

Long-term public finance report: an analysis of fiscal sustainability

March 2008



HM TREASURY



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Correspondence and Enquiry Unit
HM Treasury
1 Horse Guards Road
London
SW1A 2HQ

Tel: 020 7270 4558

Fax: 020 7270 4861

E-mail: public.enquiries@hm-treasury.gov.uk

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OVERVIEW

INTRODUCTION

1.1 In 2002 the Government launched the Long-term public finance report to provide comprehensive analysis of long-term demographic developments, and their likely impact on the public finances. The Government published the Long-term public finance report on an annual basis alongside the Pre-Budget Report between 2002 and 2006. In 2007 key population projections were due to be released by the Office for National Statistics (ONS) after the date of the Pre-Budget Report. Therefore this *Long-term public finance report* is published alongside Budget 2008, and brings together the analysis previously presented separately in the Long-term public finance report and in Annex A of the Economic and Fiscal Strategy Report (EFSR) of the Budget.¹

Motivation for the Report

1.2 The Long-term public finance report provides leading edge analysis on the long term. It assesses the potential impact of future trends on the public finances over the coming decades. This information assists the Government in managing the public finances in the long-term interests of the UK, as set out in the *Code for Fiscal Stability*.²

Long-term challenges and opportunities

1.3 Decisions and policies formulated by the Government now shape the policy environment that future generations will inherit. However, as discussed in the Stern Review: "...assessing impacts over a very long time period emphasises the problem that future generations are not fully represented in current discussion."³ The Government therefore takes a long-term view regarding policy decisions, including those that have shaped the outcome of the 2007 Comprehensive Spending Review (CSR). The main long-term challenges facing the UK were identified as:

- demographic and socio-economic change, with rapid increases in the old-age dependency ratio;
- increasing pressures on natural resources and the global climate, requiring action by governments, businesses and individuals to maintain prosperity and improvement in environmental care;
- the intensification of cross-border economic competition, and the rapid pace of innovation and technological diffusion, with new opportunities for growth, as the balance of international economic activity shifts towards emerging markets such as China and India; and
- continued global uncertainty arising from global market instability, and ongoing threats from international terrorism and conflict, and the continued imperative to tackle global poverty.

1.4 This analysis is updated in *The UK economy: analysis of long-term performance and strategic challenges* published alongside Budget 2008.⁴ The Strategy Unit in the Cabinet Office has also analysed the future strategic challenges facing the UK.⁵

¹ Annex A of the Economic and Fiscal Strategy Report, in *Budget 2007: Building Britain's long-term future: Prosperity and fairness for families*, HM Treasury, March 2007.

² *Code for Fiscal Stability*, HM Treasury, March 1998.

³ *Stern Review on the economics of climate change*, Sir Nicholas Stern, October 2006, Chapter 2, page 31.

⁴ *The UK economy: analysis of long-term performance and strategic challenges*, HM Treasury, March 2008.

⁵ http://www.cabinetoffice.gov.uk/strategy/work_areas/strategic_challenges0208.aspx.

Focus on demographic change and public finances **1.5** The trends identified in the 2007 CSR and the strategic challenges analysis are likely to have profound effects both on Britain's society and economy over the coming decades. The trends are also likely to affect the public finances in the long term, with some of them likely to put upward pressure on spending needs, while others might dampen spending pressures. The picture is similar on the revenue side. As in previous Long-term public finance reports, this year's Report focuses only on the potential impact of demographic change on the public finances over the coming decades. Future reports might widen the coverage of analysis to include other long-term trends as well.

Uncertainty of projections **1.6** It is of course very challenging to assess the impact of current policies over a long-term horizon of up to 50 years. Even short- and medium-term impacts over one to five years are highly uncertain; as the timeframe lengthens the uncertainty increases. On 23 October 2007 the ONS published the latest set of official population projections for the United Kingdom.⁶ The projections are a key input for the analysis presented in this Report and it is therefore important to note the uncertainties inherent in them. For example, it is extremely difficult to predict future trends in fertility rates or migration flows, as they have fluctuated immensely in the past decades and are likely to continue to fluctuate in the future. However, some trends are more certain than others, such as the increased number of people who will retire over the next 30 years.

THE UK FISCAL FRAMEWORK

1.7 The UK's fiscal framework is central to achieving the Government's objective of high and stable long-term economic growth. The framework facilitates transparent, long-term decision-making in both the public and private sectors. The fiscal framework is guided by the *Code for Fiscal Stability*, which sets out a commitment to managing the public finances in the long-term interests of Britain. The five key principles of the *Code* – transparency, stability, responsibility, fairness and efficiency – also support a long-term focus in the policy-making process.

Objectives for fiscal policy **1.8** Fiscal policy is set with consideration for the short, medium and long terms. The *Code* requires the Government to state its objectives and the fiscal rules by which fiscal policy is operated. The Government's objectives for fiscal policy are:

- over the medium term, to ensure sound public finances and that spending and taxation impact fairly both within and between generations; and
- over the short term, to support monetary policy and, in particular, to allow the automatic stabilisers to help smooth the path of the economy.

1.9 In the long run, fiscal policy supports the Government's long-term goals by ensuring that the public finances are sustainable, contributing to a stable environment that promotes economic growth. This environment is important for achieving the Government's objective of building a stronger, more enterprising economy and a fairer society, extending economic opportunity and supporting those most in need to ensure that rising national prosperity is shared by all.

Fiscal rules **1.10** The Government has formulated two fiscal rules through which the objectives for fiscal policy are implemented, which also reflect the commitments to fiscal sustainability and generational fairness. They are:

⁶ <http://www.statistics.gov.uk/statbase/Product.asp?vlnk=8519>.

- the **golden rule**: over the economic cycle, the Government will borrow only to invest and not to fund current spending; and
- the **sustainable investment rule**: public sector net debt as a proportion of GDP will be held over the economic cycle at a stable and prudent level. Other things being equal, net debt will be maintained below 40 per cent of GDP over the economic cycle.

1.11 The golden rule specifies that current spending should be financed by current taxes over the economic cycle, thus ensuring generational fairness and fiscal sustainability. In addition, the sustainable investment rule ensures debt sustainability and also supports generational fairness by limiting the scope for the current generation to leave excessive debt burdens to future generations.

STRUCTURE AND KEY FINDINGS

Long-term demographic trends

1.12 Population projections are central to the analysis presented in this Report. Chapter 2 presents the latest official population projections, published by the ONS in October 2007, and discusses how the ONS derive the assumptions underlying these projections. Given the inherent uncertainties of population projections, Chapter 2 presents the ONS' principal population projections and a selection of variant projections, and explains that an assessment of long-term fiscal sustainability should include sensitivity analysis around key population assumptions.

Complementary approaches

1.13 Chapter 3 discusses the approaches used to assess in a comprehensive and rigorous way the sustainability of the public finances over the long term. In addition to presenting backward-looking indicators such as net debt, this Report uses two other distinct but complementary approaches to assess long-term fiscal sustainability:

- in line with previous Long-term public finance reports, the first approach generates 'bottom-up' projections, which capture the potential effect of demographic change on spending and revenue over the coming decades. Based on the bottom-up projections, the Report calculates a number of forward-looking fiscal indicators that take account of initial levels of debt. These shed further light on the potential fiscal challenges arising from demographic change over the coming decades; and
- the 'top-down' fiscal projections are based on the assumption that the Government's two fiscal rules will be met over the next 30 years. As such the top-down projections give some indication what resources might be available in the long term to deal with the fiscal consequences arising from an ageing population. Until 2007, these illustrative top-down fiscal projections were published in Annex A of the EFSR.

1.14 Chapter 3 also presents the assumptions used to generate the long-term fiscal projections. For example, projecting future GDP growth requires assumptions about future labour-market trends and productivity growth. Chapter 3 presents updated employment projections, using the latest population projections and the 'cohort' method developed in previous reports. Chapter 3 also describes the methodology used to project future spending and revenue trends.

Updated projections and assessment of sustainability

1.15 Based on the approaches and assumptions set out in Chapter 3, Chapter 4 analyses how long-term demographic change might affect Government spending and revenue, and its long-term fiscal position over the coming decades. A comprehensive assessment shows that the UK is equipped to deal with the fiscal challenges arising from

demographic change over the coming decades. The Government will continue to be in a position to meet its fiscal rules in the long term, ensuring that the long-term public finances remain sustainable. The UK is therefore well placed to deal with the potential fiscal impacts arising from other long-term trends. Sensitivity analysis indicates that these findings are robust to changes in assumptions, including in the underlying population assumptions.

2

LONG-TERM SOCIO-ECONOMIC TRENDS

INTRODUCTION

2.1 As with previous Long-term public finance reports, the focus of this Report is on demographic change and how this might affect the sustainability of the public finances over the long term. The long-term demographic trends presented in this chapter are based on the latest 2006-based Office for National Statistics (ONS) population projections.

Variant population projections

2.2 The population projections are subject to substantial uncertainty, and are highly sensitive to the underlying assumptions used. The ONS therefore publish principal (central) population projections as well as an extensive set of variant projections. The assumptions for the variant population projections provide an illustration of the potential range of uncertainty surrounding future trends of net migration (the difference between inflow and outflow of people and other adjustments), fertility rates (the number of children per woman) and life expectancy.¹ Table 2.1 shows the assumptions used by the ONS for the principal and the following four variant population projections:²

- low population (low fertility rate, low migration and low life expectancy);
- low life expectancy (principal fertility rate, principal migration and low life expectancy);
- old (low fertility rate, low migration and high life expectancy); and
- low migration (principal fertility rate, principal life expectancy and low migration).

Table 2.1: Assumptions for principal and selected variant population projections

| | Assumptions | | | | |
|--|-------------|----------------|---------------------|---------|---------------|
| | Principal | Low population | Low life expectancy | Old | Low migration |
| Fertility rate ¹ | 1.84 | 1.64 | 1.84 | 1.64 | 1.84 |
| Life expectancy at birth (years) in 2031 | | | | | |
| Males | 82.7 | 80.7 | 80.7 | 84.7 | 82.7 |
| Females | 86.2 | 84.9 | 84.9 | 87.5 | 86.2 |
| Long-term average annual net migration | 190,000 | 130,000 | 190,000 | 130,000 | 130,000 |

¹Long-term average number of children per woman

Source: Office for National Statistics, 2006-based national population projections

¹ See UK population set to increase to 65 million over the next ten years, News Release, Office for National Statistics, October 2007, page 2.

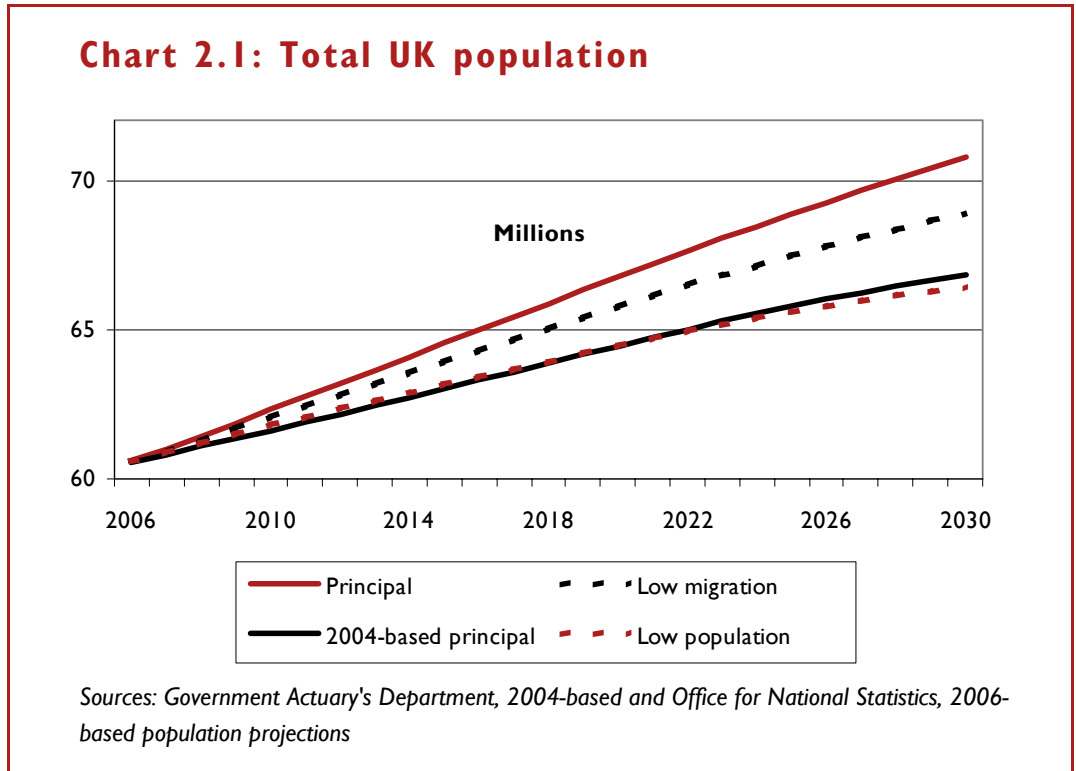
² ONS produces a range of high and low population variants, the full list can be found at http://www.gad.gov.uk/Demography_Data/Population/2006/methodology/varlist.asp.

Selection of variants **2.3** The focus of this Report is on the effect that demographic change might have on the long-term public finances. The variants listed above were selected as they illustrate both favourable as well as more challenging population structures from a public finances point of view. This provides a symmetric sensitivity analysis of the effect of demographic change on the long-term sustainability of the public finances, which is necessary given the uncertainty surrounding the population projections. For illustrative purposes, this chapter also discusses the natural change and high life expectancy variants, which are respectively based on the assumption that net migration will be zero in the future and that life expectancy will be higher than in the principal variant. However, the natural change and high life expectancy variants are not used in the sensitivity analysis of the effect of demographic change on the long-term sustainability of the public finances.

2.4 Both migration and fertility have fluctuated significantly in the past. Of particular interest are therefore the ‘low migration’ and ‘low population’ variants as these are based on assumptions that are closer in line with averages over the last decade and as such offer useful alternative illustrations of the long-term.

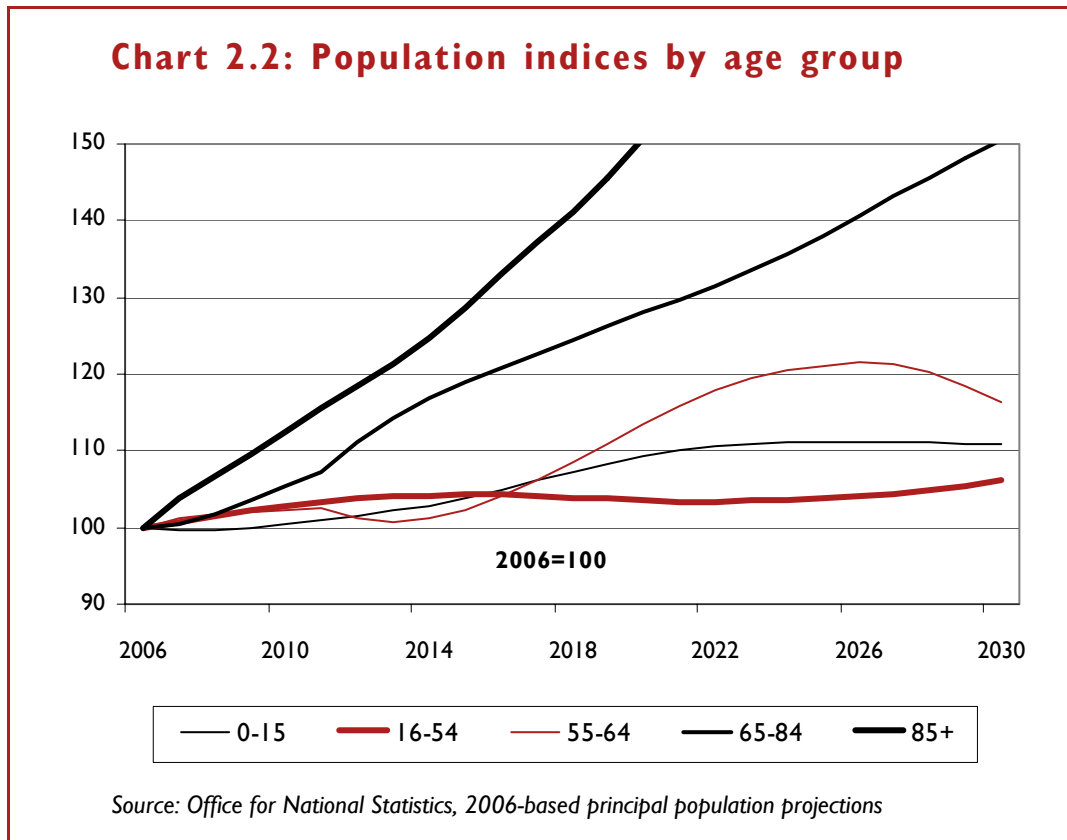
THE CHANGING SIZE AND STRUCTURE OF THE UK POPULATION

Total population projected to increase **2.5** The 2006-based ONS principal population projections show that the UK’s population will increase from 60.6 million in 2006 to close to 67 million by 2020, over 70 million by 2030 and to around 78 million by 2055. Chart 2.1 shows the projected evolution of the total population size in selected population variants up to 2030. The chart shows that the total population size is projected to increase by less in the low migration variant, and by the least in the low population variant. This remains true for later decades. In comparison with the previous (2004-based) population projections, the 2006-based principal population projections are significantly higher as result of increases in the migration, fertility and life expectancy assumptions. A more detailed comparison of the 2004-based and 2006-based projections can be found later on in this chapter.



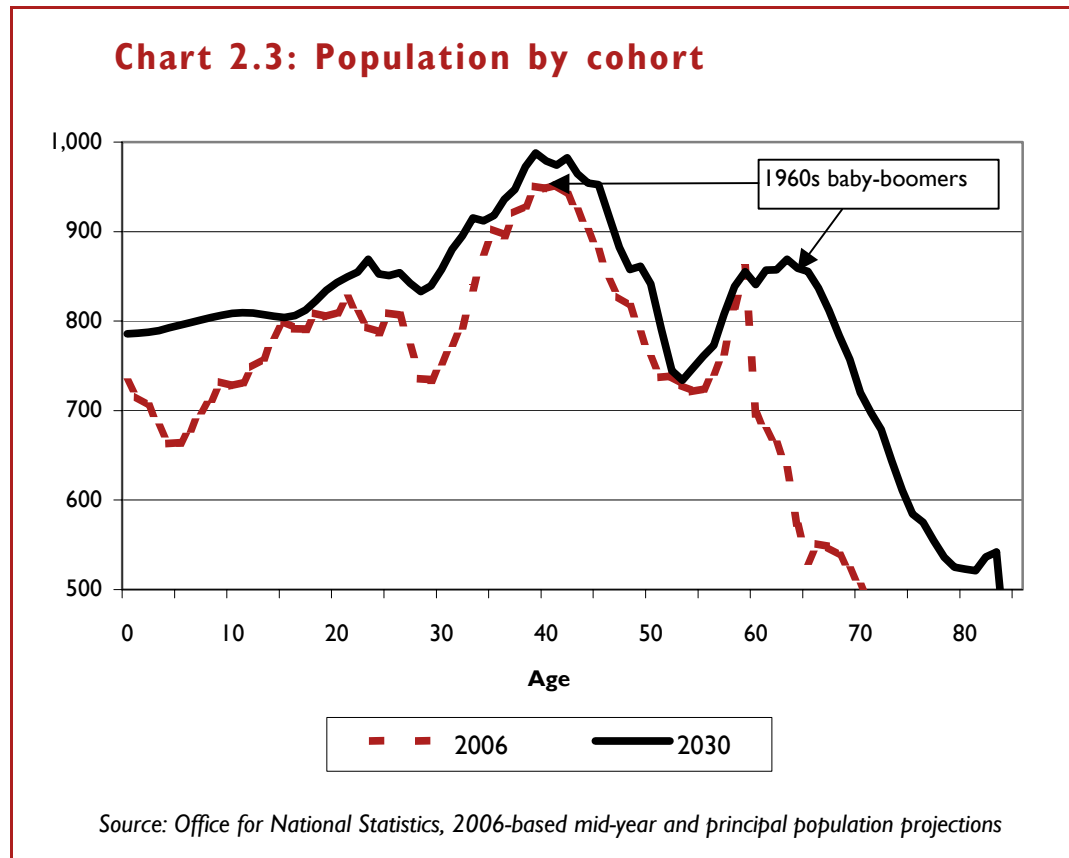
Age structure of the population

2.6 In addition to the projected rise in the number of people living in the UK, the ONS principal projections also show a marked change in the age composition of the population over the long term, with the share of older people in the total population rising gradually. Over the coming decades there are projected to be wide variations between the growth rates of different age groups. Chart 2.2 shows that the younger working-age population is projected to remain relatively stable over the period up to 2030. The number of children is set to increase gradually by around 10 per cent while the 55-64 year olds show a rise of around 20 per cent over the same period. This contrasts with large projected increases for the older age-groups: the 65-84 year olds will have grown by over 50 per cent, and the 85+ group will have grown by around 50 per cent by 2020 and more than doubled (not shown in the chart) by the 2030s. It should be noted that this group is relatively small to begin with and the rapid growth of this cohort should be interpreted within that context.



‘Baby boomers’

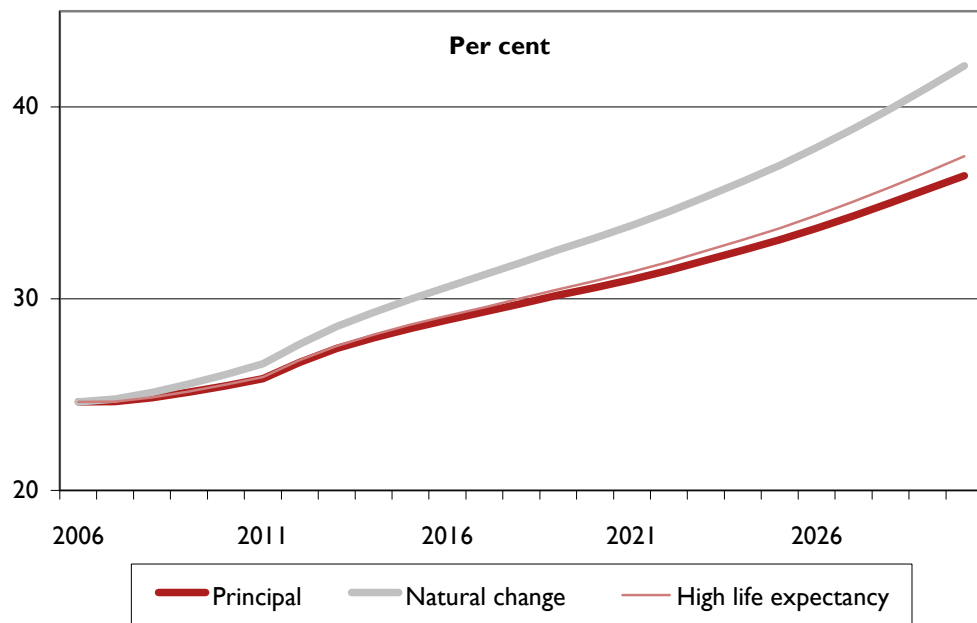
2.7 The changing age structure of the population is partly due to the ageing of the ‘baby-boom’ cohorts. Chart 2.3 shows the actual age distribution of the UK’s population in 2006 and the projected distribution for 2030. The two most prominent features of the 2006 distribution are the spike around the 60-year age group and the much larger hump around the 40-year age group. The former represents the immediate post-war baby boom, the latter the more sustained and pronounced second baby boom of the 1960s. Females of the immediate post-war baby boom are now leaving the labour force and entering State Pension age, with males following within the next few years. The cohorts of the second baby boom are currently at their prime in the labour market but will reach State Pension age in the late 2020s and early 2030s. This is demonstrated clearly by the projected population distribution for 2030, which shows the second baby boom hump reaching State Pension age 20 years on.



2.8 The second important feature of the 2030 distribution as shown in Chart 2.3 is the large hump between the mid 30s to late 40s age group, which is projected to develop as a result of assumed net migration. Over time this ‘migration hump’ will develop differently to the baby boom humps. The hump will shift to the right as the initial cohorts of immigrants age, but it will also broaden as the projections are based on the assumption that younger immigrants will continually enter the country.

Old-age dependency ratio **2.9** The changing age structure of the population will affect the evolution of the demographic old-age dependency ratio (defined here as the number of people aged 65 years and over relative to the number of people aged 16 to 64 years). Between the early 1970s and the mid 1990s the ratio edged up only slightly – reaching around 25 per cent. The 2006-based principal population projections show an increase of around 6 percentage points by 2020 and around 20 percentage points by the mid 2050s.

2.10 Chart 2.4 presents the projected evolution of the dependency ratio in the principal and two specific population variants: natural change and high life expectancy. The natural change variant is based on the assumption that there will be zero migration in the future. This enables an identification of the impact of the fertility and life expectancy assumptions on the ageing of the population in the absence of migration. The high life expectancy variant is based on the assumption that life expectancy will increase by more over the coming decades than assumed in the principal projections. The fertility rate and migration assumptions remain unchanged though.

Chart 2.4: Demographic old-age dependency ratios

Source: Office for National Statistics, 2006-based population projections

2.11 Chart 2.4 shows that projections of the dependency ratio are highly dependent on the underlying demographic assumptions used. In the natural change variant the dependency ratio is projected to increase by just under 15 percentage points by the mid 2020s. Under the assumptions used in the natural change variant the rapid growth in the dependency ratio would occur due to a significant increase in the number of people aged 65 years and over caused by the ageing of the baby boomers, and a marginal decline in the number of people of working age. Comparing the projected evolution of the dependency ratio in the natural change and principal variants shows that the dependency ratio is projected to be over 2 percentage points higher in the natural change variant by 2020. This gap is projected to increase to over 6 percentage points by 2030 and over 10 percentage points by 2056. This demonstrates that the population would age significantly more rapidly in the absence of migration over these time horizons. The chart also shows that the effect of the high life expectancy assumption on the old-age dependency ratio is less marked.³

Ageing: a global phenomenon

2.12 The UK is not the only country with an ageing population; indeed an ageing population is a trend seen in most developed countries. For example, Spain, Japan and Italy are projected to experience the most marked population ageing over the coming decades, with the United Nations projecting the old-age dependency ratios to increase by between 35 and 45 percentage points in these countries between 2005 and 2050. Ageing will be less marked but still significant in Germany (increasing by 27 percentage points). At the lower end of the spectrum are countries such as the US and Sweden, where the increase is projected to be only around 15 percentage points. With an

³ For more information on the natural change variant see: http://www.gad.gov.uk/Demography_Data/Population/2006/.

increase of less than 20 percentage points, the UK is therefore projected to experience relatively moderate population ageing.⁴

Despite uncertainty, some trends emerge

2.13 The discussion above – and the figures presented – illustrates the high degree of uncertainty surrounding the population projections. However, the variant population projections suggest that at least the direction (if not the magnitude) of many future trends should be seen as unambiguous: over the coming decades the UK population is most likely to increase in size, the population will age (as measured using a number of indicators) and the baby-boom generation will reach State Pension age. Net migration is most likely to remain positive over the coming years, though it is far more difficult to predict long-term migration trends. By contrast, the recent increase in the number of children will with certainty have a marked effect on the number of children of schooling age until at least 2020 though how this will develop over the longer term is again much more uncertain due to potential fluctuations in the fertility rate.

Comparison with previous projections

2.14 As shown in Table 2.2 the latest set of population projections differs significantly from the 2004-based population projections, which were used for the 2006 *Long-term public finance report*. The 2004-based principal population projections, for example, assumed period life expectancy at birth for a male in 2031 to be 81.4 years. For the purposes of the 2006-based projections, this assumption has been revised upwards to 82.7 years.⁵ Similarly, the net migration assumption was revised upwards, by 45,000 persons, as was the fertility rate assumption. Table 2.2 summarises the underlying assumptions for the 2004-based and 2006-based principal population projections.

Table 2.2: Assumptions for the 2004- and 2006-based principal population projections

| | Assumptions | |
|--|-------------|------------|
| | 2004-based | 2006-based |
| Fertility rate ¹ | 1.74 | 1.84 |
| Life expectancy at birth (years) in 2031 | | |
| Males | 81.4 | 82.7 |
| Females | 85 | 86.2 |
| Long-term average annual net migration | 145,000 | 190,000 |

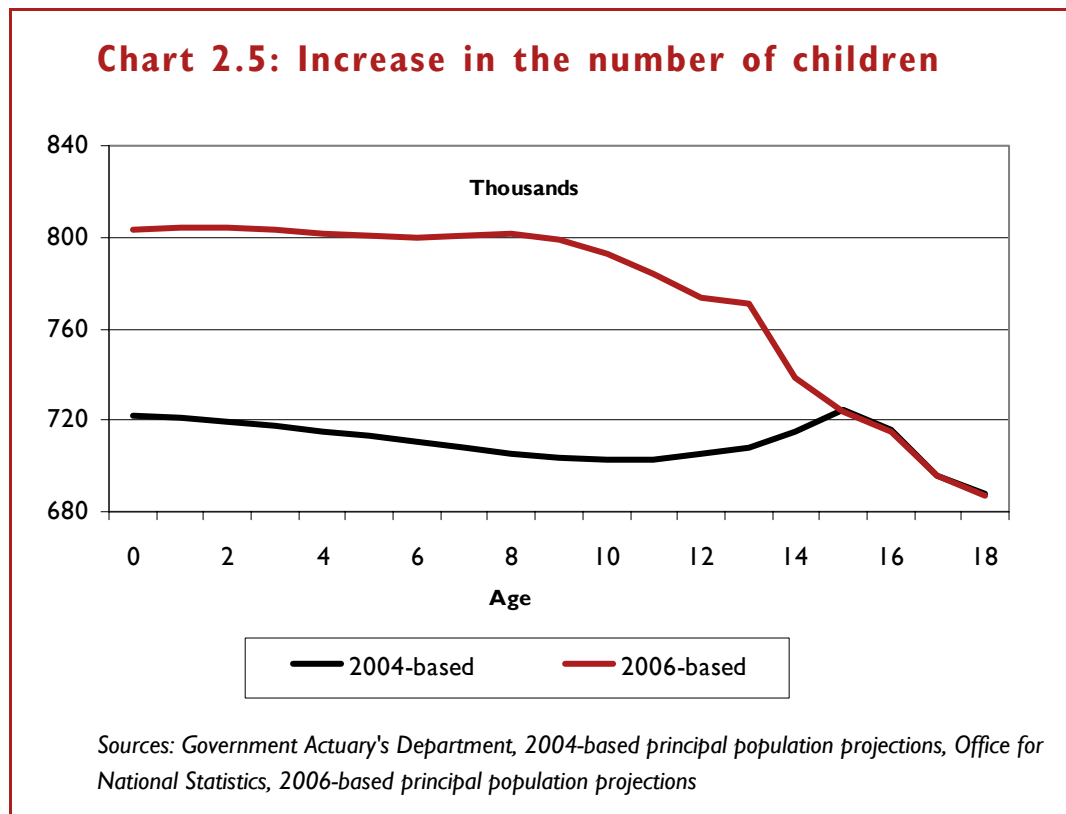
¹ Long-term average number of children per woman

Sources: Government Actuary's Department, 2004-based principal population projections, Office for National Statistics, 2006-based principal population projections

⁴ World Population Prospects: *The 2006 Revision*, United Nations, 2007 at www.un.org/esa/population/publications/wpp2006/wpp2006.htm. The United Nations population projections are not the only population projections produced by an international body. Eurostat also publishes population projections for the UK and other EU Member States and will produce a new set of projections later in 2008. See epp.eurostat.ec.europa.eu/ for previous projections.

⁵ 'Period' life expectancies for 2031 are based on the mortality rates assumed for that year and do not take account of the continuing improvement in mortality projected beyond 2031. 'Cohort' life expectancies, allowing for the assumed further mortality improvement, are also available.

2.15 As shown in Chart 2.1, an important implication of the new assumptions is that the UK population is projected to grow significantly more rapidly in the 2006-based projections than in the 2004-based projections. This is primarily due to the increased migration and fertility rate assumptions. In addition to increasing the size, the new assumptions also have important implications for the projected structure of the UK population over the coming decades. One new development is a large increase in the number of children in the 2006-based projections. This occurs because of the increase in the fertility rate assumption and the increase in the number of females of childbearing age. Chart 2.5 shows the projected population by age for younger cohorts in 2020 for both the 2004-based and 2006-based population projections, demonstrating the increase in the number of children.



THE LONG TERM AND UNCERTAINTY

Assumptions and uncertainty

2.16 There are many reasons why it is very challenging to model future trends in fertility, net migration and life expectancy with any certainty. As result of significant socio-economic changes and medical advances, the fertility rate, for example, dropped sharply between the mid 1960s and the late 1970s. After a relatively stable period, it fell further during the 1990s but has since started to increase again. As there are many factors contributing to the levels of fertility it is difficult to explain this reversal and even more difficult to predict how fertility rates will develop in future. Equally, there is substantial uncertainty regarding the future evolution of life expectancy, with some scientists believing that absolute life expectancy is limited, while others support the view that, at least in principle, there should be no upper limit to life expectancy.⁶ Based on emerging evidence, the Government Actuary's Department over the years increased its life expectancy assumption and the latest ONS upward revision goes in the same

⁶ See 2003 Long-term public finance report: fiscal sustainability with an ageing population, HM Treasury, December 2003, page 7.

direction. However, it is difficult to predict whether this trend will continue in the future and if indeed it does, at what rate. It has been suggested that lifestyle changes in the developed world, including the increase in obesity recorded over the last few decades, might lead to a decline in life expectancy in the future.⁷ Box 2.1 below provides more information on how the ONS derived the long-term assumptions.

Box 2.1: The long-term assumptions for the 2006-based population projections

The population projections are highly sensitive to the underlying assumptions used, so it is important to understand fully how the assumptions are derived.

For the United Kingdom as a whole, completed family size has been falling steadily from an average of around 2.45 children for women born in the mid 1930s. Women born in 1960 had an average of 1.98 children per woman. The fertility rates of women currently in their 20s or younger are highly conjectural, but there is evidence that falls in cohort fertility are slowing down. For the principal projections the ONS assume that average completed family size for the United Kingdom as a whole will remain below two children and eventually level off at 1.84 children for women born after 1990.

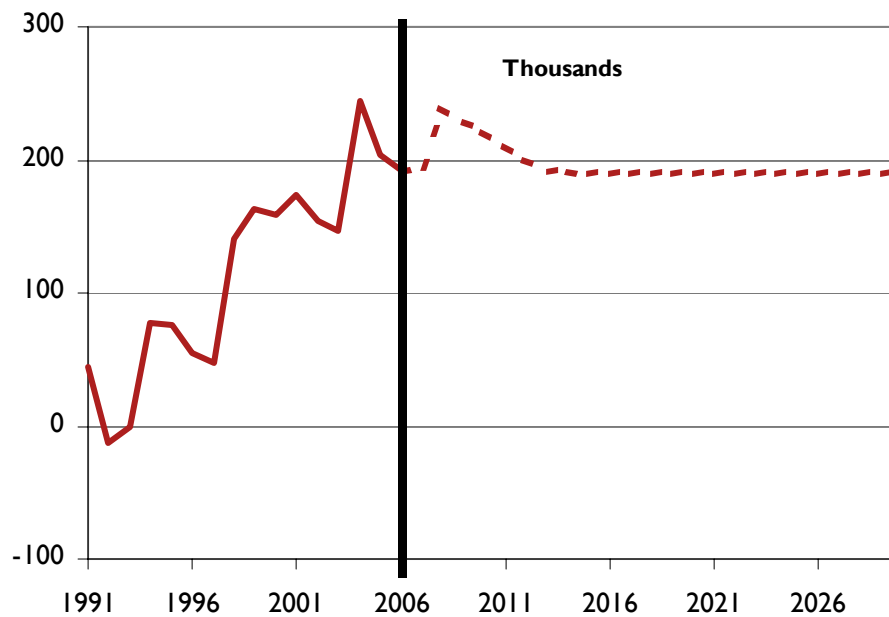
Assumed improvements in mortality rates after 2006-07 are based on past trends. Current improvements in mortality vary considerably by age. However, over the 40-year period 1965-2005, the average annualised rate of improvement in mortality rates in the UK has been nearly 1.6 per cent for males and 1.2 per cent for females. This compares to the average annual rate of improvement over the whole of the 20th century, which was around 1 per cent for both males and females. There is considerable debate as to whether the impact of future technical, medical and environmental changes will have a greater or lesser effect on improvements in mortality in the future than they had over the 20th century. The ONS assume that annual rates of improvement will converge to a rate of 1 per cent for most ages by 2031; in other words equivalent to the average rate of improvement over the whole of the 20th century.

The new long-term assumption for annual net migration to the United Kingdom is 190,000 compared with 145,000 in the previous projections. Most of the increase can be explained by the increase in the International Passenger Survey (IPS) component of the migration assumption, which increased from 145,000 in the 2004-based assumptions to 170,000. The increase to the IPS component is due to taking account of data for two new years (2004 and 2005) where net migration to the UK was at record levels. There is also a significant net increase in the number of short-term migrants, which increased by 20,000 in the 2006-based assumptions. This adjustment results from a methodological change following improvements to the estimation of international migration, announced by ONS in April 2007.^a

^a <http://www.statistics.gov.uk/statbase/Product.asp?vlnk=14834>;
http://www.gad.gov.uk/Demography_Data/Population/2006/.

2.17 Predicting future net migration flows is especially difficult as many factors are impacting on the decisions of potential future migrants, such as political and economic circumstances back home relative to those in potential destination countries. The strength of push and pull factors has varied over time. This is demonstrated by Chart 2.6, which shows the actual levels of net migration to the UK since 1991 compared to the new ONS projections. The chart shows a significant degree of fluctuation in net migration levels in recent times; as recently as 1993 there was a net outflow of people from the UK.

⁷ See <http://www.dh.gov.uk/en/Policyandguidance/Healthandsocialcaretopics/Obesity/index.htm>.

Chart 2.6: Actual and projected net migration

Sources: Office for National Statistics, Total international migration tables and 2006-based population projections

Projections not forecasts

2.18 The discussion in this section highlights the extent to which the assumptions have varied in the past – highlighting the uncertainty that exists when attempting to model future trends. The ONS population projections should therefore not be interpreted as forecasts of what is necessarily likely to happen over the coming years and decades but instead as an indication of what would happen if the assumptions turned out to be valid.⁸ Box 2.2 below provides more information on the Government's efforts to better understand the drivers of socio-economic change given the uncertainties surrounding the assumptions used in the projections.

⁸ HM Treasury will continue to use the medium-term net migration projection set out in *Trend growth: new evidence and prospects*, published alongside the 2006 Pre-Budget Report. This projection is a little lower than the ONS medium-term net migration projection, but in line with the ONS' long-term assumption of 190,000 per annum. The latest data on migration and population growth are consistent with this projection.

Box 2.2: Understanding the socio-economic drivers of population change

A deeper understanding of the broader range of socio-economic explanations for the observed changes in fertility rates, increases in life expectancy and recent trends in net migration is likely to complement the analysis provided in the report, given the uncertainties surrounding the assumptions.

For example, it is known that fertility rates vary substantially within the female population, for example by age and socio-economic status. Fertility rates for women aged 30 years and over have been increasing over the recent past, while for the most part the rate for those in their 20s has been declining. Changing attitudes to family size, delayed entry into marriage or cohabitation, and increased female participation in education and the labour market are some of the factors that influence fertility rates.

The structure of households and behaviour (e.g. consumption, mobility and working patterns) will also affect the role of Government in the future and the public finances in the long term. For example, the population of households, as opposed to individuals, in the UK has recently increased substantially. This change is largely driven by increases in the number of single person households, which in turn is influenced by changes in family formation, and an ageing population.

To get a better handle on these and other relevant issues, HM Treasury is working with researchers and analysts across government and in the external research community to ensure the best emerging thinking in the social sciences is brought together in understanding the underlying trends and their likely impact on public finances.^a

^a For further information see <http://www.esrcocietytoday.ac.uk/ESRCinfoCentre/index.aspx>.

3

ASSUMPTIONS AND APPROACHES TO ASSESSING LONG-TERM FISCAL SUSTAINABILITY

ASSESSING LONG-TERM FISCAL SUSTAINABILITY

Defining long-term fiscal sustainability

3.1 Any assessment of long-term fiscal sustainability will have to be made against a benchmark. There are many possible ways to think about long-term fiscal sustainability and as a result there are also many definitions. For example, an assessment of sustainability could be based on the idea that a government should be able to meet its obligations if and when they arise in the future. In that particular case sustainability will therefore also depend on a government's future revenue (with which it might be able to meet its obligations) and the timing of the future obligations. Alternatively, long-term fiscal sustainability could be interpreted as meaning that a government can impose the fiscal constraints it would like to impose. What matters for the Government is that it will be able to meet its two fiscal rules, which are set out in Chapter 1, over the longer term. An assessment of long-term fiscal sustainability should therefore also answer directly whether the Government will be able to meet its two fiscal rules over the long term.

Approaches

3.2 This Report gives a wide-ranging assessment of long-term fiscal sustainability by bringing together three different approaches for doing so. These are:

- **backward-looking indicators**, including the national accounts measure of public sector net debt, which is used by the Government, and Generally Accepted Accounting Principles (GAAP) -based balance sheets, which will be prepared as part of Whole of Government Accounts (WGA);
- **bottom-up forward-looking analysis based on comprehensive projections** of how future spending and revenue might evolve without any constraints; and
- **top-down constrained analysis** of public finances within the framework of the Government's fiscal rules.

3.3 These different approaches have their respective advantages and disadvantages, which are discussed in more detail below. Box 3.1 discusses some of the issues relating to fiscal sustainability and inter-generational fairness.

Box 3.1: Fiscal sustainability and inter-generational fairness

As this chapter sets out, there are a number of ways to assess the long-term sustainability of the public finances. However, attaining fiscal sustainability does not necessarily imply that the outcome is also “inter-generationally fair”. As with the concept of long-term fiscal sustainability, there is no unique definition of what “inter-generationally fair” means. For example, inter-generational fairness could be defined as meaning that all generations pay the same net transfer to government (in other words the difference between what they receive from government in terms of health care, state pensions or transfer payments and what they pay in terms of taxation) as a share of their incomes. However, as societies become richer, it could also be argued that future generations should pay larger net transfers as what was left to individuals will still be larger in absolute terms than what will be left to preceding generations.

To illustrate, consider the case of the 1960s baby boom generation, which is larger than its direct predecessor and successor. The ageing of this generation will most likely lead to an increase in spending on older people in the coming decades. One way to maintain sustainable public finances in the light of this pressure on spending would be to increase tax revenues from future workers. Using the above interpretations of inter-generational fairness, it could be argued, on the one hand, that this would not be fair and that the baby boomers should contribute financially to the increased future spending they will cause (for example by reducing debt now). On the other hand, if fairness implies that tax burdens should be proportionate to the ability to pay, then one could also argue that a larger tax burden should be imposed on future workers to cover the increased spending. This is because, even after tax, future workers are likely to be richer than today’s workers (as result of productivity growth) and their ability to pay will therefore be greater than that of existing workers.

Backward-looking indicators**National accounts measure of net debt**

3.4 Measures of public debt have often been the prime focus when analysing the sustainability of the public finances. Debt (less liquid financial assets) is the cumulative outcome measure of past borrowing, and as such provides a measure of obligations created in the past that have been accumulated to date. An advantage of using debt is that the national accounts approach, which underpins measures of debt, is based on internationally agreed rules, allowing the public finances in one country to be compared with those in other countries.¹ Furthermore, debt can easily be understood and interpreted as a concept, helping to improve transparency.

3.5 However, debt is a backward-looking indicator and as such is not designed fully to answer the question of whether a government will be able to meet its obligations if and when they arise in the future. Equally, information on the stock of debt today cannot answer the question of whether the Government will be able to meet its two fiscal rules over the long term. In addition, while the national accounts approach is based on internationally agreed rules, what is covered by debt is not. For example, debt could be measured on gross or net bases and could cover the general government (in other words central and local governments) or the public sector, which also covers public corporations.

¹ For more information on the concept of national accounts see <http://www.statistics.gov.uk/CCI/nugget.asp?ID=55>.

GAAP-based balance sheets 3.6 GAAP-based accounts look at past transactions and the extent to which these have already committed future funding flows. They therefore provide a fuller picture of the Government's position than a simple cash statement, by including all of the Government's assets and liabilities. One of the balance sheet's advantages is that it will show a wider range of assets and liabilities than net debt, including financial and non-financial assets and liabilities as well as provisions for future cash transfers arising from past transactions. However, as with debt, GAAP-based balance sheets are mainly backward looking. For example, they do not include future spending and revenue that will occur as a result of future changes to circumstances or decisions, which limits the balance sheet's use in assessing long-term fiscal sustainability.

'Bottom-up' analysis of comprehensive projections

3.7 Indicators based on comprehensive projections will generally take account of existing liabilities (for example debt) but also include information about future spending and revenue streams. As such they can provide an answer to the question of whether government will be able to meet its obligations if and when they arise in the future. The main limitation is that projecting into the future is inevitably subject to a high degree of uncertainty, making sensitivity analysis and careful interpretation of the results important.

Bottom-up projections 3.8 The bottom-up approach projects the path of individual spending and revenue items, either in absolute terms or as a share of GDP, into the future, without any constraints on the fiscal aggregates. Bottom-up projections can take into account a wide range of factors including demographic developments, cost and demand drivers, and investment requirements. An advantage of bottom-up projections is that they allow the individual drivers of each spending and revenue item to be examined in more detail. However, by looking at taxation and spending items in isolation from the rest of a government's fiscal policy decisions, the bottom-up projections do not present necessarily a realistic picture of the future path of aggregate spending and revenue.

3.9 The relationship between the initial debt stock and future trends in spending and revenue provide the basis for two technical fiscal sustainability indicators. These indicators form a part of the assessment of long-term fiscal sustainability presented in this Report.²

Fiscal gaps 3.10 The first of the two indicators is the 'fiscal gap'. This calculates the immediate and permanent change in the projected primary balance needed to achieve a certain, pre-determined debt target in the future. The primary balance is the difference between Government spending and revenue (excluding spending on debt interest and interest receipts). The required change in the primary balance to GDP ratio depends on the initial and desired target ratios, the time horizon and the projected primary balance using the bottom-up projections.

Intertemporal budget constraint 3.11 The second indicator is the intertemporal budget constraint (IBC), which states that the present discounted value (PDV) of all future primary balances into infinity must equal the current level of debt. If the PDV of future primary balances is not sufficient to cover the current debt burden, then the fiscal stance needs to be tightened. The intertemporal budget gap, which measures the extent of the imbalance, can be used to calculate the immediate and permanent change in the fiscal stance to meet the IBC.

² See 2005 *Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, December 2005, Chapter 3 for a more detailed discussion, while the 2002 *Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, November 2002, provides technical derivations of the indicators.

3.12 Both indicators have their respective strengths and weaknesses. The fiscal gap indicator can be a useful tool to inform policy-making if set over relatively shorter time horizons (e.g. 20 or 25 years) but these relatively shorter time horizons also imply that potentially important future developments might not be captured. To deal with this issue, the Report provides fiscal gap calculations covering a number of time horizons. This flexibility does not exist for the intertemporal budget constraint. The IBC requires that all future spending and revenue – into infinity - are accounted for. While this ensures that the entire possible projection horizon is captured, it probably makes the IBC less attractive as a tool to guide policy-making today. Both the fiscal gap indicator and the intertemporal budget constraint calculate the required change in the fiscal stance (if any) to achieve long-term fiscal sustainability based on the projected primary balances.

‘Top-down’ analysis of public finances with fiscal constraints

Bottom-up versus top-down **3.13** The bottom-up approach projects the path of individual spending and revenue items into the future, without any constraints on the fiscal aggregates. But in reality future governments *will* ensure that the aggregate of spending and revenue will evolve in a controllable fashion. To achieve this, future governments will have to make policy changes to adapt to a changing social, economic and political environment and will have to prioritise some policy areas over others. This is one of the key functions a government performs.

3.14 The top-down approach introduces this reality into the long-term projections by imposing a set of high-level constraints on the future evolution of spending and revenue. For example, explicit assumptions could be made regarding the future evolution of government spending. Or it could be assumed that a government will maintain a stable debt to GDP ratio over time, which will tell the government what fiscal position it will need to run to achieve its objective. For the UK, the two obvious fiscal constraints to impose are the Government’s two fiscal rules, discussed in Chapter 1. The top-down illustrative long-term fiscal projections presented in this Report therefore assume that the Government will meet its golden rule in every year after the medium term (it is assumed that there will be no economic cycle beyond the medium term) and will meet its sustainable investment rule every year over a 30-year time horizon, a time horizon long enough to capture major population trends but short enough to remain policy relevant.³

3.15 The top-down approach therefore answers the question what resources are available for future spending, assuming that the fiscal rules are met and revenue remains constant as a share of GDP beyond the medium term (capturing current policy on an aggregate level). By contrast, the bottom-up projections identify where spending and revenue pressures might arise in the future. The top-down approach together with the bottom-up approach therefore present a good picture of what challenges the Government might face in the future and what might have to be done to meet the fiscal rules in the future. As such these two approaches complement each other.

³ Up to 2007, the top-down illustrative long-term projections were published in Annex A of the Economic and Fiscal Strategy Report (EFSR) of the Budget, which also provided a full discussion of the methodology and assumptions used. Previous Long-term public finance reports showed updated illustrative top-down projections.

ASSUMPTIONS

3.16 The backward-looking indicators are based on actual data. Both the forward-looking bottom-up and top-down approaches depend on a number of assumptions regarding the future, including:

- population and labour-market trends;
- discount rates;
- productivity growth; and
- policy settings.

Demography

3.17 The population projections used in this Report are the latest projections published by the Office for National Statistics (ONS) on 23 October 2007. Chapter 2 discusses these projections in detail. The long-term spending and revenue projections are shown using the 2006-based principal population projections and, to provide sensitivity analysis, a number of variants that are described in detail in Chapter 2. The particular variants are ‘low population’, ‘low life expectancy’, ‘old’ and ‘low migration’.

3.18 This particular set of variants was chosen for the purpose of the sensitivity analysis as it includes variants that have a more favourable impact as well as less favourable impact on the public finances. The variants are therefore symmetric in the fiscal effect they have. The ONS publish these variants without stating how likely they might be.

Labour market

3.19 The Report requires assumptions on labour market participation rates and the unemployment rate. For example, projections of the working-age population, and assumptions on rates of participation in the labour market and unemployment (and hence the employment rate) are needed to derive employment levels. These in turn are necessary, alongside productivity assumptions, to derive economic growth rates and hence future projections of GDP levels. Furthermore, future state pension expenditure depends on entitlements, which in turn depend on labour market participation over a working life.

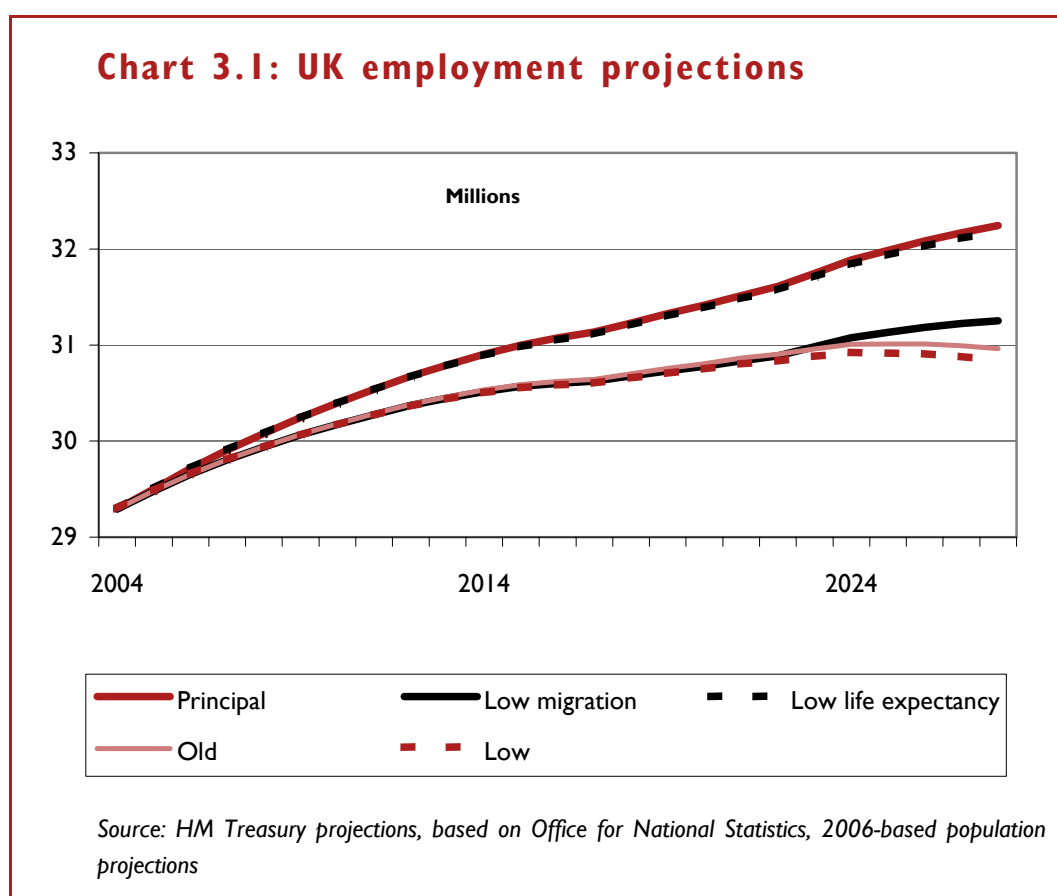
Cohort employment model

3.20 Employment levels can be projected in a number of ways, including using econometric methods or by simply holding the aggregate employment rate constant and letting the employment levels change in line with changes in the size of the working-age population. Since 2005 the Long-term public finance report has used the ‘cohort’ method to project employment levels, which captures the impact of an ageing workforce on overall participation (with older workers generally having lower participation rates than younger workers) and the effect of current young cohorts gradually replacing current older cohorts.⁴ This is important, as each generation or cohort has its own specific level of participation that is usually different from the corresponding level of participation of preceding and future generations.

⁴ Annex B of the 2005 *Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, December 2005, provides further technical details of the cohort employment model.

Employment and State Pension age **3.21** To provide a reasonable picture of how employment levels might evolve over the long term, the cohort employment model needs to take account of the Government's policies that might affect labour market behaviour. In particular, the cohort employment model takes into account the future increase of the female State Pension age from 60 years in 2010 to 65 years in 2020 and the announced gradual increase of the male and female State Pension age from 65 years in 2022 to 68 years by the mid 2040s in line with projected gains in life expectancy. The 2006 *Long-term public finance report* provides a detailed discussion of how the announced changes to the State Pension age in later decades might affect future employment trends. It assumed that the announced increases in the State Pension age will have a positive effect on future participation levels.

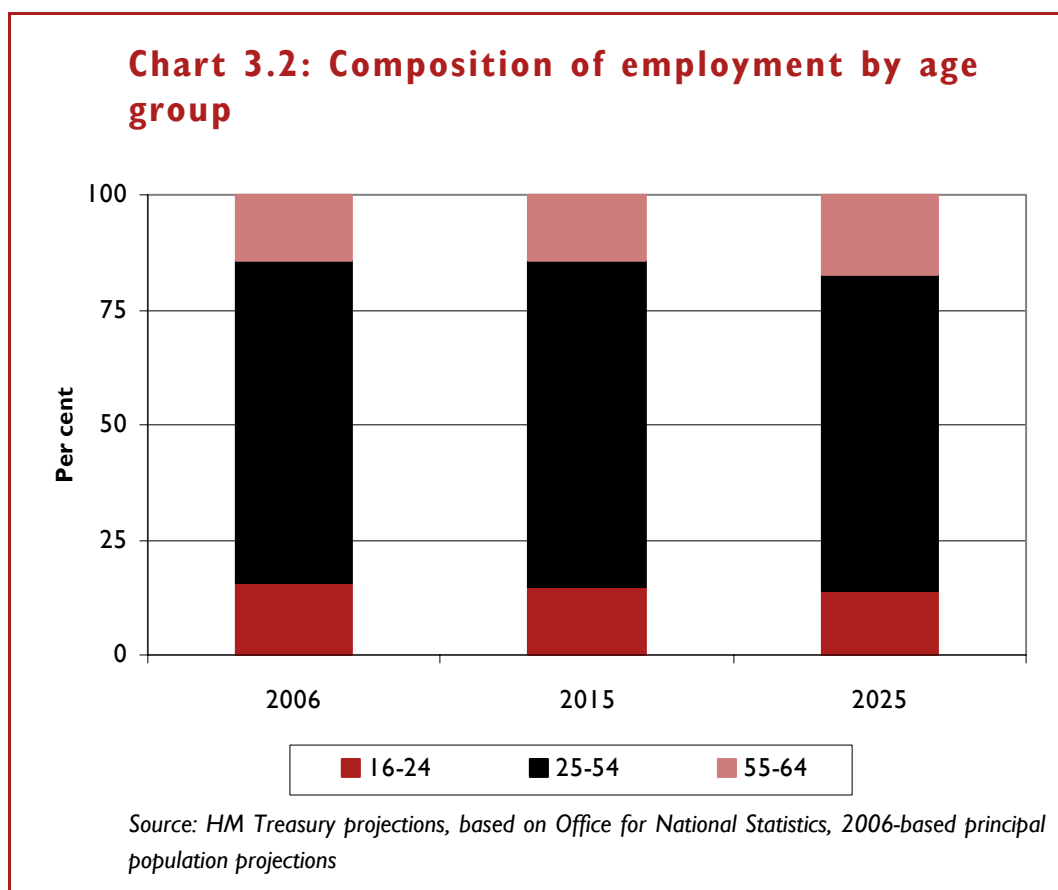
3.22 Chart 3.1 shows projections of employment, based on the principal and variant projections discussed above for the UK over the next 20 years, where employment is defined across the age group 16 years to 69 years.⁵ Using the same methodology as in the 2006 Long-term public finance report, the new principal projections indicate that employment will continue to rise over the coming decades reaching over 32 million in 2030, which is nearly 3 million higher than employment levels now. By 2057, employment is projected to be close to 35 million, over 5 million higher than now in the principal projections. The smallest increase is projected by the low population variant, in which employment is projected to increase by less than 1 million throughout the projection period.



⁵ The baseline projection of employment therefore includes individuals who are above the State Pension age. This is done because a substantial number of people above that age are projected to be in employment and will therefore contribute to projected GDP growth.

3.23 The projected aggregate level of employment varies according to the population variant chosen. As Chart 3.1 shows, each of the chosen population variants shows a lower aggregate level of employment than the principal projections. The low life expectancy variant is closest to the principal case, as life expectancy primarily affects cohorts above working age. Over the given time period the other three variants provide significantly lower employment projections than in the principal case, because of the low migration assumption used in each of the three variants. Over longer time periods the low fertility assumption used in the old and low population variants causes projected employment levels to decline gradually in later decades.

3.24 In addition to future trends in the aggregate employment level, it is useful to consider projected changes in the age composition of employment over time. Chart 3.2 suggests that the age composition of the workforce will change gradually over the next 20 years, with the share of the 55-64 year old age group in employment projected to increase by just over 3 percentage points between now and 2025. The projected marginal increase in the share of employment of this age group is primarily as a result of the announced increase in the State Pension age, which is assumed to have a positive effect on the labour market participation for those nearing retirement.

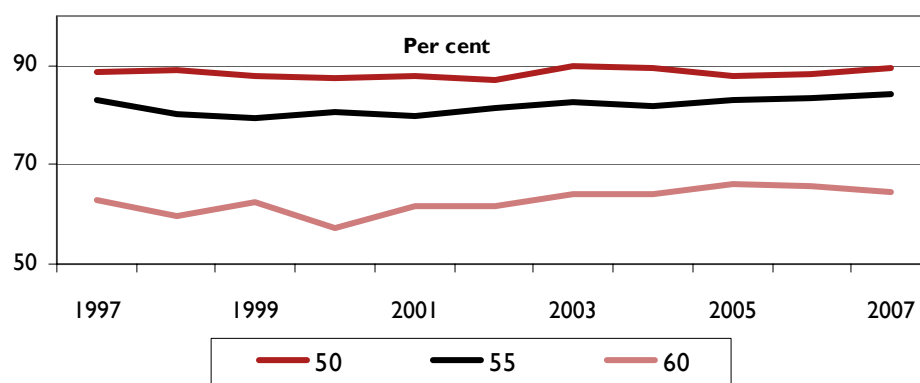


3.25 The employment projections above are based on the assumption that labour market behaviour – in terms of entry rates into and exit rates out of the labour market across age groups – remains the same over the long term as observed in the recent past. The one exception is the modelled change in behaviour as a result of the announced increase in the State Pension age. This is not the only change in behaviour that might be expected. Indeed there are a number of upside and downside risks to the long-term employment projections. Box 3.2 discusses the issue of labour-market participation rates for older workers.

Box 3.2: Raising the labour-market participation rate of older workers

Over the last few decades the UK's population has aged significantly and this trend is projected to continue in the coming decades. As a result, as shown in Chapter 2, the old-age dependency ratio is also projected to increase. One way to alleviate pressures on the workforce from a growing number of retirees is to extend people's working lives. The chart shows participation rates for 50, 55 and 60 year old males over the last ten years. While participation rates typically peak for males in their 30s, it can be seen in the chart that they begin to fall for workers in their 50s – well before they reach State Pension age. By the time they reach 60, only around two-thirds of males are still participating in the labour market. The picture is similar for females.

Labour market participation rates at ages 50, 55 and 60



Source: Office for National Statistics, Labour Force Survey

The Government's announced increases in the State Pension age over the coming decades will play an important role in raising the effective retirement age, encouraging older workers to retire at a later age. This will become increasingly important over the next ten years as the 1960s baby boomers reach the age at which participation rates historically began to fall. It should not be assumed though that older people are not engaged in an economic activity merely because they do not participate in the formal labour market. Many people in their 50s and 60s provide substantial informal care, either for their own parents or parents in law or indeed for their spouses. It also appears that many more people in their 50s and 60s now than in the past provide informal childcare service by looking after their grandchildren so that their own children can participate in the labour market.

Productivity and gross domestic product (GDP)

Productivity growth 3.26 The productivity growth assumption (output per person) used in the baseline projections is 2 per cent per year as in previous reports. While lower than recent productivity growth, this is used because it is the average long-term productivity growth rate for the UK since the mid 1950s. In addition to the baseline assumption, for the purpose of the bottom-up approach, lower and higher productivity growth assumptions of 1¾ per cent and 2¼ per cent per year are also used to provide some sensitivity analysis.

GDP growth in baseline projections **3.27** The analysis is based on GDP growth that is consistent with trend growth over the medium-term forecast period. Beyond that, projected GDP growth is derived based on assumptions regarding productivity and projections of employment growth. Table 3.1 shows the average real GDP growth rates in the coming decades for the baseline projections.⁶ Previous Long-term public finance reports assumed that employment would have a neutral effect on trend growth over the long term. However, employment growth derived from the latest population projections leads to an increase in trend growth. This Report therefore projects higher GDP growth of 2¼ to 2½ per cent per year over the coming decades.

Table 3.1: Real GDP growth and its components in the principal scenario (per cent)¹

| Year | 2017-18 to 2026-27 | 2027-28 to 2036-37 | 2037-38 to 2046-47 | 2047-48 to 2056-57 |
|--------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Productivity | 2 | 2 | 2 | 2 |
| Employment | ¼ | ¼ | ½ | ¼ |
| Real GDP | 2¼ | 2¼ | 2½ | 2¼ |

¹Productivity growth is 1¾ per cent and 2¼ per cent in the low and high productivity scenarios respectively

Source: HM Treasury

GDP growth under variant population projections **3.28** As can be seen from Table 3.2, real GDP growth will vary across the different population variants discussed above. Real GDP growth is projected to be slowest in the low population variant and fastest in the principal variant. Over a 50-year time horizon, the different growth rates will lead to very different economic outcomes, with GDP projected to be ten per cent bigger in 2050 in the principal population variant than in the low population variant.

Table 3.2: Real GDP growth under variant population projections

| Year | 2017-18 to 2026-27 | 2027-28 to 2036-37 | 2037-38 to 2046-47 | 2047-48 to 2056-57 |
|---------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Principal | 2¼ | 2¼ | 2½ | 2¼ |
| Low life expectancy | 2¼ | 2¼ | 2½ | 2¼ |
| Low migration | 2¼ | 2¼ | 2¼ | 2 |
| Old | 2¼ | 2 | 2 | 1¾ |
| Low population | 2¼ | 2 | 2 | 1¾ |

Source: HM Treasury

⁶ The employment projections used for the purposes of this Report are defined across the age group 16 years to 69 years. If employment levels were defined according to the State Pension age then a larger increase in employment would be observed as a result of the increase in the female State Pension age from 60 years to 65 years between 2010 and 2020.

Discount/debt interest rate

3.29 A discount/debt interest rate assumption is required to assess the long-term sustainability of the public finances. This is necessary either to calculate the present discounted value of future spending and revenue flows or to project debt into the future. A discount rate can be derived from data on long-term real interest rates based on index-linked gilts. Real interest rates have varied between 1 per cent and 5 per cent since 1986, and have remained between 1 per cent and 4 per cent since 1998, averaging less than 2½ per cent since 2000. To provide some sensitivity analysis, the Report presents results based on discount rate assumptions of 2½, 3 and 3½ per cent.

3.30 The discount/debt interest rate assumptions are higher than the real interest rates for UK government bonds with five- and ten-year maturities have been since the end of the 1990s. However, they are in line with the recommendations of the 2003 Green Book.⁷ The Green Book is a best practice guide for all central Government departments and executive agencies on the process of project appraisal and evaluation. The 2003 Green Book recommends a discount rate of 3½ per cent but also states that there are a number of circumstances (for example when the impacts occur over the long term as in these calculations of long-term fiscal sustainability), in which a lower discount rate may be appropriate.⁸

ASSUMPTIONS SPECIFIC TO BOTTOM-UP APPROACH

Spending and revenue

Current policies are assumed

3.31 The long-term projections are based on the assumption of current policy, in other words it is assumed that the Government will leave current policy unchanged in the future. This should not be interpreted as meaning that policy will not change over time but it is used so that the long-term projections do not prejudge future Government policy. Current policy has been interpreted as all policy already in place or announced in the 2007 Comprehensive Spending Review and 2008 Budget. In particular, current policy refers to the level of per capita spending and revenue in 2012-13, the end of the medium term, and not, for example, the growth rate of spending and revenue in that particular year.

Spending and revenue profiles

3.32 The long-term projections are generated using detailed age profiles for males and females for all major spending and revenue categories. The profiles capture the age distribution of spending and revenue over a representative individual's lifetime and therefore can pick up any changes in aggregate spending and revenue as a result of demographic change.

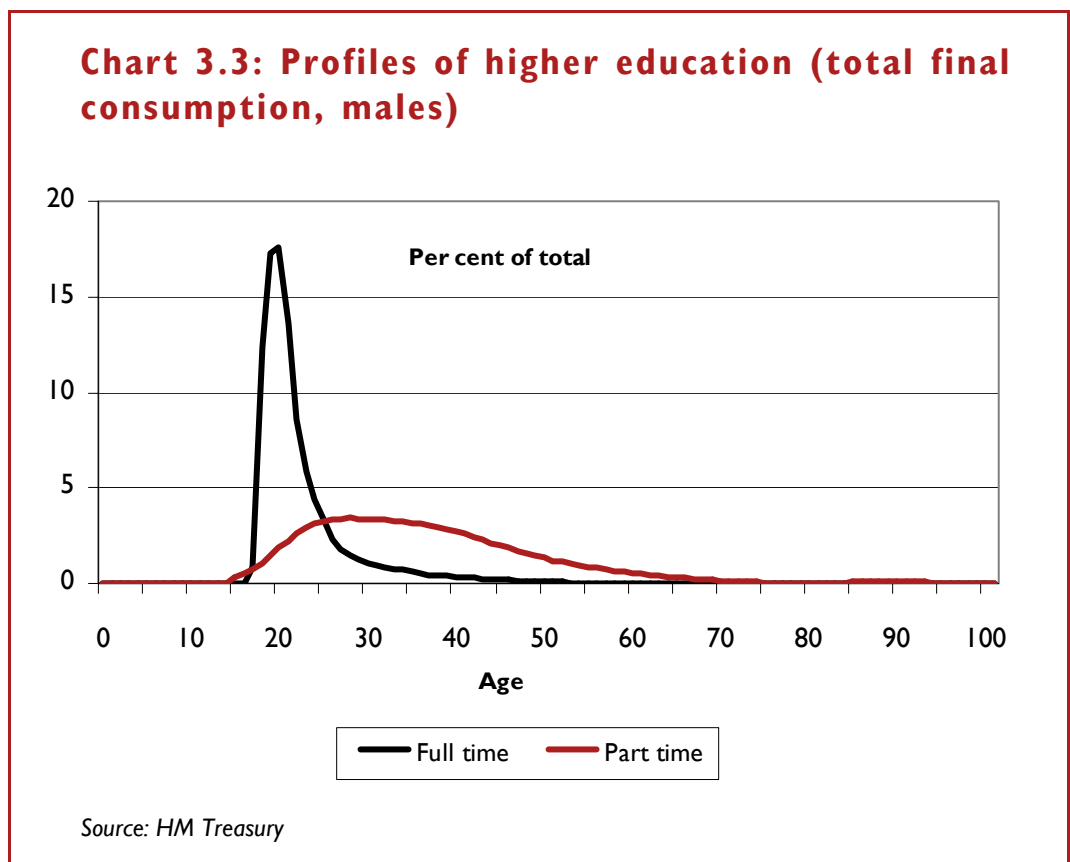
3.33 The age profiles for males and females for all major spending and revenue categories were updated for the 2006 *Long-term public finance report*. These updated profiles are again used - with two exceptions discussed below - in this year's Report as the per capita age distribution of spending and revenue only changes gradually (if at all) over time.

⁷ *The Green Book: appraisal and evaluation in central government*, HM Treasury, 2003.

⁸ The EU's Economic Policy Committee also assumes a real interest rate of 3 per cent for the purposes of their age-related spending projections. See *The impact of ageing on public expenditure: projections for the EU25 Member States on pensions, health care, long-term care, education and unemployment transfers*, Economic Policy Committee and European Commission, February 2006.

Education spending: an example **3.34** Chart 3.3 shows the age profiles for full-time and part-time higher education for a stylised male as examples (similar profiles exist for females). The profile shows the percentage consumed of total lifetime spending on full-time (part-time) education at any specific age. The chart shows that the stylised male consumes around 17½ per cent of total lifetime spending on full-time higher education in every year between the ages 20 to 22, in other words around half of lifetime spending will be consumed aged 20 to 22 years. After the age of 22 the profile shows a rapid decline, converging towards 0 by age 40. This reflects the fact that the number of students enrolled in full-time higher education drops rapidly with increases in age.

3.35 The picture is very different for part-time higher education. Generally more mature people, often with previous work experience, enrol in part-time higher education courses. In addition, the age band is much wider, with males in their 50s and 60s enrolling too. This is reflected in the shape of the profile.



Per capita allocations and contributions **3.36** With these profiles, it is possible to derive the per capita allocation or contribution as a share of total spending or total revenue on the different spending and revenue items.

3.37 Using information on total spending and revenue from HM Treasury’s latest medium-term public finance projections as a starting point, the projection model raises the per capita allocations and contributions in line with assumed productivity gains over the projection horizon, except in those cases where current policy is to uprate spending in line with prices. These per capita terms are then combined with the official population projections to generate spending and revenue projections.

Exceptions **3.38** As in previous years, a number of spending and revenue items are not projected using the methodology described above. There are two main reasons for doing so. First, a number of spending items are projected using specific long-term projection models

available in other Government departments. Second, some spending and revenue items are projected using a shifted profile, which capture announced policy changes in the future. The 2006 *Long-term public finance report* provides more information on these exceptions.⁹

3.39 The second group comprises the income tax and national insurance contributions (NICs) projections. The profiles for these items have been shifted so as to maintain consistency with the employment projections in general and the projected increase in employment rates for older workers as a result of the state pension reforms in particular. Since 2006 these profiles have also been updated to reflect policy changes to income tax and NICs announced in Budget 2007.

ASSUMPTIONS SPECIFIC TO TOP-DOWN APPROACH

3.40 ‘Top-down’ refers to the fact that a number of high-level assumptions are imposed on the model, which constrain the evolution of specific fiscal aggregates. For the top down approach, also referred to below as illustrative long-term fiscal projections, the high-level assumptions are that:

- tax to GDP ratio remains constant after the medium term;
- the Government’s golden rule holds in every year after the medium term. The golden rule is assumed to hold in every year after the medium term because it is not possible to project an economic cycle beyond the medium-term horizon; and
- the Government’s sustainable investment rule is met in every year over the projection period of 30 years.

3.41 The illustrative projections incorporate long-term social security projections provided by the Department for Work and Pensions, which cover pension and non-pension social transfers. Using this information and projections of debt interest payments to calculate total transfer spending, it is possible to calculate how much money the Government has left out of total current expenditure for current consumption, i.e. current expenditure on goods and services. Current consumption covers, among other things, current spending on health, education, law and order, and defence.

3.42 For the purposes of the illustrative long-term fiscal projections presented in this Report, the baseline GDP projections explained above are used. This is in contrast to the illustrative long-term fiscal projections shown in previous Budgets, which were based on the cautious productivity growth rate assumption of 1¾ per cent per year rather than the 2 per cent per year used for the baseline projections. This change in assumption has been made for two reasons: first, to increase consistency between the bottom-up and top-down projections as most of the discussion on the bottom-up projections is based on the baseline projections. Second, this Report provides substantial sensitivity analysis including on different productivity growth rate and discount rate assumptions, and different population variants.

Taxation and spending assumptions

3.43 The long-term illustrative top-down projections are based on the fiscal forecasts and assumptions presented in Chapter C of the Financial Statement and Budget Report (FSBR). Beyond 2012-13, it is assumed that the Government will leave current policy

⁹ See 2006 *Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, December 2006.

unchanged, in the sense that the tax to GDP ratio will remain constant and Government will meet its fiscal rules. This should not be interpreted as meaning that policy will not change over time; the assumption is used so that the long-term projections do not pre-judge future government policy. Beyond the medium-term horizon, the illustrative top-down projections could therefore be described as a ‘what if’ scenario. They describe what might happen if high-level policy settings in 2012-13 were to continue throughout the rest of the projection period. For example, the assumption that the Government will continue to raise the same amount of revenue as a proportion of GDP as in 2012-13 implies that it will offset possible changes in tax bases by changing policy in a revenue-neutral way. Furthermore, the assumption that the Government will meet its two fiscal rules over the long term implies that the golden rule will be met. With revenue assumed to remain constant, as a share of GDP, this also implies that the sum of total current expenditure and depreciation is also assumed to be constant, as a share of GDP, from 2012-13 onwards.

3.44 Current public consumption is calculated as total current expenditure less transfers. Transfers mainly consist of social security spending (e.g. basic State Pension and Disability Living Allowance) and debt interest payments. The latter are calculated using the projected debt stock and a long-term interest rate, which is assumed to equal the implicit average interest rate between 2007-08 and 2012-13. Under the assumption that the current budget is in balance, the change in the absolute level of public sector net debt reflects changes in public sector net investment. The share of public sector net investment in GDP is set at 2 per cent beyond the medium term.

INTRODUCTION

4.1 This chapter presents the results of this year's *Long-term public finance report*. The results are presented in terms of historical data and forward-looking indicators. The latter are presented on a range of discount rate and productivity growth rate assumptions, thereby illustrating some of the uncertainty regarding long-term projections.¹ In addition, the chapter presents sensitivity analysis based on a selection of variant population projections chosen to capture the high degree of uncertainty surrounding future population trends and compares the results with those presented in the 2006 *Long-term public finance report*.² The chapter concludes that the Government will continue to be in a position to meet its fiscal rules in the long term, ensuring that the long-term public finances remain sustainable. The UK is therefore well placed to deal with the fiscal challenges arising from demographic change over the coming decades.

INDICATORS BASED ON HISTORICAL DATA

Net debt, net worth and indicative net liabilities

4.2 A common starting point for thinking about long-term fiscal sustainability is to consider a sustainable debt to GDP ratio. The Government's sustainable investment rule is based on this principle. The sustainable investment rule states that public sector net debt will be held at a stable and prudent level over the cycle, and that, other things equal, net debt will be maintained below 40 per cent of GDP over the economic cycle.

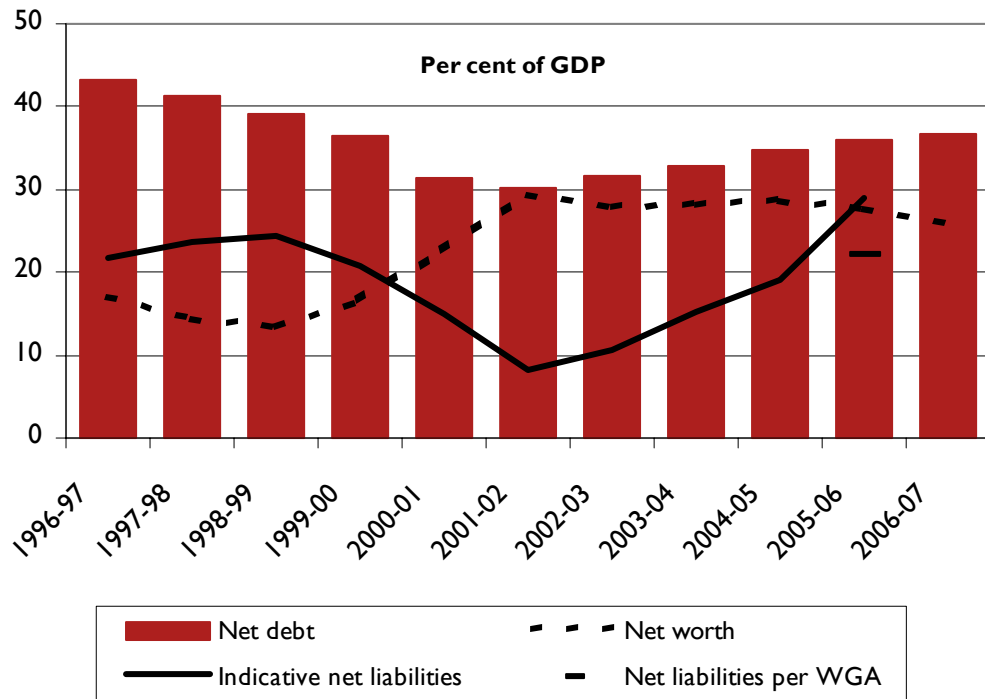
4.3 The national accounts measure of net debt is one of the key fiscal aggregates and is the basis for the Government's sustainable investment rule. The Government has reduced net debt, as a share of GDP, from more than 40 per cent in 1997-98 and Chart 4.1 shows that net debt has remained below 40 per cent since then.³ The chart also shows the public sector's net worth position, a broader measure of sustainability than net debt as it includes non-financial, as well as financial assets. Between 1998-99 and 2001-02 net worth doubled as a share of GDP and has since then remained relatively stable. Unlike net debt, however, net worth is not at present used as a key indicator of the public finances because of difficulties involved in accurately measuring many government assets and liabilities.

¹ The assumptions used in this Report are stated in Chapter 3.

² 2006 *Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, December 2006.

³ Chapter 2 of the 2008 Budget provides updated projections of net debt as a share of GDP up to 2012-13.

Chart 4.1: Public sector net debt, net worth and indicative net liabilities



Source: HM Treasury

4.4 Chart 4.1 also shows indicative numbers of net liabilities over the same period, derived from GAAP-based balance sheets for Government.⁴ Net liabilities are calculated as the difference between total assets and total liabilities. The former comprises the public sector capital stock and financial assets, while the latter includes government debt and provisions. The difference between net worth and net liabilities is that the former includes creditors (certain liabilities), while the latter in addition to that includes provisions (probable liabilities).

4.5 As in the case of net worth, net liabilities are also not at present used as a key indicator of the public finances. Net liabilities, as a share of GDP, have been lower than net debt since 1996-97. This indicates that the value of the Government's non-financial assets has exceeded that of its provisions, including those for public service pensions. The indicative net liability data are complemented by an estimate of net liabilities for 2005-06, derived using dry-run whole of government accounts. This estimate shows a similar picture to that presented by the indicative figures.⁵

BOTTOM-UP ANALYSIS OF FUTURE SPENDING AND REVENUE

4.6 This section presents the results of the spending and revenue projections given the baseline assumption of 2 per cent productivity growth per year, the Office for

⁴ Generally Accepted Accounting Principles.

⁵ For a more detailed discussion of the relationships between net debt, net worth, net liabilities and the projections presented in this Report, see 2004 *Long-term public finances report: an analysis of fiscal sustainability*, HM Treasury, December 2004.

National Statistics (ONS) 2006-based principal population projections and the other modelling assumptions stated in Chapter 3.

Projections, not forecasts **4.7** It should be emphasised that the projections of spending and revenue provide an illustration of how spending and revenue evolve under the particular set of assumptions made; they do not serve as forecasts. Over the given time horizon, these assumptions are subject to significantly more uncertainty than would be appropriate for a forecast. For example, the projections assume that there are no changes in government policies and that there is no behavioural change. (Box 4.1 below provides a more detailed discussion of long-term projections and behavioural change.) Nevertheless, the approach used in the Report is transparent and provides a clear baseline.

GDP projections **4.8** As discussed in Chapter 3, the baseline assumptions on productivity and employment growth lead to projections for GDP growth that fluctuate between 2¼ and 2½ per cent per annum until the 2050s. Under this growth assumption, real GDP is projected to be around three times larger than it is now. With the population projected to increase by around a third (see Chapter 2), GDP per capita is therefore projected to increase substantially over the time horizon.

Box 4.1: Long-term projections and behavioural change

People's circumstances and behaviours change all the time as experience of the last few decades illustrates. Time-saving technologies such as washing machines have reduced the workload at home while consumer technologies such as television and personal computers have changed the way families spend their free time.^a Changes in work-life patterns, female labour market participation and fertility rates have altered the allocation of roles within the household. At the same time growing prosperity has transformed lifestyles – former luxuries such as international travel or eating out have now become the norm.

Expectations of government and its role within society have also changed significantly over the last century. It is not unreasonable to assume that people's preferences will continue to change, posing new challenges, but also opportunities, for both public services and the wider society. However, the model used in this Report assumes that behaviour will remain constant over time, as it is impossible to predict the changes that may occur over the time horizon that is covered. For example, on the spending side the model implicitly assumes that health spending will not be affected by rising incomes. In fact, there is some evidence to suggest that health spending rises with income. In the long term, it might then be possible that this trend continues and that demand for health will increase by more than demographic factors alone would imply.

^a For more detail see *Long-term opportunities and challenges facing the UK: analysis for the 2007 CSR*, HM Treasury, November 2006.

Spending projections

4.9 For the purpose of the projections, spending is broken down into age-related expenditure and other expenditure, such as spending on defence. Age-related spending is further broken down into education, state pensions, health, long-term care and public-service pension spending. Table 4.1 shows the evolution of projected spending, as a share of GDP, in these different categories up to the mid 2050s using the modelling assumptions (such as constant current policy) set out in Chapter 3.

Table 4.1: Spending projections (per cent of GDP)

| | 2007-08 | 2017-18 | 2027-28 | 2037-38 | 2047-48 | 2057-58 |
|-------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Education | 5.0 | 5.6 | 5.8 | 5.6 | 5.5 | 5.6 |
| State pensions ¹ | 4.9 | 5.1 | 5.6 | 6.3 | 6.3 | 7.2 |
| Health ² | 7.4 | 7.9 | 8.6 | 9.2 | 9.6 | 9.9 |
| Long-term care ³ | 1.2 | 1.2 | 1.4 | 1.7 | 1.8 | 2.0 |
| Public-service pensions | 1.5 | 1.8 | 2.0 | 1.9 | 1.8 | 1.8 |
| Total age-related spending | 20.1 | 21.7 | 23.4 | 24.7 | 25.0 | 26.6 |
| Other spending | 20.4 | 19.1 | 18.9 | 18.6 | 18.1 | 18.0 |
| Total spending^{4,5} | 40.5 | 40.8 | 42.3 | 43.3 | 43.1 | 44.5 |

¹ State pension spending is defined as the sum of the basic State Pension, State Second Pension, Pension Credit, Winter Fuel Payments, Over 75 TV licences, and Christmas Bonus. ² Gross NHS spending. ³ Excluding long-term care provided within the NHS which is accounted for under Health. ⁴ Total spending including gross investment but excluding interest and dividends payments. ⁵ Totals may not sum due to rounding
Source: HM Treasury

Education 4.10 Education spending is projected to rise from 5 per cent in 2007-08 to just below 6 per cent of GDP by 2027-28 before stabilising around 5.6 per cent thereafter. Most of the increase in projected education spending is the result of increases during the medium-term horizon.⁶ In addition to that, population projections show an increase in the total number of people of education age (either in schools, higher education or further education) over the coming decades, contributing to increasing spending projections. The small drop in spending, as a share of GDP, beyond 2027-28 is due to the fact that the first of the new larger cohorts will enter the labour market in full. As a result GDP is projected to grow more rapidly during that period than absolute education spending, leading to a levelling off in the ratio.

State pensions 4.11 State pension spending is projected to increase by $\frac{3}{4}$ percentage point over the next 20 years, starting from just under 5 per cent of GDP in 2007-08. After 2027-28 this growth is projected to rise further and state pension spending is projected to reach just over 7 per cent of GDP by the mid 2050s. The initially slow increase in the projections is to a large extent the result of the gradual increases in life expectancy, while the acceleration of projected pension spending after the 2020s is mainly driven by the 1960s baby boomers reaching State Pension age. However, the projected increase also reflects the fact that a larger proportion of the workforce will benefit from more generous state pensions in the future, for example females due to increased labour-market participation and correspondingly higher build up of entitlements.

Health 4.12 Health spending is projected to increase steadily from just under 7½ per cent in 2007-08 to just under 10 per cent of GDP by 2057-58. As in previous years, non-demographic factors that might affect health spending beyond the medium term are not modelled. For example, trends in obesity could have fiscal impacts in the future. Recent findings on this issue are discussed in Box 4.2.

⁶ See 2007 Pre-Budget Report and Comprehensive Spending Review, HM Treasury, October 2007, Annex B.

Box 4.2: Tackling obesity

In October 2007 the Government's Foresight Programme published its report *Tackling Obesity – Future Choices*.^a The report looks 40 years ahead and uses scientific evidence, commissioned research and expert advice to present a strategic view of the issue of obesity.

Foresight predicts that by 2050 60 per cent of adult males, 50 per cent of adult women and about a quarter of all children under 16 could be obese. According to the report, obesity increases the risk of a range of chronic diseases and could have an economic cost of around £45 billion per year by mid century.

The causes of obesity are complex encompassing biology and behaviour, but set within a cultural, environmental and social framework. Foresight finds that there is compelling evidence that humans are predisposed to put on weight by their biology. Although personal responsibility plays a crucial part in weight gain.

Successfully tackling obesity is a long-term, large-scale commitment. According to Foresight, it will take time to reverse the current prevalence of obesity in the population, which have been at least 30 years in the making, and it will take at least three decades before reductions in the associated diseases are seen. Foresight argues that policies aimed solely at individuals will be inadequate and that simply increasing the number or type of small-scale interventions will not be sufficient to reverse this trend.

^a *Tackling Obesity: Future Choices*, Foresight, October 2007. The Foresight Programme is based in the Government Office for Science, which in turn is based within the Department for Innovation, Universities and Skills.

Long-term care **4.13** Long-term care spending is projected to increase from 1¼ per cent of GDP in 2007-08 to 1½ per cent by 2027-28 and then 2 per cent by 2057-58.

Public service pensions **4.14** Expenditure on public service pensions is projected to increase from 1½ per cent of GDP now to 2 per cent by 2027-28, remaining just under 2 per cent thereafter. The projected increase reflects recent changes in the size of the public service workforce, improved life expectancy and the fact that some schemes, and in particular the National Health Service (NHS) scheme, are not yet mature. Box 4.3 discusses the related issue of unfunded public service pension liabilities.

Box 4.3: Unfunded public service pension liabilities

The total liability of the unfunded public service occupational pension schemes as at 31 March 2006 was estimated by the Government Actuary's Department (GAD) to have been £650 billion. The estimate published previously for the total liability at 31 March 2005 was £530 billion.

The increase in the estimate is mainly due to discounting effects, which affects the size of the estimate but not the underlying annual cash flows. For example, in 2005-06, the financial year to which the latest estimate relates, Government expenditure on paying unfunded public service occupational pension benefits was around £19 billion, equivalent to around 1½ per cent of GDP.

The latest projections, presented in Table 4.1, show that expenditure on public service pensions will remain a relatively stable proportion of GDP, remaining between 1½ and 2 per cent of GDP. As this report shows, the UK's overall long-term fiscal position, taking account of this expenditure, remains sustainable on the basis of current policies.

In more detail, the change in the liability estimate breaks down as follows (numbers do not sum due to rounding):

- £98 billion was due to accounting effects – a change in the discount rate and the unwinding of the discount. These do not affect the size or timing of any pension payments;
- £9 billion derived from changed actuarial assumptions, which mainly relate to increasing life expectancy; and
- £8 billion was the net effect of the build up of an extra year's liabilities and the discharge of liabilities as benefit payments are made, and other miscellaneous items.

This liability estimate covers all unfunded public service occupational pension schemes. These are defined as pension schemes established by statute or by Ministers exercising statutory powers. The main schemes covered are those for the NHS, teachers, civil service, armed forces, police, firefighters, judiciary and the atomic energy authority.

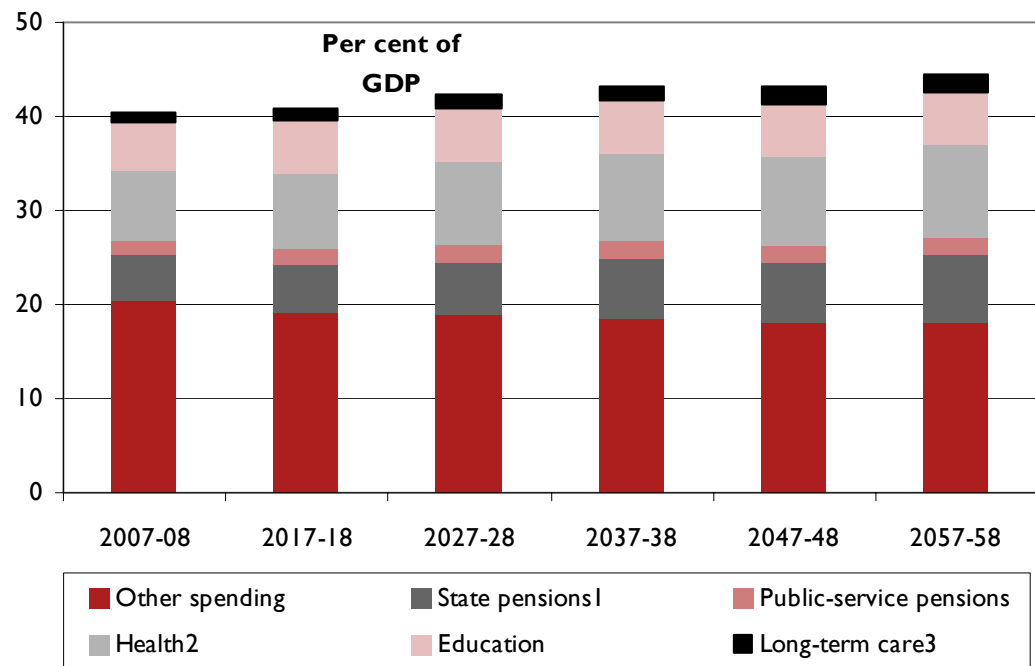
The estimate is a notional figure that represents the value of all future payments accrued up to 31 March 2006, and due over the next 60 to 70 years or so to around 7 million individuals who work, have worked, or are dependants of individuals who worked in the public service. The size of this estimate is therefore dependent on assumptions of a number of factors, such as the mortality of current and future pensioners and, crucially, a discount rate in order to express future cash flows as a single notional figure in today's terms.

The key actuarial assumptions used to value the liabilities of individual schemes are set out in the relevant reports by the scheme actuary and have been reported in scheme resource accounts using the FRS17 accounting methodology, applied in accordance with guidance approved by the Financial Reporting Advisory Board (FRAB) for pension schemes funded directly by central Government; or the Chartered Institute of Public Finance and Accountancy (CIPFA) for the pension schemes for police and firefighters. The discount rates used for pension schemes reporting under FRAB guidance was 2.8 per cent above price inflation, compared to 3½ per cent above price inflation for the previous estimate. For schemes reporting under CIPFA guidance, the discount rate was around 1.6 per cent above price inflation, compared to around 2.4 per cent above price inflation for the previous estimate. Further information on the liabilities for individual pension schemes is available in the individual scheme resource accounts.

Age-related and non age-related spending **4.15** Altogether, age-related spending is projected to grow and exceed 26½ per cent of GDP by 2057-58. By contrast, other spending as a share of GDP is projected to fall slightly over the long term from 20½ per cent to 18 per cent of GDP in 2057-58. This is driven by relative falls in non-pension social transfers, which are, based on current policies, mainly increased in line with prices. The share of age-related spending is therefore projected to increase from around half of total government spending in 2007-08 to around 60 per cent by 2057-58.

Spending over the next decade **4.16** Over the coming decade, age-related spending is projected to increase by just over 2 percentage points. This increase is mainly due to higher health and education spending, with each item projected to increase by around 1 per cent of GDP over this time period. By contrast, only around a tenth of the increase in age-related spending is caused by spending on state pensions (with the remainder driven by increases in projections for spending on long-term care and public service pensions). The increase in health spending is the result of an increase in birth rates, an increase in life expectancy and the ageing of the 1960s baby boomers. While this cohort will put additional pressure on health spending over the next decade, most of them who are in employment will not retire until the late 2020s and therefore state pension spending is projected to increase only significantly from then onwards. Over a longer time horizon the increase in annual spending on state pensions catches up with that of health expenditure, and by 2057-58 health and state pension spending are projected to increase by around 2½ per cent of GDP each.

Spending summary **4.17** The changing size and structure of the UK's population is projected to lead to an increase in public spending, as a share of GDP, over the coming decades. Between now and 2027-28 total spending is projected to increase by nearly 2 per cent of GDP, as result of a 3½ percentage point increase in age-related spending as share of GDP and a 1½ percentage point fall in other spending as share of GDP. By 2057-58, age-related spending is projected to increase by 6½ per cent of GDP. This is partly offset by a fall in 'other' spending over the same projection horizon, leading to an increase in total spending of 4 per cent of GDP by 2057-58, as shown in Chart 4.2.

Chart 4.2: Baseline spending projections¹

¹Total spending includes gross investment but excludes interest and dividends paid

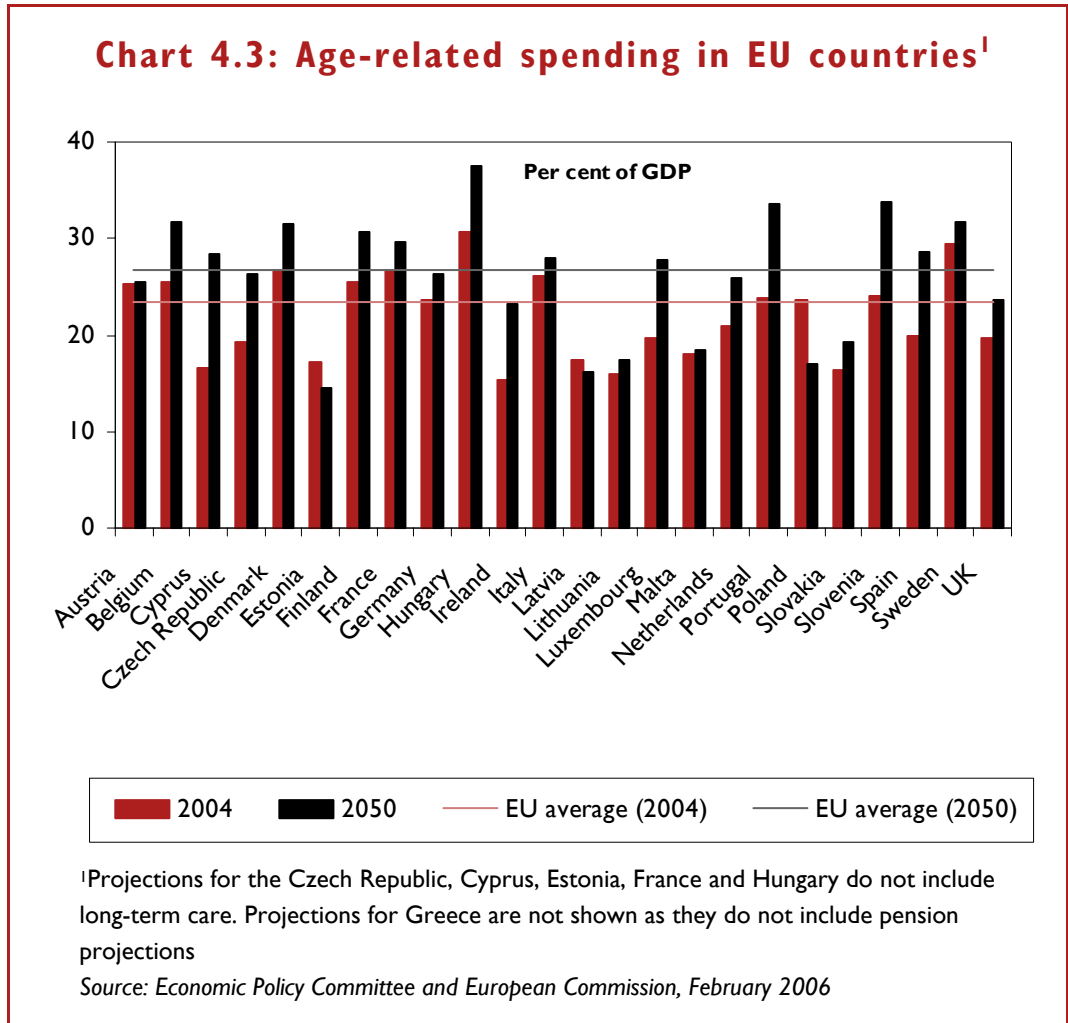
Source: HM Treasury

International comparison

4.18 The UK is not the only country with an ageing population and the projected increases in age-related spending, as a share of GDP, over the coming decades are in line with those projected in many other developed countries. In February 2006, the European Union's Economic Policy Committee produced a set of age-related expenditure projections for the 25 Member States for the period 2004 to 2050.⁷ Chart 4.3 shows age-related spending over the coming decades in EU countries. It shows that age-related spending in the UK is projected to be similar in 2050 to the EU average now. An update of expenditure projections for EU Member States is due to be published in 2009.⁸

⁷ *The impact of ageing on public expenditure: projections for the EU25 Member States on pensions, health care, long-term care, education and unemployment transfers (2004-2050)*, Economic Policy Committee and European Commission, February 2006.

⁸ *Report on the impact of ageing populations on public spending – Council conclusions*, Council of the European Union, February 2006.



4.19 In April 2007 the Australian Government published its second Intergenerational Report 2007 (IGR2), which focuses on the implications of demographic change for economic growth and assesses long-term fiscal sustainability.⁹ According to the report: “...Australian Government spending will rise by around 4¾ per cent of GDP by 2046-47. Health, age pensions and aged care account for most of the projected rise in spending.” Spending on health alone is projected to increase as a proportion of GDP from 3.8 per cent in 2006-07 to 7.3 per cent in 2046-47.

4.20 The US Congressional Budget Office (CBO) publishes regularly long-term analysis covering a wide range of topics. For example, the CBO projects that as a result of the ageing population: “...Social Security spending will rise from its current level of 4.2 per cent of GDP in 2007 to 6.4 per cent of GDP in 2050.” Spending on Medicare and Medicaid (the two principal health care schemes) is projected (for the ‘intermediate spending path’) to double from 4½ per cent of GDP in 2007 to about 9 per cent of GDP by 2030.¹⁰

⁹ Intergenerational report, Australian Treasury, April 2007.

¹⁰ See *The Budget and Economic Outlook: An Update*, Congressional Budget Office, August 2007, page 22; and *Long-Term Spending on Entitlement Programs*, Congressional Budget Office, March 2007, page 2.

Revenue projections

4.21 Table 4.2 summarises the revenue projections, as a share of GDP, over the next five decades, broken down by revenue from taxes on income and wealth, social contributions and other revenue. These projections are based on the assumptions and modelling methodologies stated in Chapter 3 and should not be interpreted as forecasts.

Table 4.2: Baseline revenue projections (per cent of GDP)

| | 2007-08 | 2017-18 | 2027-28 | 2037-38 | 2047-48 | 2057-58 |
|-----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Taxes on income and wealth | 14.6 | 15.4 | 15.5 | 15.5 | 15.5 | 15.6 |
| Social contributions | 6.9 | 7.2 | 7.1 | 7.1 | 7.0 | 7.0 |
| Other | 16.6 | 16.6 | 16.9 | 17.1 | 17.1 | 17.3 |
| Total receipts¹ | 38.0 | 39.2 | 39.4 | 39.7 | 39.6 | 39.9 |

¹Excluding interest and dividends received

Source: HM Treasury

Taxes on income and wealth

4.22 The table shows that, based on the assumptions including unchanged policy, and modelling methodologies presented in Chapter 3, revenue from taxes on income and wealth is projected to rise, as a share of GDP, between 2007-08 and 2017-18, reflecting mainly the increases projected over the medium-term horizon.¹¹ Beyond 2017-18, revenue is projected to remain relatively stable, as a share of GDP, at just over 15½ per cent through to the second half of the 2050s.

Social contributions

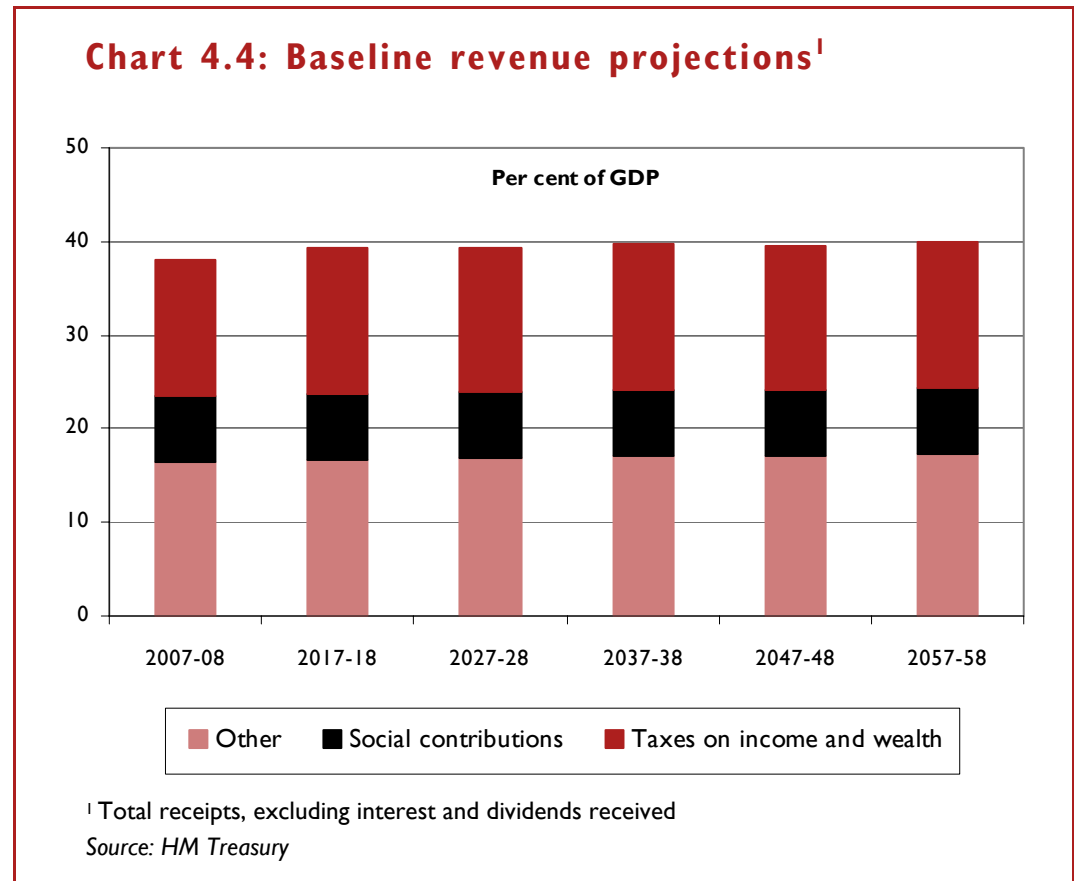
4.23 Revenue from social contributions is projected to remain relatively constant over the projection horizon. They increase only slightly to just over 7 per cent of GDP by 2017-18 but return to 7 per cent of GDP thereafter.

4.24 Other revenue is projected to increase from around 16½ per cent of GDP now to 17.2 per cent of GDP by 2057-58.

Revenue summary

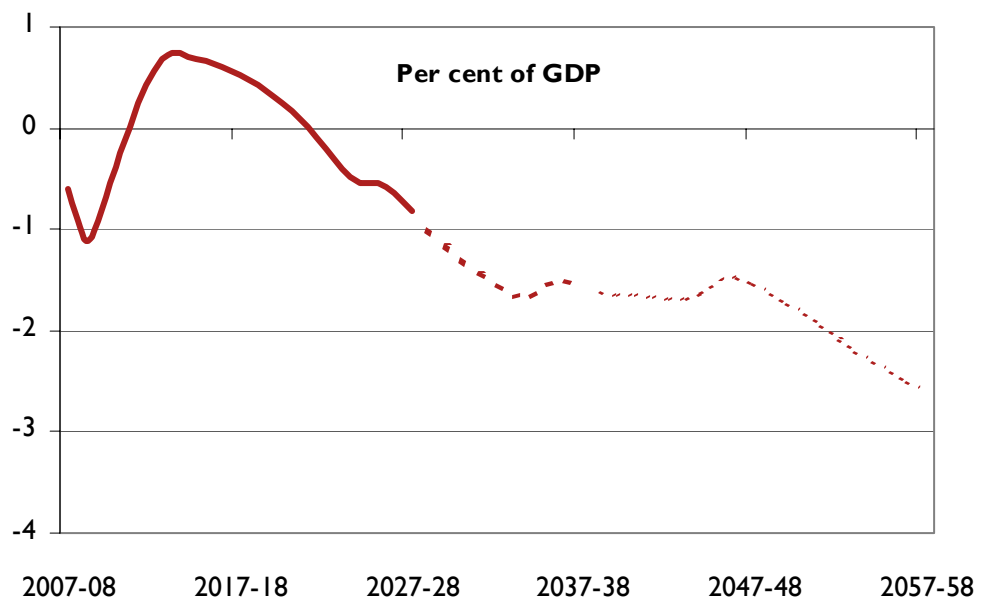
4.25 Total receipts, as a share of GDP, are projected to increase by 1 percentage point in the next decade, reaching just over 39 per cent by 2017-18. They are projected to grow to close to 40 per cent of GDP by 2057-58. This is shown in Chart 4.4.

¹¹ See 2008 Budget, HM Treasury, March 2008, Annex B.



Primary balance 4.26 As a result of the projected spending and revenue trends, the general government primary balance is projected to show a surplus of around $\frac{1}{2}$ per cent of GDP in 2017-18. The primary balance is projected to turn negative in 2021-22 and show a deficit of just under 1 per cent of GDP by 2027-28. With the baby-boom generation reaching State Pension age by the late 2020s, the primary deficit is projected to reach $1\frac{1}{2}$ per cent of GDP by the mid 2030s before stabilising for the following ten years or so. The primary balance is projected to decline further in later decades as the large cohorts born at the beginning of this century (see Chapter 2) gradually reach State Pension age and will consume gradually more health services. This is illustrated in Chart 4.5.¹²

¹² To derive the primary balance shown in Chart 4.5, it is necessary to add general government interest and dividends received to the spending and revenue projections. This follows the International Monetary Fund's *Manual on Fiscal Transparency*.

Chart 4.5: Primary balance in baseline scenario

Source: HM Treasury

Sensitivity analysis

Population variants 4.27 The previous section presented the projection results based on the principal population projections. As discussed in Chapter 2 though, there are large uncertainties regarding the population projections and as such it is appropriate and useful to provide some sensitivity analysis around the projection results based on different population variants. This section therefore presents long-term spending and revenue projections based on the following ONS population variants:

- low population (low fertility rate, low migration and low life expectancy);
- low life expectancy (principal fertility rate, principal migration and low life expectancy);
- low migration (principal fertility rate, principal life expectancy and low migration); and
- old (low fertility rate, low migration and high life expectancy).

Economic growth 4.28 As each variant is based on different assumptions regarding migration, fertility and life expectancy, they differ both in the size of the population as well as the age structure that they project. This affects the size of the workforce and hence projected GDP. Each of the variants presented here projects a smaller workforce than the principal variant and therefore they also project lower GDP. However, the age structure and size of the population also affects the projections of spending and revenue, and whether spending and revenue as share of GDP are higher or lower than under the principal variant depends on the particular attributes of each alternative variant.

4.29 The low population variant is similar to the principal variant of previous population projections underpinning the 2006 *Long-term public finance report* and therefore provides some useful continuity. The other variants give a comprehensive picture of the potential fiscal challenges arising under a range of population outcomes. Table 4.3 shows the spending projections, as a share of GDP, under the different population variants.

Table 4.3: Spending projections (per cent of GDP) under variant population projections

| | 2007-08 | 2017-18 | 2027-28 | 2037-38 | 2047-48 | 2057-58 |
|-----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Low population | | | | | | |
| Education | 5.0 | 5.4 | 5.3 | 5.2 | 5.0 | 5.1 |
| State pensions | 4.9 | 5.1 | 5.5 | 6.2 | 6.2 | 6.9 |
| Health | 7.4 | 7.9 | 8.5 | 9.2 | 9.5 | 9.9 |
| Long-term care | 1.2 | 1.2 | 1.4 | 1.6 | 1.7 | 1.8 |
| Public-service pensions | 1.5 | 1.8 | 2.0 | 2.1 | 2.0 | 2.1 |
| Total age-related spending | 20.1 | 21.4 | 22.8 | 24.3 | 24.4 | 25.8 |
| Other spending | 20.4 | 19.0 | 18.6 | 18.4 | 17.8 | 17.6 |
| Total spending | 40.5 | 40.4 | 41.4 | 42.7 | 42.3 | 43.4 |
| Low life expectancy | | | | | | |
| Education | 5.0 | 5.6 | 5.8 | 5.6 | 5.5 | 5.6 |
| State pensions | 4.9 | 5.0 | 5.4 | 5.9 | 5.7 | 6.3 |
| Health | 7.4 | 7.9 | 8.6 | 9.3 | 9.8 | 10.3 |
| Long-term care | 1.2 | 1.2 | 1.4 | 1.6 | 1.6 | 1.6 |
| Public-service pensions | 1.5 | 1.8 | 2.0 | 1.9 | 1.8 | 1.8 |
| Total age-related spending | 20.1 | 21.6 | 23.2 | 24.4 | 24.5 | 25.7 |
| Other spending | 20.4 | 19.1 | 18.9 | 18.4 | 17.8 | 17.6 |
| Total spending | 40.5 | 40.7 | 42.1 | 42.8 | 42.3 | 43.3 |
| Low migration | | | | | | |
| Education | 5.0 | 5.6 | 5.8 | 5.6 | 5.5 | 5.6 |
| State pensions | 4.9 | 5.1 | 5.6 | 6.4 | 6.5 | 7.4 |
| Health | 7.4 | 7.9 | 8.6 | 9.4 | 9.7 | 10.1 |
| Long-term care | 1.2 | 1.2 | 1.5 | 1.7 | 1.9 | 2.0 |
| Public-service pensions | 1.5 | 1.8 | 2.0 | 2.0 | 1.9 | 1.9 |
| Total age-related spending | 20.1 | 21.7 | 23.5 | 25.1 | 25.5 | 27.0 |
| Other spending | 20.4 | 19.1 | 19.0 | 18.7 | 18.2 | 18.1 |
| Total spending | 40.5 | 40.8 | 42.5 | 43.7 | 43.7 | 45.1 |
| Old | | | | | | |
| Education | 5.0 | 5.4 | 5.3 | 5.2 | 5.0 | 5.0 |
| State pensions | 4.9 | 5.2 | 5.8 | 6.9 | 7.5 | 9.1 |
| Health | 7.4 | 7.9 | 8.5 | 9.3 | 9.8 | 10.4 |
| Long-term care | 1.2 | 1.2 | 1.5 | 1.8 | 2.1 | 2.5 |
| Public-service pensions | 1.5 | 1.8 | 2.0 | 2.0 | 2.0 | 2.0 |
| Total age-related spending | 20.1 | 21.6 | 23.2 | 25.3 | 26.4 | 29.0 |
| Other spending | 20.4 | 18.9 | 18.7 | 18.7 | 18.5 | 18.6 |
| Total spending | 40.5 | 40.5 | 41.9 | 44.0 | 44.8 | 47.7 |

Source: HM Treasury

Low population 4.30 Compared to the principal projections, the low population variant yields lower spending projections, as share of GDP, for all spending items and across the projection horizon. The gap between the two projections becomes bigger the further out the time horizon that is being considered. Overall, by 2057-58 age-related spending, as share of GDP, is nearly 1 per cent lower than the in principal projections, with the biggest difference in education spending, while ‘other’ spending is nearly ½ percentage point lower.

Low life expectancy 4.31 The low life expectancy variant also projects lower spending on age-related and ‘other’ spending, as share of GDP, when compared with the principal variant. In particular, it projects lower state pension and long-term care spending as share of GDP.

Low migration 4.32 Spending projections based on the low migration variant are higher for state pension, health and long-term care spending projections, as share of GDP, when compared to the principal projections. Total spending, as share of GDP, is therefore projected to be ½ per cent higher than in the principal projections by 2057-58.

Old 4.33 The old variant yields lower education spending projections as share of GDP when compared to the principal projections. However, all other spending items are projected to be higher using this variant, leading to total spending projections by 2057-58 that are 3 per cent of GDP higher than the principal projections of total spending.

4.34 Table 4.4 below shows the projections for revenues, as share of GDP, under the different population variants.

Table 4.4: Revenue projections (per cent of GDP) under different population variants

| | 2007-08 | 2017-18 | 2027-28 | 2037-38 | 2047-48 | 2057-58 |
|----------------------------|---------|---------|---------|---------|---------|---------|
| Taxes on income and wealth | | | | | | |
| Social contributions | | | | | | |
| Other | | | | | | |
| Low population | 38.0 | 39.2 | 39.5 | 40.0 | 39.7 | 40.0 |
| Low life expectancy | 38.0 | 39.2 | 39.3 | 39.5 | 39.2 | 39.4 |
| Low migration | 38.0 | 39.2 | 39.4 | 39.8 | 39.7 | 40.1 |
| Old | 38.0 | 39.2 | 39.7 | 40.4 | 40.5 | 41.3 |

Source: HM Treasury

4.35 Comparing the revenue projections for the different variants with the principal projections shows that the main assumption that impacts is that of life expectancy. In particular the low life expectancy variant projects lower revenue as share of GDP, while the old variant (that differs only from the low population variant in that it uses the high life expectancy assumption) projects higher revenue as share of GDP. The low life expectancy variant projects revenue as share of GDP that is ½ per cent lower than the principal, while the old variant projects revenue as share of GDP that is 1¼ per cent higher. In contrast, both the low population and low migration variants yield revenue projections that are very similar to those based on the principal variant.

Comparison with previous results

4.36 The results presented above are based on the latest information available, including updated population projections, and take into account the 2007

Comprehensive Spending Review as well as updates in medium-term public finance projections published in Budget 2008. Changes in these inputs to the projections therefore also imply changes in the projections themselves, which are set out below.

GDP projections **4.37** Previous Long-term public finance reports assumed the same productivity growth rate of 2 per cent in the baseline projections, but that projected employment would have a neutral effect on trend growth over the long term. The 2006 *Long-term public finance report* therefore projected real GDP growth to average around 2 per cent per year beyond the medium term.¹³ The new population projections and resulting employment growth lead to projections for GDP growth that fluctuate between 2¼ and 2½ per cent per year until the 2050s.

Spending projections **4.38** The latest projections show total public spending in 2057-58 of 44½ per cent of GDP, which is the same as was previously projected based on 2006 data. However, both the composition of total spending and the spending path up to 2057-58 differ from the previous projections. From the end of the medium term to the mid 2030s the new projections are higher than the old projections, while spending between the mid 2030s and the mid 2050s is now projected to be lower. The composition has changed as the projection for age-related spending is higher compared to the last projections throughout the projection period, while the latest projections of ‘other’ spending are lower than previously projected.

Revenue projections **4.39** As share of GDP, total revenue at the end of the medium term is projected to be lower than previously projected. This difference grows the further out the projections go, reaching around 1½ percentage points by the mid 2050s.

Primary balance **4.40** As explained above, in comparison with the 2006 *Long-term public finance report* the latest projections, which are based on the assumptions and methodologies set out in Chapter 3, show that spending, as share of GDP, is higher between the end of the medium term and the mid 2030s, slightly lower between the mid 2030s and mid 2050s but higher again thereafter. Based on the new results, total revenue, as share of GDP, is projected to be lower than in the previous report throughout the projection period. The overall effect of the changes in revenue and spending projections is a deterioration in the projected primary balance relative to that shown previously.

4.41 As explained above, the low population variant is similar to the principal variant of previous population projections underpinning the 2006 *Long-term public finance report* and therefore provides a useful comparison. It illustrates to some extent the effect of changes in the latest population projections on the public finance projections. The projected primary balance, as share of GDP, based on the low population variant is broadly the same as that shown in the 2006 *Long-term public finance report*. This means that the difference between the results presented in this Report and the previous one is mainly due to changes in the population projections.

Analysis of the long-term fiscal position using forward-looking indicators

Fiscal gaps **4.42** Chapter 3 introduced two indicators, the fiscal gap and intertemporal budget constraint, which can be used to assess the sustainability of the public finances. As stated in Chapter 3, one of the key differences between these two indicators is the time horizon over which they assess sustainability. The fiscal gap represents the change in the projected primary balance needed to attain a particular debt target at a particular

¹³ 2006 *Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, December 2006, page 28.

point in time. A positive fiscal gap, for example, implies that fiscal policy should be tightened relative to that indicated by the projections, in order to attain a particular debt level in the future. Taking the 40 per cent net debt to GDP ratio from the sustainable investment rule as the target, it is therefore possible to use the fiscal gap concept to estimate the primary balance that is consistent with the Government's sustainable investment rule over different time horizons.¹⁴

4.43 Table 4.5 shows for a number of different interest rate assumptions and productivity scenarios the fiscal tightening required to achieve a net debt to GDP ratio of 40 per cent. For example, on the basis of unchanged policies and other assumptions set out in Chapter 3, if the Government wished to achieve this net debt to GDP ratio by 2027-28, the fiscal stance (as measured by the primary balance) would have to be around ½ per cent tighter than projected in the baseline case using an interest rate assumption of 3 per cent. The table also shows that the Government could tighten fiscal policy by slightly less the lower the assumed interest rate. The change in the primary balance is assumed to occur from 2013-14 onwards, that is, beyond the medium-term horizon for fiscal policy.

Table 4.5: Fiscal gaps in baseline and variant productivity scenarios¹ (per cent of GDP)

| Interest rate (per cent) | 2½ | 3 | 3½ |
|-------------------------------------|----|----|----|
| Baseline scenario | | | |
| Target year | | | |
| 2027-28 | ¼ | ½ | ¾ |
| 2037-38 | ¾ | 1 | 1¼ |
| 2047-48 | 1 | 1¼ | 1½ |
| 2057-58 | 1½ | 1½ | 1¾ |
| Lower productivity scenario | | | |
| Target year | | | |
| 2027-28 | ½ | ¾ | 1 |
| 2037-38 | 1¼ | 1¼ | 1½ |
| 2047-48 | 1½ | 1¾ | 1¾ |
| 2057-58 | 1¾ | 2 | 2 |
| Higher productivity scenario | | | |
| Target year | | | |
| 2027-28 | 0 | ¼ | ½ |
| 2037-38 | ½ | ¾ | 1 |
| 2047-48 | ¾ | 1 | 1 |
| 2057-58 | 1 | 1 | 1¼ |

¹ Change to primary balance needed to attain net debt of 40 per cent of GDP at end of target year. Rounded to the nearest quarter percentage point. The productivity growth rates are 2, 1¾ and 2¼ per cent respectively

Source: HM Treasury

¹⁴ The fiscal gap calculations in this Report are based on the public sector rather than the general government sector to be consistent with the Government's fiscal rules. To derive public sector spending and revenue from the general government-based projections, it is assumed that all spending and revenue items linked to public corporations remain constant as a share of GDP after the medium term. The difference between the general government and public sector numbers is small.

4.44 The results presented in Table 4.5 should be interpreted within the context of an average absolute difference between forecast and outturn for public sector net borrowing of little over 1 per cent of GDP for the one-year ahead forecast over the period 1970-71 to 2006-07.¹⁵ This means that the fiscal gaps calculated for the period up to 2037-38 are similar in all three scenarios to the average absolute difference between forecast and outturn for public sector net borrowing for the one-year ahead forecast over the last few decades, in other words they are small enough to be within the margin of error.

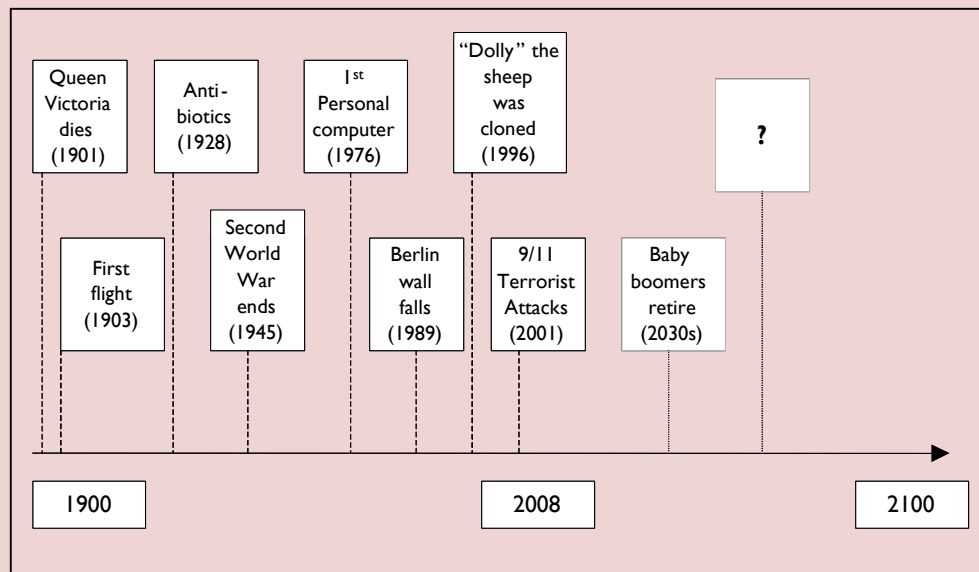
4.45 The calculated fiscal gaps widen in all three scenarios for target years further into the future. However, the gaps remain relatively small even for these target years. For example, the fiscal gap in the baseline scenario for 2057-58 is 1½ per cent under the assumption of a 3 per cent interest rate – only slightly larger than the average absolute difference between forecast and outturn for public sector net borrowing for the one-year ahead forecast over the last few decades.

Intertemporal budget constraint **4.46** As stated in Chapter 3, the intertemporal budget gap is calculated over an infinite time horizon, locking in the projected fiscal position at the end of the actual projection horizon in 2105. It is highly unlikely that the very distant future will look even remotely similar to the projections presented here, so the calculated intertemporal budget gaps are arguably less policy relevant than the fiscal gaps in general, and the fiscal gaps calculated over the next 20 or 30 years in particular. Nonetheless, they provide useful insights. Box 4.4 presents the calculated intertemporal budget gaps for the different scenarios and provides some discussion on the time horizons involved.

¹⁵ 2007 *End of year fiscal report*, HM Treasury, October 2007.

Box 4.4: Intertemporal budget constraint

As stated, the intertemporal budget constraint calculates the Government's solvency over an infinite time horizon, assuming that the world will look exactly the same every year after 2105. This is clearly a very strong and unrealistic assumption to make. Furthermore, the long-term projections up to 2105 merely show what the world would look like if the assumptions used, including those of unchanged behaviours, turned out to be correct – again this is unrealistic. Nonetheless the intertemporal budget constraint provides a useful “what if” analysis, which complements the other analysis provided in this Report. The following chart is meant to provide a sense of the time horizon involved for calculating the intertemporal budget gap.



The table presents estimates of the intertemporal budget gap, expressed in terms of an increase in tax revenue, under a range of discount rate and productivity rate assumptions. It is likely that higher rates of productivity will be associated with higher real interest/discount rates. The results show that how much revenue would have to change to maintain intertemporal balance depends to some extent on the discount rate assumption used.

Intertemporal budget gaps (per cent of GDP)

| Discount rate (per cent) | 2½ | 3 | 3½ |
|-----------------------------------|----|----|----|
| Lower productivity (1¾ per cent) | 3¾ | 4 | 4 |
| Baseline (2 per cent) | 3¼ | 3½ | 3½ |
| Higher productivity (2¼ per cent) | 2¾ | 2¾ | 3 |

Source: HM Treasury

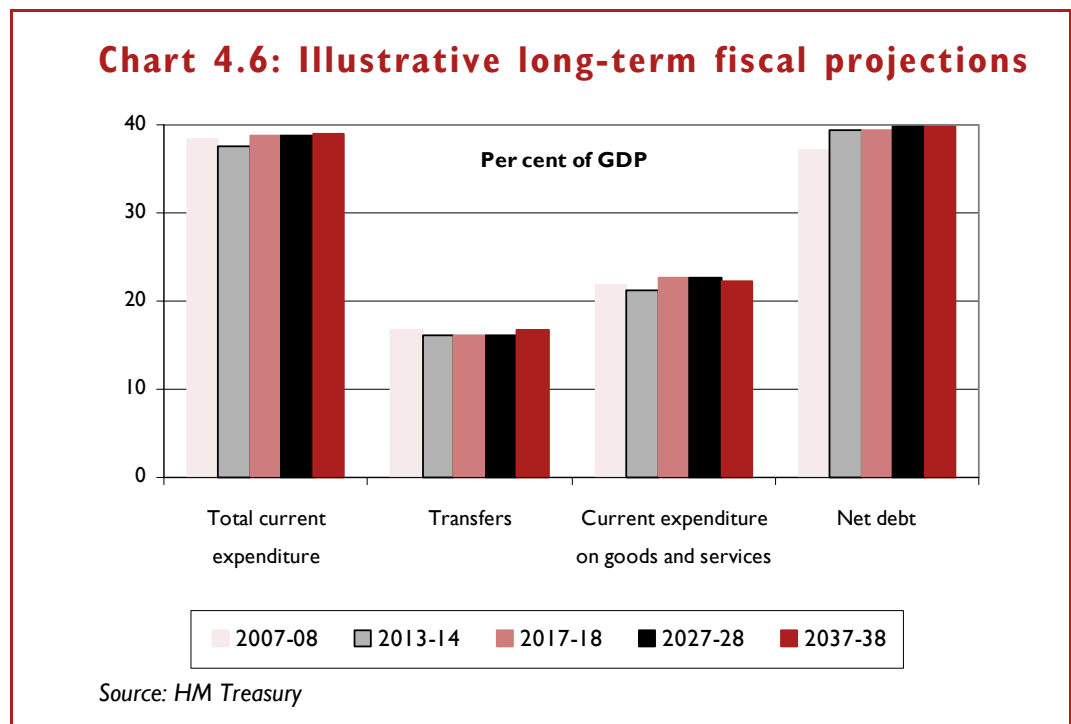
It is assumed that the change in tax revenue, as a share of GDP, will take place in 2013-14 and that a proportionate change will be maintained thereafter to meet the intertemporal budget constraint. As stated in Chapter 3, the adjustment could also include changes on the spending side. In practice, structural reforms will be at least as important given the time horizon concerned. In any case, the future will almost certainly look very different to that projected here and as such the results need to be interpreted with extreme caution.

TOP-DOWN PROJECTIONS OF PUBLIC FINANCES

4.47 The discussion of results so far has been based entirely on the bottom-up modelling approach. However, as explained in Chapter 3 a comprehensive assessment of the long-term sustainability of fiscal policy should consider both the top-down and bottom-up approaches.

4.48 The bottom-up approach looks at how long-term trends, in the case of this Report projected demographic change, could affect future spending and revenue in the absence of any high-level constraints if current policy were to remain unchanged. It therefore provides an indication of future pressures on public spending, while indicating in what way revenue might evolve. By contrast, a top-down modelling approach imposes high-level constraints on the fiscal aggregates and then shows the combinations of spending and revenue that could meet those constraints. For instance, the illustrative fiscal projections shown in Chart 4.6 impose the Government's fiscal rules as the high-level constraint. The projections then show by how much current expenditure and investment will be able to grow, given certain assumptions regarding government revenue, transfer payments and capital depreciation.

4.49 The modelling approach, including the underlying assumptions, used to generate the top-down illustrative fiscal projections presented in Chart 4.6 is explained in Chapter 3.¹⁶ The results show firstly that current public consumption can grow at around the same annual rate of GDP after the medium term while meeting the Government's golden rule; secondly that public sector net investment can grow more or less in line with the economy without jeopardising the sustainable investment rule throughout the projection period; and thirdly, the net debt to GDP ratio is projected to remain below 40 per cent by the end of the 30-year projection period.



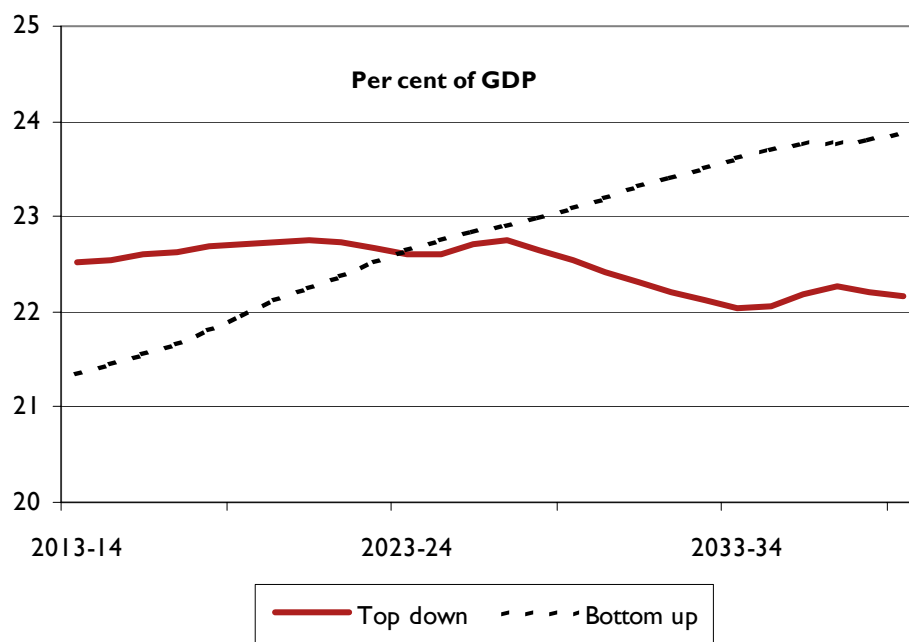
¹⁶ For further detail on the top-down modelling approach see Annex A Economic and Fiscal Strategy Report, Budget 2007: *Building Britain's long-term future: Prosperity and fairness for families*, HM Treasury, March 2007.

4.50 Long-term trends, such as demographic change, will clearly play a crucial role in determining future demand pressures on public spending. For instance, as the baby boom generation ages it is plausible to assume that pressure to increase spending on items benefiting older cohorts will increase. However, governments would not allow spending on individual items to grow independently and without constraint forever. Instead they will have to make policy choices to maintain macroeconomic stability and ensure that fiscal policy remains fair. In this way, the top-down and bottom-up modelling approaches complement each other and used together show how future governments will have to balance future fiscal pressures on the demand side against the need to maintain macroeconomic stability by adhering to some form of high-level fiscal constraint.

Bringing the bottom-up and top-down approaches together

4.51 Chart 4.7 shows projected government spending on current goods and services derived respectively from the bottom-up approach and the top-down modelling approach discussed above. The chart compares the evolution of current government spending on goods and services in a scenario in which the Government meets increased demand for these goods and services arising from demographic change (bottom up) and in a scenario in which the Government manages spending in order to meet the fiscal rules (top down). The illustrative results show that governments will have the fiscal space to manage comfortably the impact of projected demographic change up to the mid 2020s. Beyond that governments will be faced with a range of policy choices to manage the ageing of the population. However, even at that point the policy choices that have to be made are – at least in fiscal terms – relatively moderate, being equivalent to around 1¾ per cent of GDP by the late 2030s.

Chart 4.7: Comparing current spending in the top-down and bottom-up approaches



Source: HM Treasury

CONCLUSIONS

A comprehensive assessment

4.52 The Report provides illustrative projections, which enable an assessment of the sustainability of the public finances over the coming decades in light of demographic change. The analysis for this Report is based on the latest population projections, as published by the ONS in October 2007, and on the medium-term public finance projections published in Budget 2008. The assessment, as summarised in this chapter, brings together three different approaches: backward-looking indicators that illustrate the current position of the public finances; bottom-up projections based on the unconstrained development of spending and revenue in response to the projected demand side pressures emerging from demographic change; and top-down projections of the public finances with constraints based on the Government's two fiscal rules.

4.53 Net debt, as a share of GDP, has been reduced since 1997-98 and net worth, which is a broader measure of sustainability as it includes non-financial assets, has doubled as share of GDP between 1998-99 and 2001-02 and has since remained relatively stable. This improvement in the public finances puts the UK in a better position to deal with future challenges than it would otherwise be.

4.54 The bottom-up approach illustrates that demographic change is likely to put upward pressure on spending as the demand for health care, long-term care, and state pensions will increase with the ageing of the population. In addition the projected increase in the number of children puts pressure on education spending. Demographic change also implies that revenue, as share of GDP, is projected to increase, although it is projected to remain below spending. Sensitivity analysis based on different population variants illustrates that the different projected demographic structures affect how spending and revenue will evolve. Given the uncertainty surrounding population projections, it is therefore important to continue to monitor population trends. Based on the unconstrained projections of revenue and spending, this chapter uses forward-looking fiscal indicators to assess the sustainability of the public finances, the most relevant of which is the fiscal gap. This shows that only a modest improvement in the projected primary balance is required to meet the Government's sustainable investment rule for a variety of target years over the coming decades.

The fiscal framework provides the relevant policy context

4.55 Of course in reality public spending and revenue will not evolve without constraints, as the Government's fiscal rules will guide the development of fiscal aggregates. The top-down approach therefore complements the bottom-up approach by producing 30-year projections that impose fiscal constraints. This shows firstly that public consumption can continue to grow at around the same annual rate of GDP after the medium term while meeting the Government's golden rule; secondly that public sector net investment can grow more or less in line with the economy without jeopardising the sustainable investment rule throughout the projection period; and thirdly that the net debt to GDP ratio is projected to remain below 40 per cent by the end of the 30-year projection period.

The UK is well placed to deal with the fiscal consequences of population ageing

4.56 As is widely recognised, there will be a number of opportunities and challenges arising from demographic change over the coming decades – such as increases in life expectancy and the ageing of the 1960s baby-boom generation. While these developments will have profound socio-economic impacts, the analysis in this Report focuses on the effect that they might have on the public finances. A wide-ranging assessment of the current fiscal position as well as future pressures on the public finances shows that the UK is well equipped to deal with the fiscal challenges arising from demographic change over the coming decades. The Government will continue to

be in a position to meet its fiscal rules in the long term, ensuring that the long-term public finances remain sustainable. The UK will therefore be well placed to deal with the potential fiscal impacts arising from other long-term trends.

A

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LIST OF ABBREVIATIONS

| | |
|--------|---|
| CBO | Congressional Budget Office |
| CIPFA | Chartered Institute of Public Finance and Accountancy |
| CSR | Comprehensive Spending Review |
| DH | Department of Health |
| DMO | Debt Management Office |
| DWP | Department for Work and Pensions |
| ECOFIN | Council of European Finance Ministers |
| EFSR | Economic and Fiscal Strategy Report |
| EPC | Economic Policy Committee |
| ESRC | Economic and Social Research Council |
| EU | European Union |
| FRAB | Financial Reporting Advisory Board |
| FSBR | Financial Statement and Budget Report |
| GAAP | Generally Accepted Accounting Principles |
| GAD | Government Actuary's Department |
| GDP | Gross Domestic Product |
| IBC | Intertemporal budget constraint |
| IBG | Intertemporal budget gap |
| IGR2 | Intergenerational Report 2007 |
| IMF | International Monetary Fund |

| | |
|-------|--|
| IPS | International Passenger Survey |
| NHS | National Health Service |
| LTPFR | Long-term Public Finance Report |
| ONS | Office for National Statistics |
| PDV | Present Discounted Value |
| NICs | National Insurance Contributions |
| NIESR | National Institute of Economic and Social Research |
| UN | United Nations |
| WGA | Whole of Government Accounts |

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