Office for
Budget Responsibility

Fiscal sustainability analytical paper: Population projections and pensions spending update

July 2016

1 Introduction and context

1.1 Each year since 2011, the Office for Budget Responsibility (OBR) has published a *Fiscal sustainability report (FSR)*, in which we consider the fiscal consequences of *past* government activity, as reflected in the assets and liabilities on the public sector's balance sheet, and the consequences of *future* government activity, through the use of long-term demographically driven projections beyond our latest medium-term forecast horizon.

1.2 Due to the uncertainty that has followed the result of the 23 June referendum on the UK's membership of the European Union, we have decided to cancel the *FSR* that we had planned to publish on 12 July. The long-term projections would have been based on our pre-referendum March 2016 medium-term forecast and on assumptions about the future path of migration flows and productivity growth that would be affected by the Government's preferred choice of trade regime outside the European Union. So it is likely that some of the conclusions would not be informative at the present time. But, notwithstanding the referendum result, we remain committed to transparency in pursuing our statutory duty to examine and report on the sustainability of the public finances, so where possible we are publishing elements of the analytical work that would have featured in July's *FSR* as 'fiscal sustainability analytical papers'.

1.3 In this analytical paper, we present:

- a discussion of **demographic trends** based on the latest population projections published by the Office for National Statistics (ONS) in October 2015;
- the implications of those projections for future changes in the **State Pension age** (SPA) over the next 50 years, based on our interpretation of the 'longevity link';
- the **impact of both factors on state pensions spending** over the long term; and
- some **conclusions** that can be drawn from this analysis.

1.4 In producing this paper we have drawn on the help and expertise of officials from the Department for Work and Pensions and HM Treasury, to whom we are most grateful. The analysis, views and conclusions in this report represent the collective view of the three independent members of the OBR's Budget Responsibility Committee.

2 Demographic trends

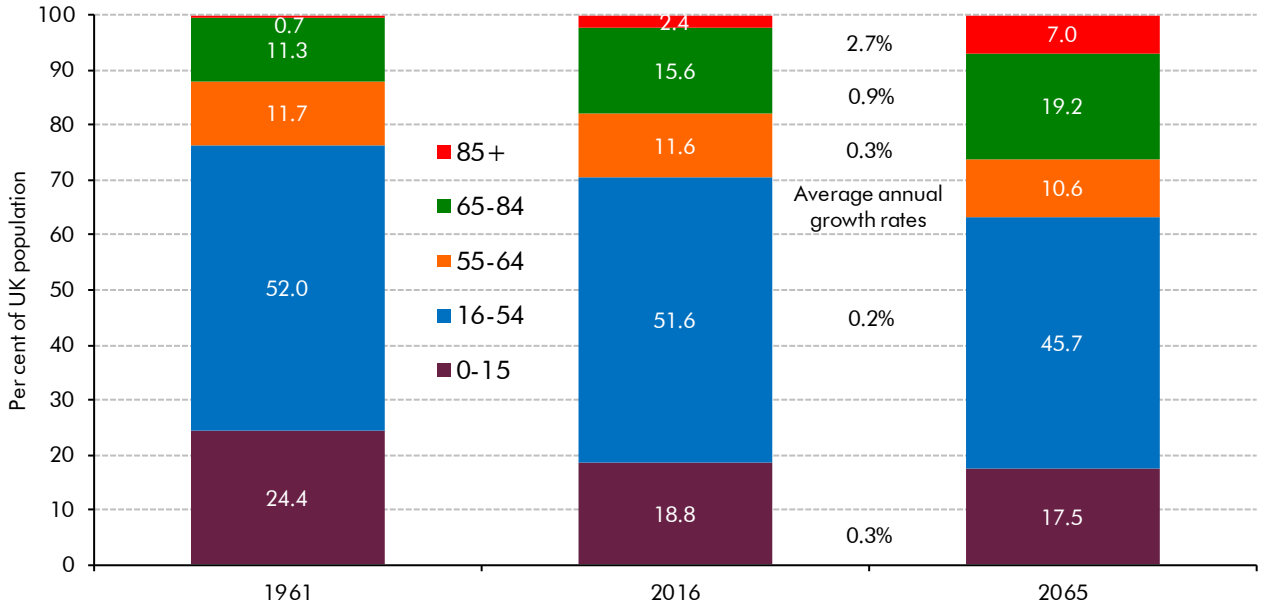
2.1 One of the most important inputs into the long-term fiscal projections that we present in our *FSRs* is a projection of the size and structure of the future population. This has significant implications both for the future size of the economy and for the future of the public finances. The projected size and structure of the population are determined by assumptions regarding longevity, fertility and net migration. As illustrated in Box 3.3 of our 2014 *FSR*, changes in these assumptions cumulated over a period of decades can have big effects, with important implications for the public finances.

2.2 We can be reasonably certain about some developments in population structure. In particular, we can be confident that the demographic bulge created by the post-WWII baby boom will continue to pass through the projections as these cohorts age. In addition, past trends of declining fertility and increasing longevity have created what is usually termed an 'ageing population'.

2.3 Combining the population estimates with the ONS latest population projections, Chart 2.1 demonstrates this phenomenon by showing how the population structure has evolved since the early 1960s and how it is projected to evolve over the next 50 years.[1] It is this ageing of the population that has the greatest impact on long-term prospects for the public finances, if we assume (as we do in our long-term projections) that spending on different public services is held constant as a share of GDP for people of particular ages.

[1] For more detail see *'National Population Projections: 2014-based Statistical Bulletin'*, Office for National Statistics, October 2015.

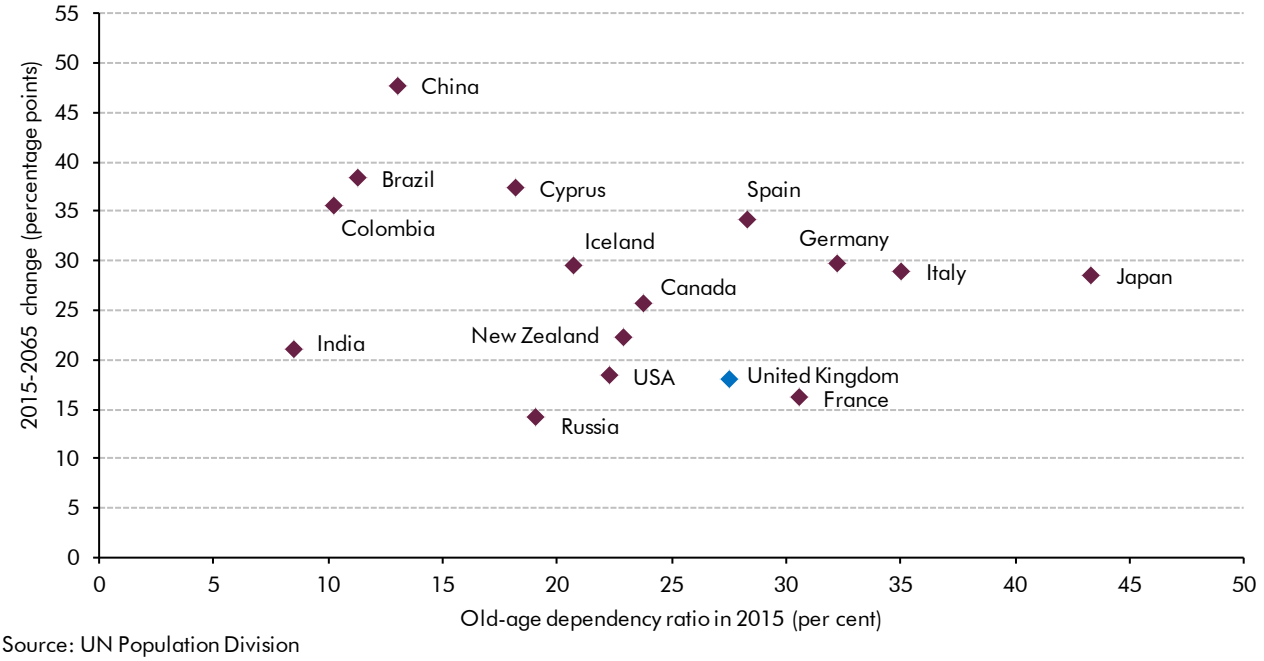
Chart 2.1: Population structure in 1961, 2016 and 2065



Note: 1961 is England and Wales only.
Source: ONS

2.4 The UK is not alone in having an ageing population. Many advanced economies will face similar pressures. Chart 2.2 shows the projected changes in the old-age dependency ratio, defined as the number of people aged over 65 as a percentage of those aged between 15 and 64, for various countries, derived from UN population projections. The chart shows that a number of countries currently have higher dependency ratios than the UK and/or are projected to see those ratios rise more quickly over the coming 50 years.

Chart 2.2: UN projections of the old-age dependency ratio



Source: UN Population Division

2.5 Since we last published an *FSR* in June 2015, the ONS has produced new population projections based on 2014 population data and updated assumptions. Estimates of the base population come from the 2011 census, updated for the latest estimates of births, deaths and net migration. Focusing on the ONS 'principal' population variant, which we have used in our most recent medium-term forecasts, the UK population is projected to increase to 81.2 million in 2065, up more than 600,000 compared to the 2012-based projections. This partly reflects the base population in 2014 being 86,000 higher than in the 2012-based projections. The effects of these changes on the assumed age structure of the population are shown in Chart 2.3, where they are described more fully.

2.6 Table 2.1 summarises the latest ONS principal population projection and how it has changed relative to the projections that underpinned last year's *FSR*. It shows that:

- **fertility rates** are unchanged at 1.89 over the long term, although they have been revised down in the near term. The ONS assumes that this reduction is only a temporary change. This long-term assumption remains below the 'replacement level' fertility rate of around 2.1 required for the population to replace itself in the long term in the absence of migration;

- **life expectancy** levels have been revised down slightly. For example, life expectancy at birth in 2039 is projected to be 0.2 years lower for men (at 84.1 years) and 0.6 years lower for women (at 86.9). This reflects higher recent mortality rates, which the ONS has reflected in its long-term assumptions. Between the 1975 and 2008 population projections, deaths were systematically overestimated as a result of the trend rise in longevity. But since the 2008-based projections, the ONS has started to revise deaths upwards slightly in the near term, while leaving the long-run assumptions broadly unchanged;

- **net migration** has been revised up. It has tended to be the largest contributing factor to errors in population projections. It has also been systematically underestimated in the past, which may in part be attributable to the difficulty in measuring the true level of immigration. The ONS has revised up long-term net migration in its principal variant from 165,000 a year in the 2012-based projections to 185,000 in the latest projections. That figure reflects average net migration over the past 23 years, but remains well below the most recent levels: in the year to December 2015, net migration reached 333,000. The ONS has assumed that the increase in net migration is skewed more towards children than those of working-age, although the overall age structure of net migration continues to reduce the old-age dependency ratio.

Table 2.1: Changes in population assumptions since the 2012-based projections

	Fertility rate	Life expectancy at birth in 2039 (years)		Long-term average annual net migration (thousands)	Size of population in 2065 (million)	
		Males	Females		16-65	Total
2012-based projections	1.89	84.3	87.5	165	46.2	80.6
2014-based projections	1.89	84.1	86.9	185	46.6	81.2
Change	**0.00**	**-0.2**	**-0.6**	**20**	**0.4**	**0.6**

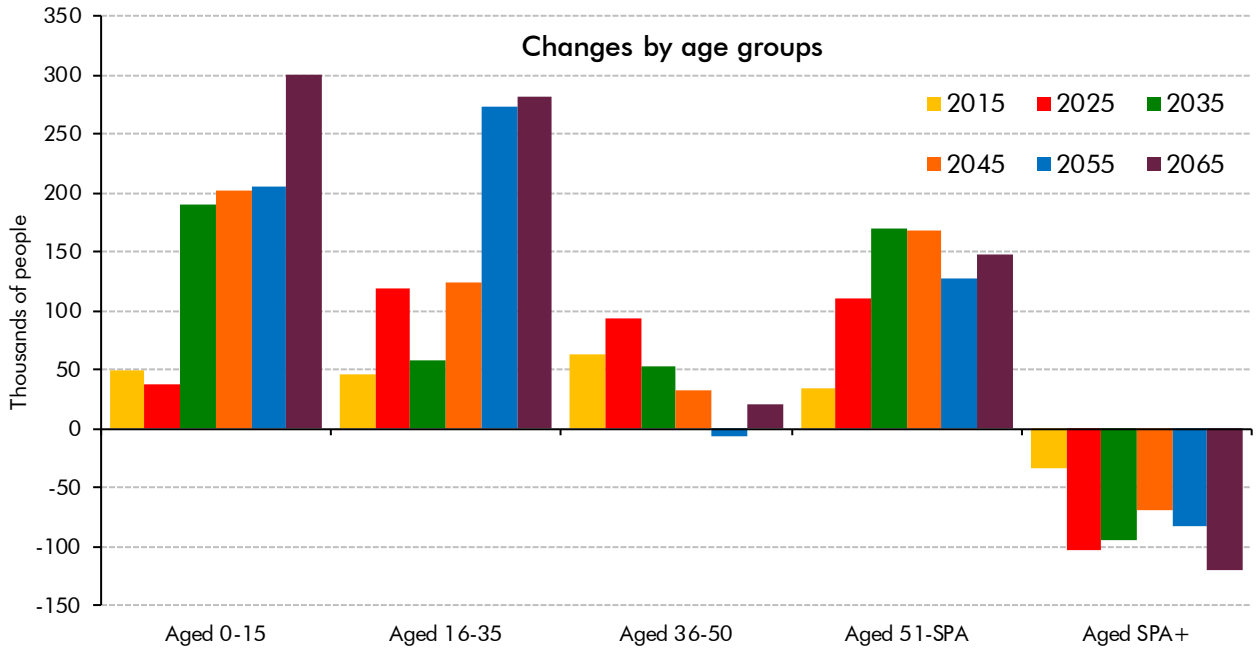
Note: the table is consistent with the ONS principal population variant.

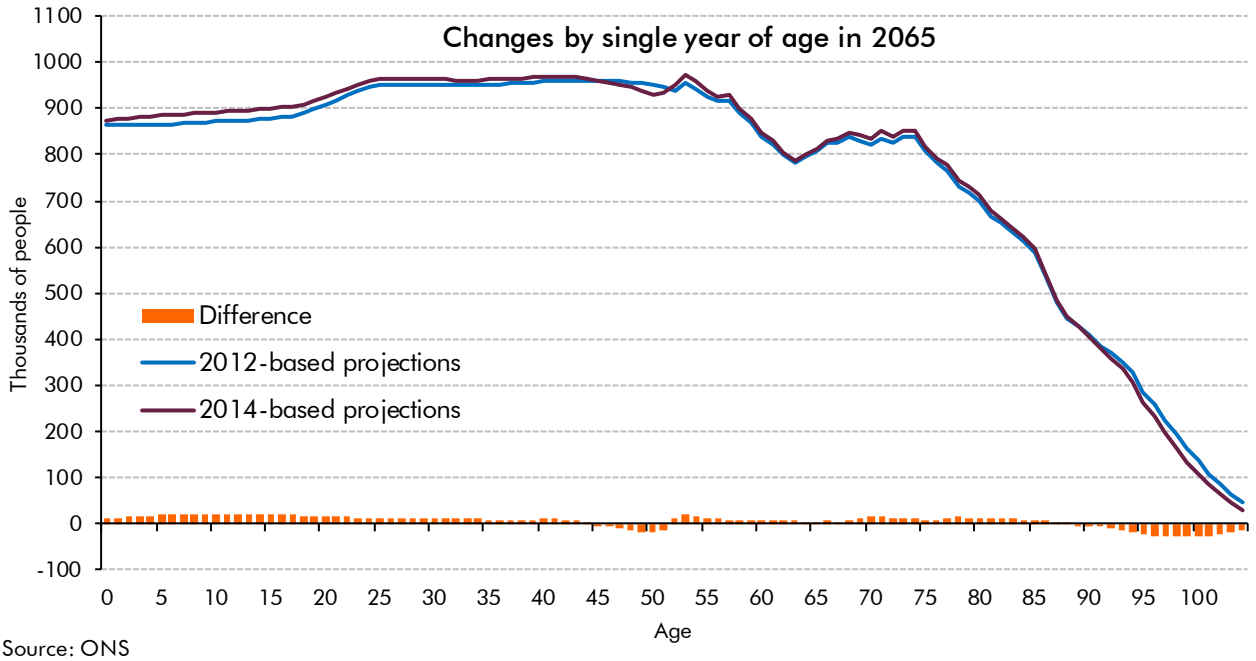
2.7 Chart 2.3 shows how the latest population projections compare with the previous projections for different age groups and what they imply for the population structure 50 years ahead. Overall, the total population is 0.8 per cent larger by 2065 than in the previous projections, with the working-age population 0.9 per cent larger but the population aged 65 and over 0.4 per cent smaller. This means the old-age dependency ratio is slightly lower at 46.4 per cent in 2065, down from 47.1 per cent in the previous projections. The main drivers of changes over the next 50 years include:

- for **children aged 0-15**: an upward revision that increases over time. That reflects higher net inward migration of young families;
- for **young adults aged 16-35**: an upward revision, also reflecting higher net inward migration and cohort effects resulting from a higher number of children gradually reaching adulthood. By 2065, the population in this age group is 1.5 per cent bigger than assumed in the previous population projections;
- for **prime-age adults aged 36-50**: an upward revision, but much smaller than for other age groups. By 2065, the population in this age group is just 0.1 per cent bigger than assumed in the previous projections;
- for **older working-age adults aged 51 to the State Pension age** (SPA): also an upward revision, but resulting more from the cohort effects of upward revisions to younger age groups as net migration at these ages has not been revised significantly; and
- for **pensioners** aged above the SPA: a downward revision due to higher mortality, especially for the over 80s. That is consistent with recent data showing more deaths than had been assumed in the previous population projections. By 2065, at which point we assume the SPA would have been raised to 69 on the basis of the longevity link, the population in this age group is 0.7 per cent smaller than previously assumed.

2.8 The rest of this paper focuses on how the upward revision to mortality rates would affect our long-term projections for state pensions spending. This is worth exploring because the effect is not straightforward in a setting where the SPA is itself influenced by projections of adult life expectancy through the 'longevity link'.

Chart 2.3: Revisions to the population age-structure in the latest ONS projections





Source: ONS

3 The State Pension age and the longevity link

3.1 The Government has legislated for a review of the State Pension age (SPA) to take place at least once every six years; in effect once in each Parliament. It has now commissioned the first independent review of the SPA, which must report to the Secretary of State for Work and Pensions by January 2017.[2] The review will be forward looking and will not cover the existing arrangements before April 2028, which have already been legislated.

3.2 Details of the core principle to guide future changes to the SPA 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.[3] The third-of-life principle is often described as a 'longevity link'.

3.3 Table 3.1 sets out our projection of the future profile of the SPA under the latest ONS population projections and how that has changed relative to the profile used in last year's *FSR*. Under these updated projections, the increases in the SPA beyond 67 would be implemented later than under the SPA path that underpinned last year's *FSR*. The increase in the SPA to 68 currently legislated to take place between 2044 and 2046 would still be brought forward, but only to the early-2040s rather than the mid-2030s. A further increase to 69 would follow in the mid-2050s, but there would be no rise to 70 within a 50-year horizon. These changes reflect the downward revisions to cohort life expectancy for a given age, which mean that the third-of-life principle would be met earlier in life than under the previous projections. The next section discusses how this affects our 50-year projections for pensions spending and the implications over an even longer horizon.

Table 3.1: Projected changes to the State Pension age over the next 50 years

	Year within which the rise is fully implemented				
State Pension age	66	67	68	69	70
FSR 2015[1]	2020	2028	2036	2049	2063
2016 update[1]	2020	2028	2041	2055	
Legislated	2020	2028	2046		

[1] Consistent with the ONS principal population variant.

[2] For more detail see *'State Pension age review: terms of reference'*, Department for Work and Pensions, March 2016.
[3] For further detail on the Government's announcement, see *'The core principle underpinning future State Pension age rises: DWP background note'*, Department for Work and Pensions, December 2013.

4 Implications for State Pension spending

The impact of the longevity link

4.1 Since our 2014 *FSR*, we have modelled the effect of applying the longevity link in our long-term projections. We have assumed that subsequent increases in the State Pension age (SPA) would be phased in over two years, in line with the Government's current approach.

4.2 As well as implying further and faster rises in the SPA than are currently legislated, applying the longevity link dampens the effect of changes in adult life expectancy on projected spending. Applied mechanically, it would mean that each additional year of expected adult life would translate into only four months more spent in receipt of the state pension. This reduces the fiscal risk associated with the successive upward revisions to life expectancy in previous population projections. If we assume the third-of-life principle operates symmetrically, it would also mean that a *downward* revision to life expectancy due to higher mortality rates would push back the profile of SPA rises and that people would therefore reach the SPA earlier.

FSR 2015 estimates

4.3 Before turning to how changes in assumed mortality rates and the path of future SPA rises would affect our long-term projections for state pensions spending, Chart 4.1 illustrates the effect of the longevity link that was factored into our 2015 *FSR*. It shows:

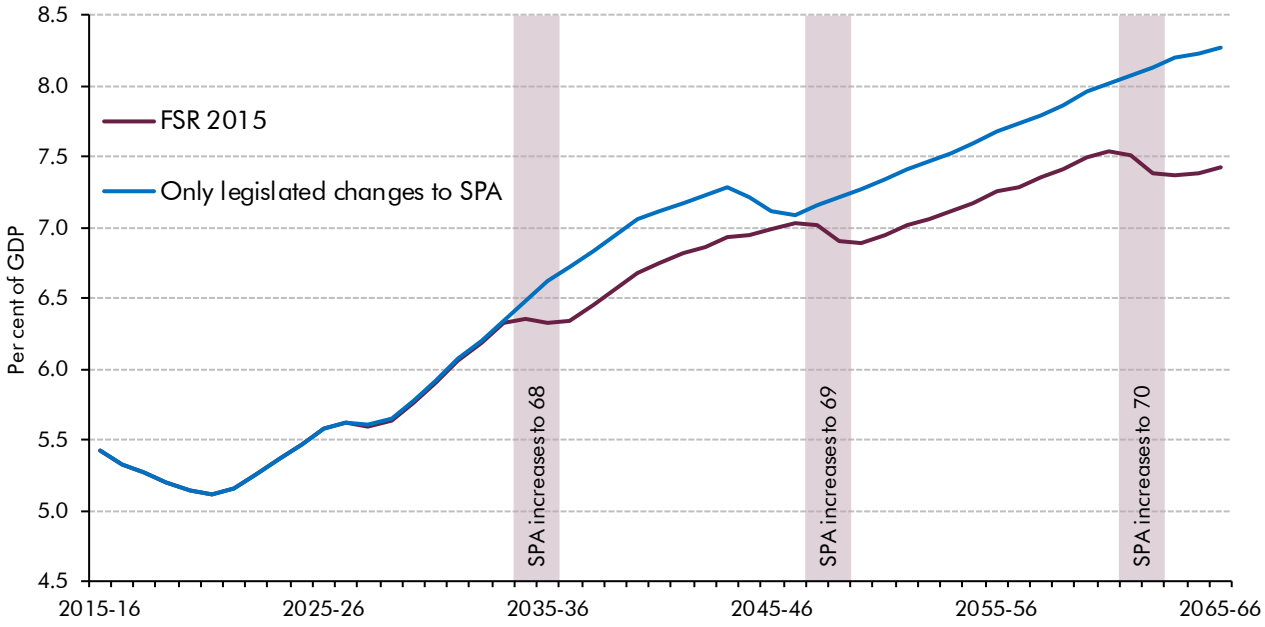
- last year's central projection, based on the ONS 2012-based population projections and our estimate of what those projections meant for the future SPA path (restated to take account of revisions to our medium-term GDP forecast). This shows that linking the SPA to life expectancy would bring forward the legislated rise to 68, reducing spending over the interim period. Implementing additional increases would further reduce spending as a share of GDP, as successive cohorts retire up to one year later following each rise; and

- last year's projection, based only on the legislated path for the SPA, absent the assumed increases due to the third-of-life principle. Comparing this with the central projection shows that raising the SPA in line with life expectancy was expected to reduce spending by 0.8 per cent of GDP by 2065-66.

4.4 The reduction in spending as a share of GDP not only reflects the lower cash pensions spending due to a relatively smaller pensioner population. We also assume that the

longevity link boosts GDP through higher employment rates (and therefore the respective denominators for the ratios shown in Chart 4.1). In our cohort model, we adjust participation rates for changes in the SPA set out in Table 3.1. Although most individuals will choose to exit the labour market either before or after they reach the SPA, exit rates do spike around that point. In order to capture the effect on participation rates of raising the SPA, we assume in effect that exit rates move with changes in the SPA, so that a 65-year old when the SPA is 66 has the equivalent exit rate to a 64-year old when the SPA is 65. We smooth this transition over earlier periods, as individuals would be expected to adapt their labour market participation choices over a longer period.

Chart 4.1: The impact of the longevity link on state pensions spending in the 2015 *FSR*



Source: OBR

The impact of the latest population projections

4.5 Moving to the 2014-based population projections means that our spending projections would be affected by the schedule of future cohorts reaching the SPA resulting from *their* life expectancy, as well as by the changes to mortality of the *existing* pensioner population. Chart 4.2 isolates the effect of the latest population projections and the associated change in the path of the SPA relative to last year's projections, stripping out the effect of other factors (e.g. updates to our medium-term forecast). The first five years of the projection are consistent with the forecast to 2020-21 that we published in our March 2016 *Economic and fiscal outlook (EFO)*, which was also based on the latest ONS population projections. Thereafter, the chart shows that:

- the latest population projections assume **higher mortality rates**, which reduces spending by 0.1 per cent of GDP in 2065-66. The cumulative impact of these savings would reduce public sector net debt by 3.0 per cent of GDP by the same date;

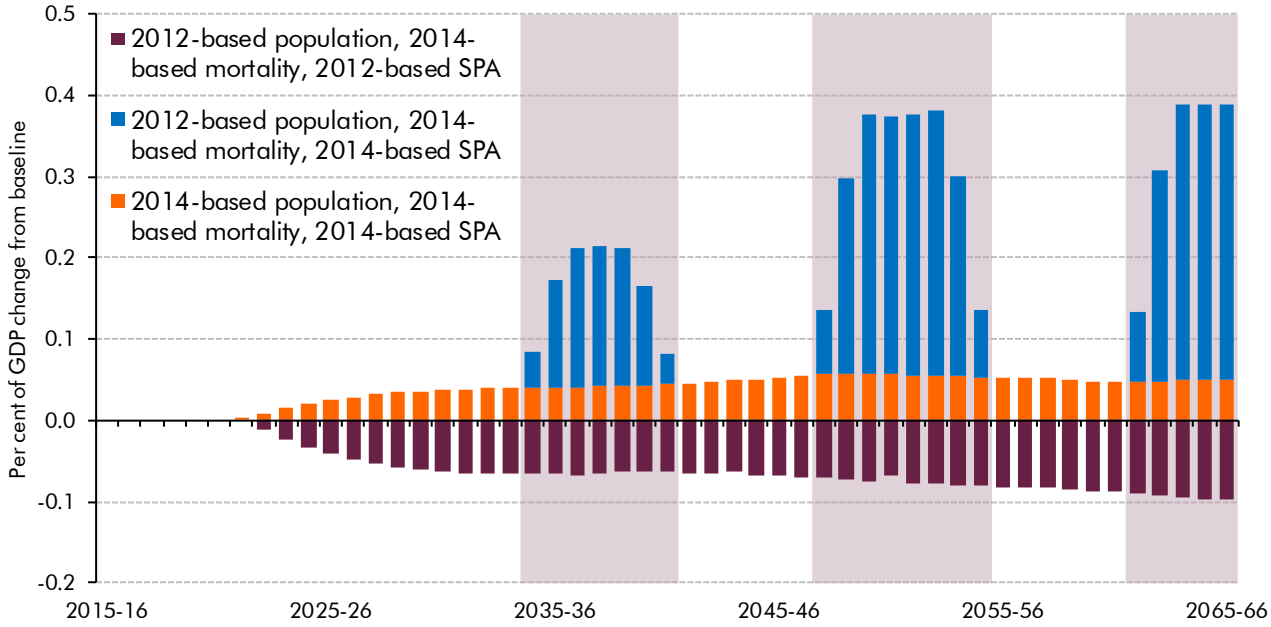
- **updating the SPA profile** to be consistent with the third-of-life principle and lower adult life expectancy (set out in Table 3.1) adds to spending in the years where the SPA is lower in our updated projection than it was in last year's *FSR*. That adds 0.3 per cent of GDP to spending in 2065-66 and 4.1 per cent of GDP to net debt; and

- adding in **other changes to the age structure of the population** increases spending slightly further as a share of GDP, because of a greater projected number of working-age people who gradually flow on to pensioner benefits. That partly offsets a reduction in pensioner population resulting from higher mortality, adding 0.05 per cent of GDP to spending in 2065-66 and 1.9 per cent of GDP to net debt.

4.6 This breakdown suggests – counterintuitively given the third-of-life principle – that the longevity link has increased spending by more than higher expected mortality has reduced it. But that reflects the 50-year horizon of our long-term projections. Over the very long term, the third-of-life principle means that around a third of the effect on spending of changes in expected mortality are offset by changes in the assumed path of SPA rises. These offsetting effects do not occur at the same time: changes in mortality rates affect the end of a state pension claim, while changes in the SPA path affect the start. That means our projections are affected less by the saving from higher expected mortality (much of which happen beyond our 50-year projection horizon) than by the higher spending from the longevity link moving future SPA changes back a few years (which are shown in the chart by the short periods of higher spending).

4.7 It is also the case that while changes in future mortality rates would affect all state pension recipients, the offsetting effect on spending via changes in the SPA path affects only those cohorts reaching the assumed SPA in specific years. For example, people reaching age 67 between 2034-35 and 2039-40 receive up to one more year of state pension at the start of their claim in these updated projections than in last year's *FSR*. As the chart shows, 18 out of the 46 cohorts in our updated projections reach the SPA earlier than in last year's *FSR*. Most of those cohorts would be expected to die beyond the 50-year horizon of these projections.

Chart 4.2: Changes to state pensions spending under different mortality and SPA assumptions, relative to 2012-based population, mortality and SPA profile



Source: OBR

5 Conclusion

5.1 In this paper we have described the latest ONS population projections and their implications for the projected changes to the State Pension age (SPA) and pensions spending. The UK, like many developed nations, is projected to have an 'ageing population', with the ratio of elderly to those of working age rising over time.

5.2 Under our interpretation of the longevity link on the SPA, the downward revision to life expectancy due to higher mortality rates in the new ONS projections would push back the profile of SPA rises so that people would reach the SPA earlier than assumed in our 2015 *FSR*. Over a 50-year horizon, counter-intuitively the longevity link would actually increase spending by more than higher expected mortality would reduce it. But, over the very long term, the third-of-life principle would have the effect one might assume, with around a third of the effect on spending of changes in expected mortality being offset by changes in the assumed path of SPA rises.