules.

The new state pension is expected to lead to an improvement in long term fiscal sustainability as over time fewer people are enrolled in additional pension. As discussed later, this effect is what primarily drives the improvement in fiscal sustainability compared to Ageing Report 2012.

1.1.2 The Private Pension system

There are two main types of occupational schemes established by employers, defined-benefit (DB) - pensions based on years of service and final pay, or on career average revalued earnings – and defined-contribution (DC) - pensions based on contributions and the investment returns they generate. Employers also now have a duty to enrol workers into a pension. To this end the UK has established the National Employment Savings Trust (NEST), a DC scheme that employers may use to fulfil their obligation.

Personal pensions, created in 1988, offer a private means of saving for retirement to those without access to an occupational scheme or who change jobs frequently. Personal pensions are largely DC schemes as described above. The government provides tax relief – up to a limit – on contributions to private pensions. When they are taken in retirement, individuals have the option to take up to 25% of the fund as a tax-free lump sum, with the rest taxed at their marginal rate.

Legislated Reforms to the Private Pension System

At Budget 2014, the government announced significant changes to the way people take their private pensions. From April 2015, individuals with DC pension savings will be able to withdraw these savings, subject to their marginal rate of income tax and scheme rules, regardless of the size of their pension savings. Previously individuals had the option to use their pension savings to buy an annuity, withdraw the total sum at a 55% tax rate or, subject to a series of rules and restrictions on, for example, how much could be withdrawn/the individual's income, enter drawdown.

Alongside this flexibility the government is introducing a system of impartial guidance to ensure that everyone approaching retirement understands their available choices. Private pensions, other than where specific exceptions apply, will have a minimum retirement age of 55, increasing to 57 by 2028 and thereafter remaining 10 years below the SPa.

These reforms do not affect these projections, as private pensions have not been modelled.

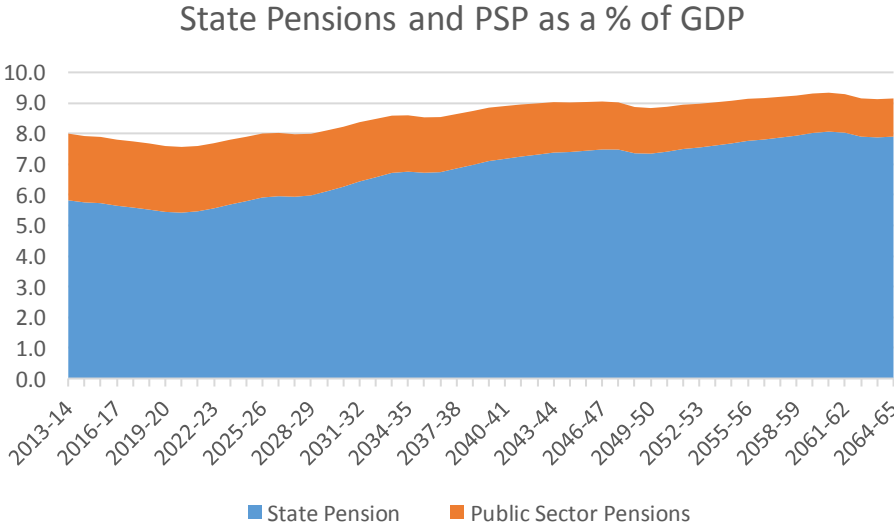
1.1.3 Public Service Pension Schemes

There are 8 main categories of occupational pension schemes in the UK for public service workers, which autonomously manage the pensions of staff in the NHS, teachers, civil servants, staff in local government, police officers, firefighters, the armed forces and judges, and which are under the direct control of Ministers. These schemes pay out benefits in addition to and separately from the State Pension, and are based on a member's time in service and earnings. Together, these pension schemes are known as

Public Service Pension schemes (PSPSs). There are also around 300 smaller Non-Departmental Public Body Pension Schemes, which are partly funded through Government grants, and which have more autonomy in designing and administering their pension schemes.

Scheme benefits vary from one scheme to another; with some being based on a member’s final salary and others on a member’s career average revalued earnings. Schemes also have different accrual rates, revaluation rates, Normal Pension Ages, employee and employer contribution rates, lump sum commutation rates and indexation rates.

The table below shows the proportion of pensions spending on the 8 largest PSPSs, relative to pensions spending on the State Pension.



This shows that PSPSs make up a small, and decreasing proportion of state pensions spending over time.

Legislated Reforms to Public Service Pensions Schemes

As detailed in the previous Ageing Report pensions fiche, the 2011 change in indexation of PSPSs (moving from RPI to CPI) contributed strongly to the sustainability of the PSPS system.

Furthermore, in 2013, most PSPS schemes moved from being calculated based on ‘career final salary’ to ‘career average salary’, thereby further decreasing PSPS expenditure and increasing the sustainability of the system.

Table 1 – statutory retirement age

		2013	2020	2030	2040 [^]	2050	2060
Men - with 20 contribution years	statutory retirement age	Removed in 2011					
	earliest retirement age	65	66	67	67	68	68
	penalty in case of earliest retirement age	There is no penalty for earliest retirement					
	bonus in case of late retirement	10.4%	5.8%*	5.8%	5.8%	5.8%	5.8%
Men - with 40 contribution years	statutory retirement age	Removed in 2011					
	earliest retirement age	65	66	67	67	68	68
	penalty in case of earliest retirement age	There is no penalty for earliest retirement					
	bonus in case of late retirement	10.4%	5.8%	5.8%	5.8%	5.8%	5.8%
Women - with 20 contribution years	statutory retirement age	Removed in 2011					
	earliest retirement age	61	66	67	67	68	68
	penalty in case of earliest retirement age	There is no penalty for earliest retirement					
	bonus in case of late retirement	10.4%	5.8%	5.8%	5.8%	5.8%	5.8%
Women - with 40 contribution years	statutory retirement age	Removed in 2011					
	earliest retirement age	61	66	67	67	68	68
	penalty in case of earliest retirement age	There is no penalty for earliest retirement					
	bonus in case of late retirement	10.4%	5.8%	5.8%	5.8%	5.8%	5.8%

Source: HM Treasury

All data in this table relates to state pensions, since private and occupational schemes have different and extremely varied retirement ages and regulations.

[^]The SPa for 2020 and 2030 have both been recently changed. For years thereafter, there is a mechanism in place for reviewing, and potentially raising, the Spa, in light of various data including longevity questions, so it is very possible that the listed ages will rise.

*This 5.8% bonus per year is judged to be roughly actuarially fair.

Note that as per Table 1, there is no statutory retirement age. Instead, there is a SPa, after which the state pension can be received, whether or not the individual has retired. The state pension cannot be taken before the SPa; however, it may be taken later, and a corresponding bonus is applied, as shown in the table.

1.2 Recent reforms of the pension system included in the projections

In terms of new reforms included in the state pensions projections, as discussed earlier, the UK has:

- brought forward the rise in SPa to 67 by 2028.

- legislated to create a new State Pension scheme for people reaching SPa from 2016 – this will cost no more than the system it replaces. These projections include the effect of the new State Pension, starting from April 2016 for new claims. This is now in legislation from the Pensions Act 2014. Whilst this will, to some extent, take account of historic earnings for transitional cohorts who have a large part of their working life under the previous scheme, the Department for Work and Pensions (DWP) have not included any of the spend on new State Pension in the 'earnings-related' line.
- removed the default retirement age, enabling people to work as long as they want to

Furthermore, for the additional Public Service Pensions projections, the UK has:

- switched from 'final salary' schemes to 'average salary' schemes

1.3 Description of the actual "constant policy" assumptions used in the projection

In the UK's domestic long-term projections, in the Fiscal Sustainability Report, published annually by the independent Office for Budget Responsibility, two assumptions are made, which are not used in these projections.¹

- a) The Government has legislated for a review of the SPa to take place at least once every six years. This review would be based on a technical assessment by the Government Actuary and an additional report considering other relevant factors. Details of the core principle to guide that review were set out alongside Autumn Statement 2013: that people should expect to spend on average up to a third of their adult life (beginning from age 20) in receipt of the state pension, with at least ten years' notice provided and changes being phased in over two years. This is hereafter referred to as the **longevity link**.

However, in practice, any changes to SPa will take place following a review as outlined in the Pensions Act 2014, and would require primary legislation, which has not yet occurred so far. Therefore these projections do not include this review, as it did not fit the definition of 'constant policy'.

- b) As discussed previously, since 2011, the state pension has been uprated each year using the **'triple-lock'** system, where pensions increase by the highest of CPI inflation, average earnings growth or a 2.5% underpin. Since this change has not officially been put into legislation, it has not been included in these projections,

as any future government could easily change it and it does not seem to fit the definition of 'constant policy'.

Since both the longevity link and triple lock assumptions are used in the UK's Fiscal Sustainability Report, the figures between the FSR and the Ageing Report are not directly comparable, although they achieve similar projections results.

The state pensions projections use the following timetable:

- Female SPa rising to 65 (equal to male SPa) between April 2010 and November 2018
- SPa rising to 66 between December 2018 and April 2020;
- SPa rising to 67 between April 2026 and April 2028; and
- SPa rising to 68 between April 2044 and April 2046.

Note that the legislated state pension rise can be seen in the table below, where it is compared against the system of reviewing the pension age according to life expectancy, which is not yet in legislation. The table below uses three variants for these reviews depending on the possible path of demographics in the future. It is clear that implementing these reviews by linking retirement age to life expectancy would improve the sustainability of the pensions system.

State Pension age	Year within which the rise is fully implemented			
	Legislated	Population variant		
		Young age	Central	Old age
66	2020	2020	2020	2020
67	2028	2028	2028	2028
68	2046		2036	2031
69			2049	2034
70			2063	2037
71				2040
72				2045
73				2051
74				2057
75				2064

The UK have used nominal GDP values as stated in the AWG spreadsheet. If these GDP projections do not include appropriate GDP adjustments for the changes in UK SPA, this will cause slight inconsistencies.

¹ <http://budgetresponsibility.org.uk/>

Detailed outline of Part 2: Demographic and labour forces projections

2.1 Demographic development

TABLE 2

Main demographic variables evolution

	2013	2020	2030	2040	2050	2060	Peak year*
Population (thousand)	64065	66892	70643	74011	77332	80078	2060
Population growth rate	0.6	0.6	0.5	0.5	0.4	0.3	2015
Old-age dependency ratio (pop65/pop15-64)	26.6	29.6	35.2	39.1	40.7	42.8	2060
Ageing of the aged (pop80+/pop65+)	27.1	27.2	30.8	32.8	38.9	38.2	2052
Men - Life expectancy at birth	79.1	80.2	81.6	82.9	84.2	85.3	2060
Men - Life expectancy at 65	18.4	19.1	20.0	21.0	21.9	22.7	2060
Women - Life expectancy at birth	82.8	83.9	85.3	86.6	87.8	89.0	2060
Women - Life expectancy at 65	20.8	21.6	22.7	23.7	24.6	25.6	2060
Men - Survivor rate at 65+	87.2	88.5	90.1	91.5	92.7	93.6	2060
Men - Survivor rate at 80+	58.6	62.1	66.6	70.8	74.5	77.7	2060
Women - Survivor rate at 65+	91.4	92.3	93.5	94.4	95.2	95.9	2060
Women - Survivor rate at 80+	70.1	73.1	77.1	80.5	83.4	85.9	2060
Net migration	165.0	172.1	203.3	209.3	190.2	171.2	2037
Net migration over population change	0.5	0.4	0.6	0.6	0.6	0.7	2059

The Eurostat population projections show the UK's population rapidly rising, from 64m to 80m people, becoming the EU's most populous member state. This has a mixed effect on pensions. The increased migration means that a larger number of taxpayers mitigate the rise in the dependency ratio. Indeed, the UK is projected to be one of the main 'destination countries' for migration with a cumulative total of 9.2m migrants by 2060. However, the ageing population means that the increasing dependency ratio still continues to be a significant problem for the UK, rising from 27% to 43% by the end of the period.

Graph 1: Age pyramid comparison: 2013 vs 2060

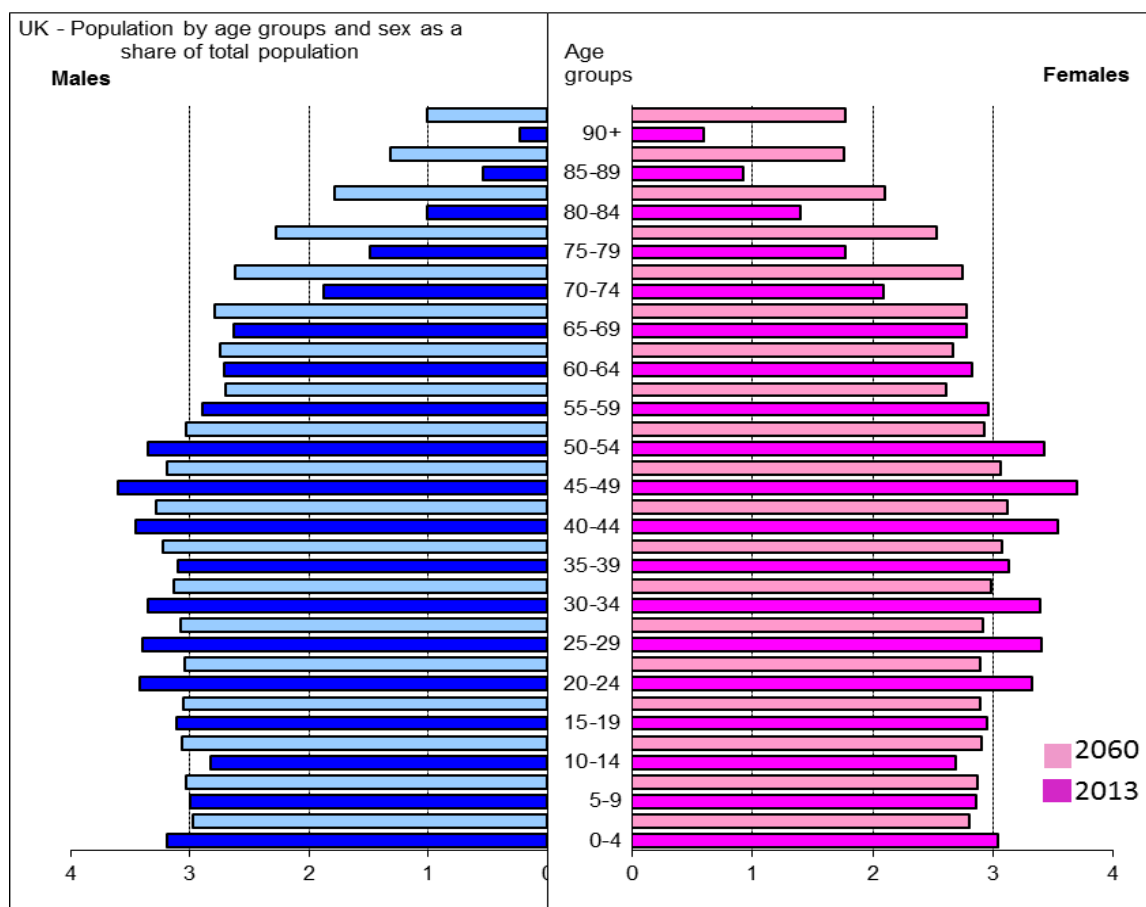


TABLE 3

Participation rate, employment rate and share of workers for the age groups 55-64 and 65-74

	2013	2020	2030	2040	2050	2060	Peak year*
Labour force participation rate 55-64	62.9	66.5	68.6	72.2	73.2	73.3	2060
Employment rate for workers aged 55-64	59.9	63.8	66.0	69.6	70.5	70.6	2060
Share of workers aged 55-64 on the labour force 55-64	95.2	95.9	96.2	96.3	96.3	96.3	2039
Labour force participation rate 65-74	15.9	14.3	16.3	19.0	22.6	22.2	2051
Employment rate for workers aged 65-74	15.5	14.0	16.0	18.7	22.2	21.8	2051
Share of workers aged 65-74 on the labour force 65-74	97.8	98.1	98.2	98.3	98.3	98.3	2040
Median age of the labour force	40.0	40.0	40.0	40.0	40.0	40.0	2013

TABLE 4a

Labour market entry age, exit age and expected duration of life spent at retirement - MEN

	2013	2020	2030	2040	2050	2060	Peak year
Average effective entry age (CSM) (I)	20.3	19.8	19.8	19.8	19.8	19.8	2013
Average effective exit age (CSM) (II)	66.4	64.9	64.9	65.6	65.8	65.8	2013
Average effective working career (CSM) (II) - (I)	46.1	45.1	45.1	45.8	46.1	46.1	2013

Duration of retirement	17.6	19.1	20.0	20.1	21.0	21.8	2059
Duration of retirement/average working career	38.1	42.3	44.3	43.8	45.6	47.3	2059
Percentage of adult life spent at retirement	26.7	28.9	29.9	29.7	30.5	31.3	2059
Early/late exit	0.9	1.6	1.3	1.4	1.3	1.5	2015

TABLE 4b Labour market entry age, exit age and expected duration of life spent at retirement - WOMEN

	2013	2020	2030	2040	2050	2060	Peak year
Average effective entry age (CSM) (I)	21.8	21.3	21.3	21.3	21.3	21.3	2013
Average effective exit age (CSM) (II)	65.5	64.2	65.2	65.8	65.8	65.8	2038
Average effective working career (CSM) (II)- (I)	43.7	42.9	43.9	44.5	44.5	44.5	2038
Duration of retirement	20.0	22.5	22.7	22.8	23.7	24.6	2059
Duration of retirement/average working career	45.7	52.5	51.7	51.2	53.3	55.3	2059
Percentage of adult life spent at retirement	29.6	32.8	32.5	32.3	33.1	34.0	2059
Early/late exit	0.9	1.9	1.5	1.1	1.2	1.4	2023

The UK has historically had a higher than EU average participation rate in the labour market, and this trend is expected to continue, something which will be helped further by migration. 25-54 year olds' participation rate will increase in the UK by 2.5% across the projection period, compared to an EU average of a 0.6% increase. In 2060, the participation rate among women in the UK will be 80.0% compared to the EU's 75.9%.

Detailed outline of Part 3: Pension projection results

3. Pension projection results

3.1 Extent of the coverage of the pension schemes in the projections

These projections of the state pension includes all components of the state pension which were included in the 2012 Ageing Report, namely the State Pension, graduated retirement pension, lump sum payments, additional state pension (state second pension, SERPS), non-contributory pension and pension credit. It also includes the pensioners' winter fuel allowance, a free TV licence for those over £75 and a £10 Christmas bonus paid to those receiving state pensions.

This year we have not included disability benefits for pensioners, as this is not a pension, and seems to be excluded by the guidance this year.

We have not included any projections for PSPSs in our central pension's projection tables, as projections for PSPSs are done by the Government Actuary's Department, whose model is not configured to use the EU macroeconomic assumptions, and therefore PSPSs have not been explicitly modelled. In order, however, to produce comparable projections to the last exercise in 2012, we have calculated approximate projections for the 8 main Public Service Schemes, and these are added to the state pension in order to provide aggregate projections in Section 3.5. Note that the inclusion of all public sector pensions will always be very problematic. There are many pension schemes, such as the BBC or Transport for London, which are only partially government funded, and which are not classed as pension's expenditure. However, these latter pensions are relatively small.

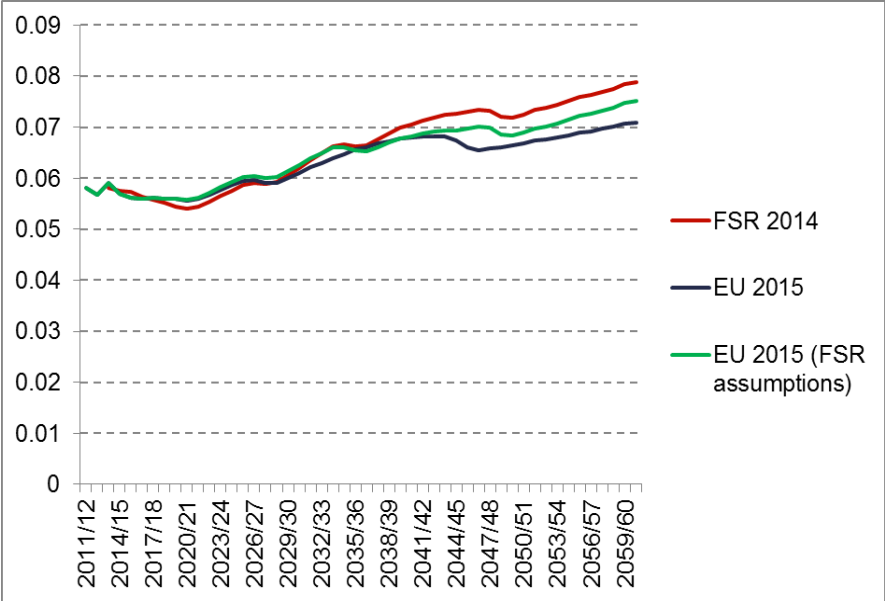
The ESSPROS assumptions below include Public Service Pensions, and hence have higher projected expenditure. Note that we have used a Euro to Sterling conversion rate of 0.84926 (from the 2013 average, taken from the ECB). As the UK works in financial years (beginning April), we have used the uprating index for year Y to provide the uprating for year Y+1/Y+2. This is because under UK benefit uprating, indices for July and September in 2014 will be used to determine benefit rates in 2015/16. In the output tables, financial years are presented.

TABLE 5 Eurostat (ESSPROS) vs. Ageing Working Group definition of pension expenditure (% GDP)

	2005	2006	2007	2008	2009	2010	2011	2012
1 Eurostat total pension expenditure	10.6	10.6	10.3	10.7	11.8	11.8	11.8	12.3
2 Eurostat public pension expenditure	5.8	5.7	6.3	6.5	7.2	7.1	7.0	7.2
3 Public pension expenditure (AWG)	:	:	:	:	6.0	5.7	5.8	5.7
4 Difference (2) - (3)					1.2	1.4	1.2	1.5
5 Expenditure categories not considered in the AWG definition, please specify:	:	:	:	:	:	:	:	:
5.1 ...	:	:	:	:	:	:	:	:
5.2 ...	:	:	:	:	:	:	:	:
5.3 ...	:	:	:	:	:	:	:	:

3.2 Overview of projection results

Under the AWG approach as per Table 6 the pension expenditure for the UK rises between 2013 and 2060, from 5.9% of GDP to 7.1%. This compares well to the domestically produced projections where state pension expenditure peaks at 7.9% of GDP in 2063-64. The Ageing Report projections are shown in the graph below, together with the domestically-produced projects (FSR) plus a sensitivity running the Ageing Report projections plus longevity link and triple lock assumptions:



Pension expenditure projections as proportion of GDP

Spending (as a proportion of GDP) levels off between 2010 and 2020 are due the acceleration in female pensions age rises between 2010 and 2018 and a general rise in male and female state pension ages (SPA) between 2018 and 2020. There are further changes in SPA during the projection period as detailed above. At these points, spending levels off whilst the change is taking place.

TABLE 6 Projected gross and net pension spending and contributions (% of GDP)

Expenditure	2013	2020	2030	2040	2050	2060	Peak year*
Gross public pension expenditure (excluding PSPS)	5.9	5.6	6.1	6.8	6.7	7.1	2060

TABLE 7 Projected gross public pension spending by scheme (% of GDP)

Pension scheme	2013	2020	2030	2040	2050	2060	Peak year*
Total public pensions (excluding PSPS)	5.9	5.6	6.1	6.8	6.7	7.1	2060
<i>of which earnings related:</i>							
<i>Old age and early pensions</i>	5.3	5.1	5.8	6.5	6.4	6.8	2060
<i>of which non-earnings related (including minimum pension and minimum income guarantee):</i>							
<i>Old age and early pensions</i>	0.64	0.43	0.34	0.30	0.27	0.28	2013

3.3 Main driving forces behind the projection results and their implications for main items from a pension questionnaire

Factors behind the change in public pension expenditures between 2013 and 2060 using pension data (in percentage points of GDP) - pensions

TABLE 8a

	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60	Average annual change
Public pensions to GDP	-0.4	0.5	0.7	-0.1	0.4	1.2	0.029
Dependency ratio effect	0.6	1.1	0.7	0.2	0.4	3.0	0.064
Coverage ratio effect	-0.7	-0.4	0.2	-0.3	0.1	-1.2	-0.028
<i>Cohort effect*</i>	-0.1	-1.2	-0.7	-0.2	-0.6	-2.8	-0.063
Benefit ratio effect	0.0	0.0	0.0	0.0	0.0	0.0	0.006
Labour Market/Labour intensity effect	-0.1	-0.1	-0.1	-0.1	0.0	-0.5	-0.012
<i>Employment ratio effect</i>	-0.1	-0.1	-0.1	0.0	0.0	-0.4	-0.009
<i>Labour intensity effect</i>	0.0	0.0	0.0	0.0	0.0	0.0	0.000
<i>Career shift effect</i>	0.0	0.0	0.0	0.0	0.0	-0.1	-0.003
Residual	0.0	0.0	0.0	0.0	0.0	-0.1	-0.001

Note that only a single table 8 is provided here. Since only the state pension is being modelled, and since it is a universal pension, the number of pensioners and pensions is, by definition, equal.

TABLE 9

	2013	2020	2030	2040	2050	2060
Public scheme (BR)	26.5	26.8	27.0	26.9	26.9	26.9

System dependency ratio and old-age dependency ratio

TABLE 10

	2013	2020	2030	2040	2050	2060
Number of pensioners (thousand) (I)	13124.5	12873.5	14508.7	17036.1	17405.9	18893.6
Employment (thousand) (II)	30273.9	31468.1	32538.7	34245.4	35607.4	36504.4
Pension System Dependency Ratio (SDR) (I)/(II)	43.4	40.9	44.6	49.7	48.9	51.8
Number of people aged 65+ (thousand) (III)	11106.6	12485.4	15112.6	17276.0	18505.1	19864.3
Working age population 15 - 64 (thousand) (IV)	41678.0	42110.9	42952.0	44139.3	45446.4	46461.4
Old-age Dependency Ratio (ODR) (III)/(IV)	26.6	29.6	35.2	39.1	40.7	42.8
System efficiency (SDR/ODR)	1.6	1.6	1.6	1.6	1.6	1.6

3.4 Sensitivity testing

The UK have also produced the same projections for each of the sensitivities requested:

- Budgetary Projection: Dynamic retirement age scenario
- Budgetary Projection: Higher employment rate scenario
- Budgetary Projection: Higher labour productivity scenario
- Budgetary Projection: Higher life expectancy scenario
- Budgetary Projection: Higher PR/ER older workers scenario
- Budgetary Projection: Lower migration scenario
- Budgetary Projection: Lower labour productivity scenario
- Budgetary Projection: TFP risk scenario

In all these scenarios, UK scenario modelling has been limited to changing the inputs detailed below:

- CPI
- earnings growth (calculated as the product of growth in the GDP deflator and labour productivity)
- triple lock (highest of CPI inflation, average earnings growth or a 2.5% underpin. We project this over the long term (from 2021/22 onwards) as being worth an extra 0.3 percentage points over and above nominal earnings growth).
- GDP deflator
- cash GDP
- average gross wage (for the benefit ratio calculation)
- populations (by age and gender)

Any other inputs/ factors have been left static. For example, the UK State Pension age has not been altered, other than described in the four baseline variants as described above. So, only two State Pension age structures are modelled, the Pensions Act 2014 ages; and the ages implied by the current Office for National Statistics low-migration population projections set against the longevity link principle.

The UK has not adjusted the rate of claiming of means tested benefits (as perhaps expected by "Budgetary Projection: Higher PR/ER older workers scenario").

It has not been possible to update the labour market or State Pension age impacts to the model with the resources available.

TABLE15 Public and total pension expenditure under different scenarios
(p.p. deviation from the baseline)

	2013	2020	2030	2040	2050	2060
Public Pension Expenditure						
Baseline	5.9	5.6	6.1	6.8	6.7	7.1
Higher life expectancy (2 extra years)	0.0	0.0	0.1	0.2	0.3	0.5
Higher lab. productivity (+0.25 pp.)	0.0	0.0	0.0	0.0	0.0	0.0
Lower lab. productivity (-0.25 pp.)	0.0	0.0	0.0	0.0	0.0	0.0
Higher emp. rate (+2 pp.)	0.0	-0.1	-0.1	-0.2	-0.1	-0.2
Higher emp. of older workers (+10 pp.)	0.0	-0.1	-0.3	-0.3	-0.3	-0.3
Lower migration (-20%)	0.0	0.0	0.1	0.1	0.2	0.2
Risk scenario	0.0	0.0	0.0	0.0	0.0	0.0
Policy scenario: linking retirement age to increases in life expectancy	0.0	0.0	-0.1	-0.2	-0.3	-0.4

Although many of the inputs in the model cannot be flexed, which can make it difficult to carry out sensitivity testing, we can make the following observations:

As **life expectancy** increases and entitlement periods lengthen pension expenditure also increases. Compared to the baseline scenario, the higher life expectancy scenario therefore also shows higher total pension spending.

Higher labour productivity has no impact on the projection results. While pension expenditure increases as state pensions are indexed in line with earnings, GDP also increases. As share of GDP, therefore, total pension expenditure under this scenario is unchanged relatively to the baseline projection.

In the **higher employment rates of all workers** scenarios based on higher employment rates, public pension expenditure is slightly below the baseline projections, but the difference is small.

In the **lower migration scenario**, pension spending is higher than in the baseline, due to a lower working age population driving up the dependency ratio.

3.5 Projections including Public Sector Pensions

Although the central projections did not include public sector pensions, as requested by the Commission we have included in this section the aggregate public pensions expenditure including Public Service Pensions projections, in order to provide a comparison with previous years.

Projected gross and net pension
spending and contributions (% of
GDP)

TABLE 6 PSPS

Expenditure	2013	2020	2030	2040	2050	2060	Peak year*
PSP Expenditure	2.2	2.2	2.3	2.1	2.0	1.8	2039
State Pension Expenditure	5.9	5.6	6.1	6.8	6.7	7.1	2026
Total Pension Expenditure	8.1	7.8	8.4	8.9	8.6	8.9	2039

3.6 Description of the changes in comparison with the 2006, 2009 and 2012 projections

TABLE 16
PSPS

	Public pensions to GDP	Dependency ratio	Coverage ratio	Employment effect	Benefit ratio	Labour intensity	Residual (incl. Interaction effect)
2006 *	1.89	4.66	0.00	-0.13	0.00	:	-2.64
2009 **	2.70	4.25	-1.43	-0.29	0.51	:	-0.34
2012 ***	1.50	4.13	-1.85	-0.32	-0.10	0.01	-0.37
2015****	0.77	4.09	-1.67	-0.51	-0.77	0.00	-0.36

* 2004-2050; ** 2007-2060; *** 2010-2060; **** 2013-2060

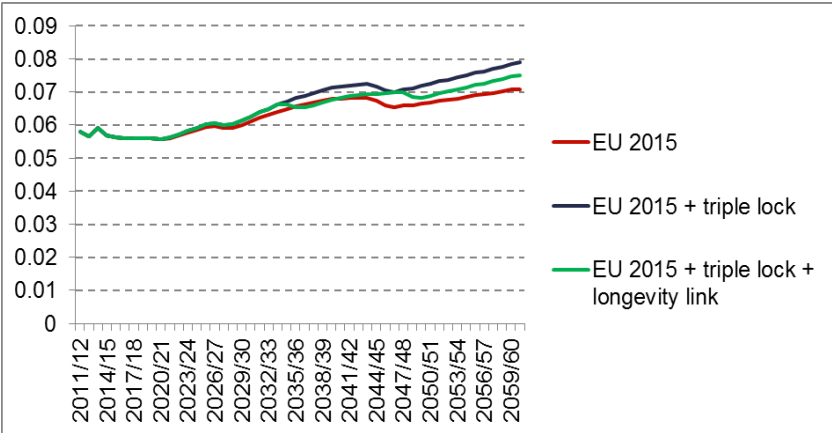
Note that Table 16PSPS, just like Table 6PSPS above, includes Public Service Pensions to provide a fair comparison.

The projections for Ageing Report 2015, whilst fairly similar both to the projections in the Fiscal Sustainability Report (FSR) 2014 and to the Ageing Report 2012, do have some differences.

The Ageing Report 2015 projects spending to be at 7.1% of GDP at the end of the period, whereas the Fiscal Sustainability Report 2014 projects pensions spending to be at 7.9%. Since no major state pensions reforms were enacted between the publication of these reports, the differences are down to two classes of assumptions: constant policy assumptions, and the EU macroeconomic assumptions, with most of the difference explained by the former.

In the FSR 2014, in line with the OBR's definition of constant policy, the 'longevity link' and 'triple lock' were both assumed. However, as explained in Section 1.3 of the fiche, neither were assumed in these projections due to the Ageing Working Group's more stringent definition of constant policy. Excluding the longevity link has a detrimental effect on fiscal sustainability in these projections, as the State Pension Age is not increased by as much, by the end of the period. However, excluding the triple lock has a much more pronounced effect in the opposite direction, since pensions spending is

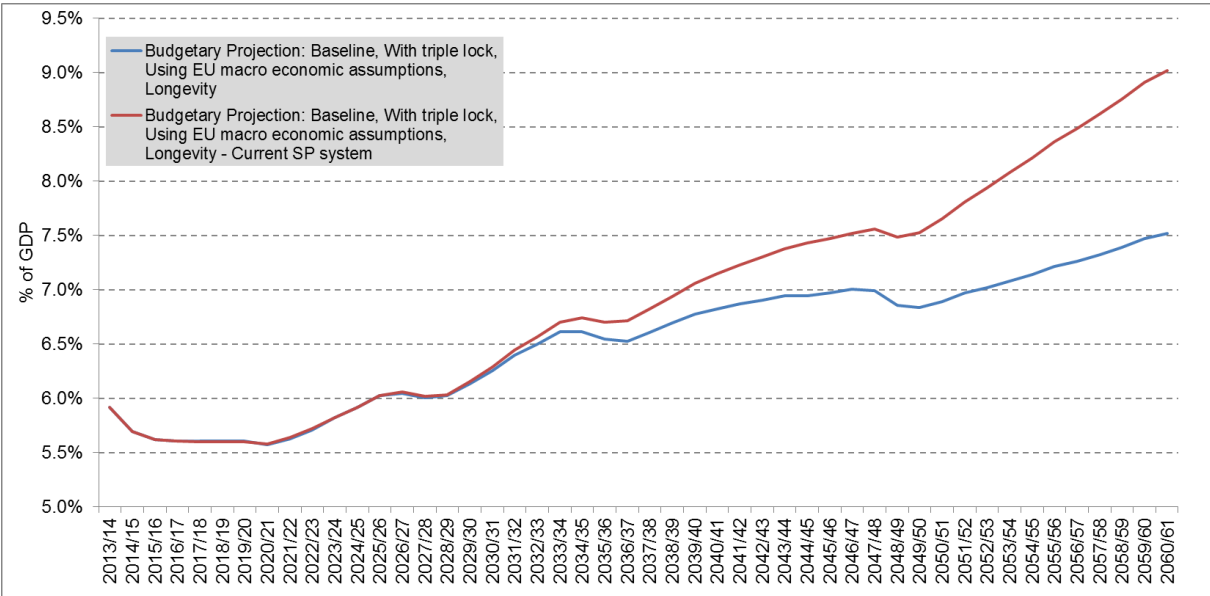
indexed by a much lower index, thus the overall effect of these assumptions changes is to result in a more sustainable pathway. The graph below shows the effects of these assumptions:



Pension expenditure projections as proportion of GDP

As can be seen, the addition of these two assumptions explains the bulk of the difference between FSR2014 and AR15. The remaining difference is attributable to different EU macroeconomic assumptions on migration, nominal GDP, and earnings growth.

The difference between Ageing Report 2015 and the previous Ageing Report 2012, can be explained through the effects of the introduction of the Single State pension. As discussed earlier, this will have the long-term effect of making the overall system more sustainable, as over time, new workers will be unable to enrol on the additional pension scheme. As the graph below shows, this results in a rapid divergence between the two sets of projections after 2040, which explains the differences between the two reports:



Thus the difference between AR15 and FSR14 can be said to be primarily due to assumptions, whereas the difference between AR15 and AR12 is primarily attributable to the effect of the reform of the single state pension.

4. Description of the pension projection model and its base data

4.1 Institutional context in which those projections are made

These projections are run by the Department for Work and Pensions (DWP). The models used are principally for the provision of long-term pensioner benefit expenditure to the UK Office for Budget Responsibility. These are published annually in the Fiscal Sustainability Report (<http://budgetresponsibility.org.uk/fiscal-sustainability-report-july-2014/>) and on the DWP website (<https://www.gov.uk/government/statistics/benefit-expenditure-and-caseload-tables-2014>).

4.2 Assumptions and methodologies applied

The projections are made up from a combination of three different models on an aggregate basis. These are then aligned to our medium term model outputs to ensure a smooth transition from the medium term forecasts (up to 2020/21) to the longer term projections.

Within the spreadsheet various adjustments are made to the projections to account for:

- The change from 2010-based population projections to 2012-based projections;
- new State Pension (formerly called Single Tier State Pension). Claims to BSP, Graduated retirement benefit and Additional Pension end after the 2015/16 SPA cohort. Payments of new State Pension are simulated.
- changes in State Pension age (as detailed in the assumptions above)
- economic determinants (using the assumptions sheet provided by EU)

4.2.1 Data used to run the model

The models use a wide variety of administrative data collected in the process of assessing and paying DWP benefits; plus managing the National Insurance system in the UK. Some of the models also incorporate survey data from a variety of household surveys. The sources are given in more detail below, against the general description of each model.

4.2.2 Reforms incorporated in the model

No reforms have been newly incorporated within the models described below. However, paragraph 1.2 describes the reforms which have been included within the projections by aggregate modelling within the summary spreadsheet.

4.2.3 General description of the model(s)

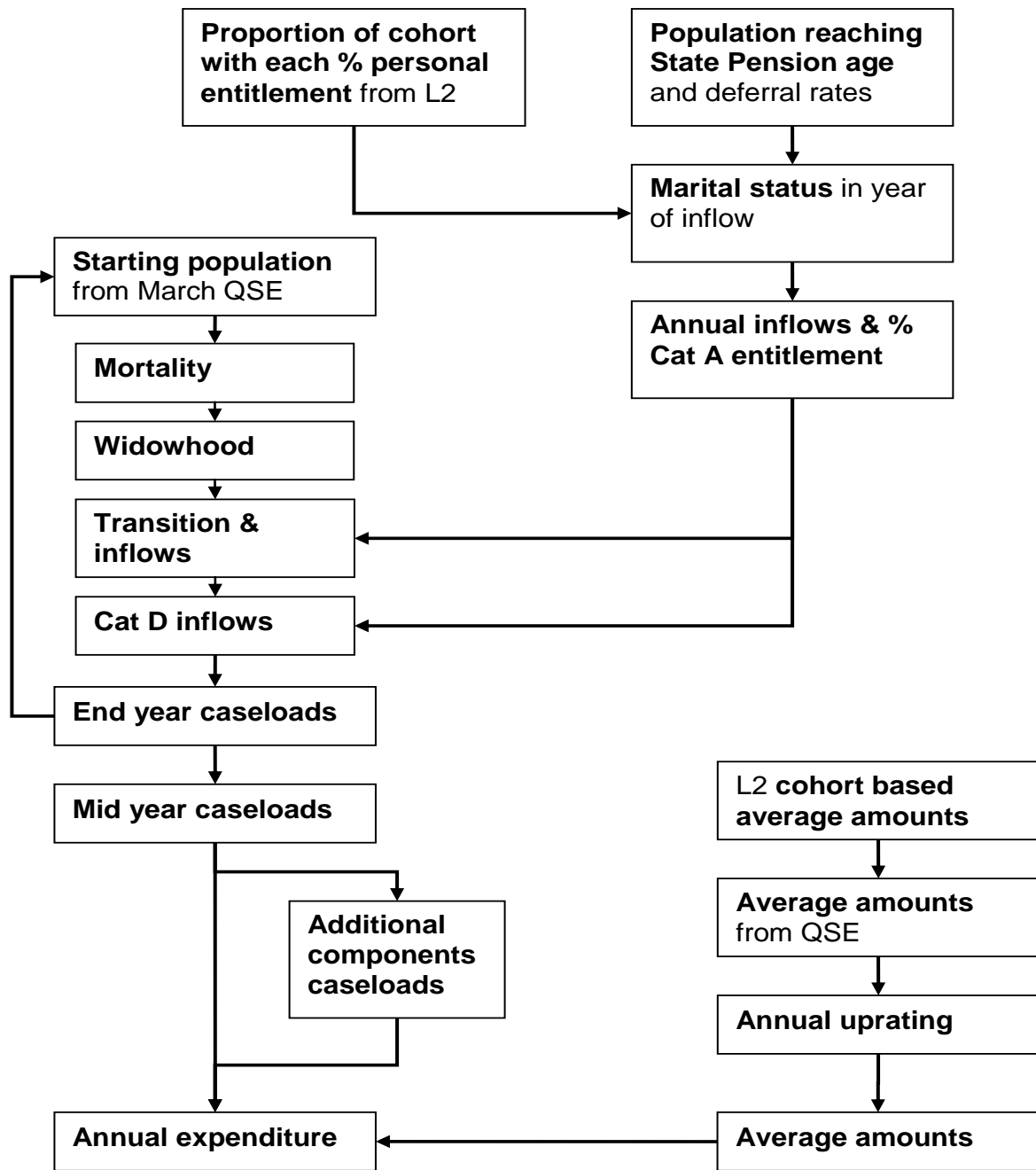
- The type and the structure of the model.

- The coverage of the model (if different schemes are modelled separately please describe scheme by scheme).
- Main equations.
- Additional assumptions: expert's judgments needed for modelling the pensioners' behaviour and pension accrual (maturation, indexation...).

The BSP model

General description of the model

1. The model is built in SAS and of an aggregate stock flow design. This means that it has inflows and outflows which are used to generate a caseload forecast each year. The caseload forecast is then multiplied by average amounts which creates an expenditure forecast.
2. The aggregation in the model is as follows:
 - a. Country of residence – GB, non-frozen rate overseas, frozen rate overseas.
 - b. Sex – male, female.
 - c. Marital status – male, single female, married female, divorced female, widowed female.
 - d. Age – 60-125 (women), 65-125 (men).
 - e. Personal entitlement – 0%, 0-50%, 50-60%, 60-80%, 80-100%, 100%.
 - f. Category of pension – A, B, D (which combined with marital status and personal entitlement information gives further breakdowns).
3. The model aggregation results in 17,550 groups. However many of these groups are not possible, such as anyone with Category D below 80. Many assumptions used in the model are also generated at a higher level. [For example mortality is only considered based on age, sex and country of residence which reduces the number of mortality assumptions to 650.]
4. The flow diagram on the following page provides an overview of the major process that occur in the model.



Calculation of inflow numbers

Cohort numbers

- Population projections provide numbers expected to reach State Pension age each year. For years where State Pension age changes monthly birth data is used to determine the new totals. This provides the total potential number of inflows which are then split by level of personal entitlement on a cohort basis. The numbers are then adjusted into year of inflow. For GB it is assumed the entire State Pension age cohort will inflow at some point during the year.

6. Overseas inflows are currently based on the growth in the GB population reaching State Pension age. For the 2009/10 State Pension age cohort approximately 12% of the GB numbers from overseas are expected to inflow.

Inflows above State Pension age

7. Rates to calculate inflows above State Pension age come from estimates used in the medium term Budget forecasts. These are simplified and extended into the long term. The rates are derived using historic inflow numbers combined with population estimates to predict how many people with unclaimed entitlement are above State Pension age at a given point in time, and when they are expected to inflow in the future.

Marital status

8. Marital status is determined at time of inflow based on age and sex. The numbers inflowing at each age are split by marital status projections. Together with the way widowhood is applied in the model this approach preserves the splits.
9. For men, marital status data is not reliable enough to be used directly. Instead marital status splits are imposed on the population using figures from the ONS. Where men can be identified as widowers and they receive a Category B or AB pension they are assigned to the widower population. The remainder of the population is assigned randomly until the correct numbers of people are in both the widower and non-widower groups.

Marital status and personal entitlement levels

10. Personal entitlement levels are not split by marital status. For men it is assumed that entitlement can be applied uniformly across both marital status groups. For women this assumption is less valid, especially under pre-reform rules where single women are much more likely to have a more complete contribution record than married women.
11. Personal entitlement is calculated using both pre and post reforms for all individuals. This is merged with the recently retired population making use of the marital status flag there. This allows conditional probabilities to be created that inform the likelihood of someone being in each personal entitlement group given the total number people in each marital status group, and also the total number of people from those groups in each personal entitlement group.
12. As proportions in each personal entitlement group change for each cohort, and proportions in each marital status group change based on age and year of inflow, the respective numbers with each marital status in a given personal entitlement group change. This does not affect the overall numbers who inflow with each level of personal entitlement, nor the total number from each marital status group.

Mortality

13. Mortality rates come from the population projections split by sex and single year of age. The same rates are used for GB and overseas claimants, and are not adjusted for level of personal entitlement or marital status.

Average amounts

14. In addition to the inflow figures, the model uses a number of average amounts to produce overall projections. The average amounts forecasts are calculated separately to the caseload forecast. It has the same aggregation as the caseload forecast so that average amounts can be applied directly to mid-year caseload to generate expenditure. The main calculations are:
 - a. Mean proportion of the standard rate at State Pension age - average amounts for each pension group in the model are combined with the full rate of Basic State Pension payable each year to convert the average amounts into mean proportions of the standard rate. This allows year on year averages to be compared.
 - b. Mean proportion of the standard rate above State Pension age - Above State Pension age future mean proportions are driven by applying observed year on year changes to preserve cohort effects.

Additional components

15. Three types of transitions (i.e. a change in entitlement) are modelled: less than 60% Category to Category D for those 80 or above; less than 100% Category A or zero entitlement to Category B/BL or Category AB/ABL for those under 80; and conversion to Category B/AB on widowhood. A series of assumptions are used to estimate transitions across these different categories of state pension to take account of the change in pensioner entitlements.
16. Basic state pension entitlements are assumed to be uprated by the maximum of price growth and 2.5% until 2011/12. After this point the projections are subject to the policy commitment of the "triple lock", and are uprated by the higher of earnings, CPI or 2.5%. Following 5 year forecasts constructed by the Office for Budget Responsibility, an assumption of the correct uprating assumption has been made. For longer term assumptions, although earnings should exhibit the higher rate of growth, the variation in variables meant that an additional 0.3% change should be incorporated.

Data sources

17. This model is used by the Department for Work and Pensions Forecasting Division to provide pension projections for the Office for Budget Responsibility's (OBR's) annual Fiscal sustainability report. It has been estimated using ONS population projections produced in 2010 and other macroeconomic assumptions determined by the independent OBR for the projections presented in the Fiscal Sustainability Report. It also uses data from the Quarterly Statistical Enquiry, a biannual 5 per cent sample of administrative data. In order to allocate people to the right group in the caseload forecast, data on personal entitlement to BSP is needed. This comes from the 'L2 dataset' (a 1 per cent sample of HM Revenue and Customs' National Insurance Recording System). L2 shows the entitlement to BSP built up by each person in terms of qualifying years, whether as a result of paying NI contributions while working or as a result of building up credits. Age and sex data from the L2 dataset is also used to show when people will reach SPA (which 'SPA cohort' they belong to).

Pension Credit

18. Pension Credit is modelled using Pensim2, a dynamic micro-simulation model that has been developed in DWP to inform analysis of likely future trends in pensioner incomes. Pensim2 builds up a picture of the future pensioner population by modelling future life events and work histories for a representative sample of individuals.

19. The model currently starts from a set of base data representative of the GB household population. This base data includes detailed information on the characteristics of individuals and their employment and pension histories to date. For each subsequent year, sets of equations are used to model, for each individual, the probability of certain events occurring, based on estimates from current data. The calculated probabilities are then used within the model to determine what happens to each individual in a given year.

20. The key elements that are simulated include:

- partnership formation and dissolution;
- mortality;
- fertility;
- education;
- labour market status and earnings; and
- accrual of occupational and personal pensions.

21. The individual labour market and pension histories generated by the model are used to calculate estimates of pensioner incomes in each year of the simulation. For contributory State Pensions, the rules of the state pension are used to calculate someone's entitlement given the extent to which they work or participate in activities that are credited.

Additional Pension Model

22. The BSP model is a payouts-based model: it is based on estimates/forecasts of pension payments at SPA for current and future pensioners. By contrast, the AP model is an accruals-based model. Estimates of entitlement to SERPS and S2P accrued during people's working lives (revalued by earnings growth) are used to estimate their entitlements to AP from SPA.
23. After SPA, entitlements are adjusted for changes in pensioners' lives, such as widowhood. They are increased each year in line with CPI inflation until death, which is estimated using mortality rates from the ONS's 2010-based national population projections.
24. In order to produce estimates of entitlement to AP there are three stages. The first stage produces earnings factors² using:
- Numbers of jobs from DWP's cohort employment model,
 - Numbers of people by individual age earning at each of three levels:
 1. between the Lower Earnings Limit and the Lower Earnings Threshold
 2. between the Lower and Upper Earnings Thresholds
 3. between the Upper Earnings Threshold and the Upper Accrual Point
 - Deductions for contracting out of AP into private pension schemes (from 2012/13 onwards the only contracting out deductions are for defined benefit schemes as it will not be possible to contract out into defined contribution pensions from April 2012).
25. The second stage combines the earnings factors with data on accrual rates (NI contributions) from the L2 database. Most of the accruals data is 'actual' data, but as the last year of actual data available from the L2 database was 2008/09, so estimation must be made going forward.
26. In the third stage, for each cohort of people, entitlements accrued in a particular financial year are increased until SPA according to the rules on revaluation during working life, as in table above. They are then converted into a 'gross AP entitlement' for the cohort at SPA and this is increased from SPA in line with CPI inflation.
27. Thus, accrued AP entitlements =
- Earnings * rate of accrual... revalued in line with earnings growth **until SPA**
 - Earnings * rate of accrual... updated in line with CPI inflation **from SPA**
28. Carer credits are modelled separately using data on benefit caseloads, economic activity, information from the L2 database and ONS population projections.

² For further details, see the paper 'DWP Earnings Factor Modelling: Turning earnings distributions into earnings factors'.

4.2.5 Public Service Pensions Scheme modelling

As was made clear in Section 1, Public Service Pensions have not been explicitly modelled. However, in order to produce the aggregate table in Section 3.5, the PSPS projections from the Government Actuary's Department (GAD) for FSR 2014 were taken as a baseline. These were then adapted to incorporate EU macroeconomic assumptions on nominal GDP and earnings growth, as well as removing the longevity link assumption in order to be consistent with the state pensions projections.