

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

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December 2004



HM TREASURY





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

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# OVERVIEW

## INTRODUCTION

**I.1** In 2002 the Government published its first *Long-term public finance report*<sup>1</sup> with the intention of providing a comprehensive analysis of long-term economic and demographic developments, and their likely impact on the public finances. In 2003 the Government presented its second *Long-term public finance report*,<sup>2</sup> which included a number of innovations over its predecessor, and announced that the report would become an annual publication. The Long-term public finance report complements the illustrative long-term fiscal projections presented in the Economic and Fiscal Strategy Report (EFSR),<sup>3</sup> published at the time of the Budget. The Government is committed to updating and reporting regularly on its assessments of long-term fiscal sustainability, both through the Long-term public finance report and through the illustrative long-term fiscal projections presented with each Budget.

### Motivation for the Report

**I.2** The publication of the Long-term public finance report is motivated by the Government's belief that sustainable public finances are a prerequisite to achieving high and stable rates of long-term economic growth, which is shared by all, and to ensuring that spending and taxation impact fairly between generations. It is therefore important for the Government to have a good understanding of potential future social and economic trends, and the fiscal implications of current policy for future generations. As well as assisting strategic decision-making, more information on long-term fiscal trends greatly improves fiscal transparency and credibility. In addition, the Government hopes that the publication will help to stimulate a public discussion on the range of socio-economic issues that will have profound effects on society in the decades to come.

### Global challenges in the long term

**I.3** One of the key socio-economic challenges that all developed economies are facing over the coming decades is the ageing of their populations. The ageing trend is mainly driven by increases in longevity (life expectancy) and continuing low fertility rates (the number of children per woman). In many developed countries these factors are also predicted to lead to a decline in the size of the working-age population, with potentially adverse effects on trend growth. At the same time, the populations of working age in many less-developed countries are predicted to increase, potentially raising trend growth. It is likely that these global demographic trends will affect future capital flows and the location of economic activity.

**I.4** These global trends will have profound effects on Britain's society and economy over the coming decades. Even though the UK population is projected to age less rapidly than those of many other developed countries (and hence the associated challenges should be less marked), a thorough understanding of the demographic and other likely long-term trends is essential for the Government to make the right long-term strategic policy decisions and to ensure that Government policy will be fiscally sustainable in the long term. Without this type of analysis there is a risk that unsustainable policies might be pursued, which require sharp corrective policy adjustments in the future. Such sudden and unexpected changes in policy could be very harmful and unfair towards the individuals and firms affected.

<sup>1</sup> 2002 *Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, November 2002.

<sup>2</sup> 2003 *Long-term public finance report: fiscal sustainability with an ageing population*, HM Treasury, December 2003.

<sup>3</sup> Annex A of the Economic and Fiscal Strategy Report, in *Budget 2004: Prudence for a purpose: A Britain of stability and strength*, HM Treasury, March 2004.

**1.5** The 2004 *Long-term public finance report* follows the general structure developed in the previous two reports but again introduces a number of innovations and refinements, including an extension to the indicators used to assess long-term fiscal sustainability, refined assumptions about age-related spending trends and an alternative scenario based on modified modelling of long-term employment trends. Future reports are likely to introduce further refinements and modifications, as understanding of these long-term issues improves further.

**1.6** On the basis of an updated assessment, which takes account of the Government Actuary's Department's (GAD) latest population projections showing a more rapidly ageing population than previous projections and the latest medium-term forecast as published in the 2004 Pre-Budget Report,<sup>4</sup> the 2004 Report finds that the UK's long-term fiscal position remains sustainable on the basis of current policies. In addition, the Report confirms that the UK is in a strong position relative to many other developed countries to deal with the fiscal challenges of the future and to maintain a high degree of inter-generational fairness.

## THE UK FISCAL FRAMEWORK

**1.7** The Government's objective of achieving high and stable long-term economic growth has to be put in the context of the UK's fiscal framework. The UK's fiscal framework facilitates transparent, long-term decision-making in both the public and private sectors. The framework is guided by the *Code for Fiscal Stability*,<sup>5</sup> 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 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 play their role in smoothing 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 a precondition 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:

- 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.

<sup>4</sup>2004 Pre-Budget Budget, HM Treasury, December 2004.

<sup>5</sup>*Code for Fiscal Stability*, HM Treasury, March 1998.

**I.II** The golden rule specifies that current spending should be financed by current taxes (and not by future generations) 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.

## PURPOSE AND STRUCTURE OF THIS REPORT

**I.I2** The *Code* also requires the Government to publish illustrative long-term fiscal projections, covering a horizon of at least ten years. In practice a 30-year horizon has been chosen. These projections, which are based on a top-down assessment of long-term fiscal sustainability and published in Annex A of the EFSR, do not identify specific long-term spending trends due to the modelling approach chosen. This Report seeks to extend and complement the analysis in the EFSR, which is updated again in this Report. To this end the Report aims to provide:

- a comprehensive picture of the sustainability of the public finances over the long term based on a range of plausible assumptions;
- an indication of the degree of inter-generational fairness;
- better quality information to guide policy and enhance the decision-making and planning by both the Government and individuals; and
- a framework for examining the effects of demography and other long-term trends on the public finances.

## Structure

### Long-term challenges

**I.I3** When assessing the long-term sustainability of the public finances and the degree of generational fairness of current policies, it is necessary to make an assessment of expected future trends. Chapter 2's main focus is on the ageing of the population, one of the key long-term socio-economic trends that might affect the sustainability of the public finances. While it is not clear how the population will evolve *exactly* over the coming decades, what can be predicted with confidence is that the number of older people will rise relative to those of working age. Chapter 2 presents the latest population projections for the UK, published by GAD in September and October 2004, which show a more pronounced ageing process than the population projections used for the previous Report. The latest population projections demonstrate the need to update regularly long-term fiscal projections, which include age-related spending and revenue, and are therefore sensitive to demographic change.

**I.I4** It is reasonable to expect that an ageing population will lead to an increase in demand for health care. However, future health spending will not only depend on future demographic trends but also on other developments. Chapter 2 looks at some of the non-demographic factors that might affect future health spending, in particular changes in healthy life expectancy.

**Comprehensive assessment of sustainability** I.15 It is important that any assessment of long-term fiscal sustainability is as comprehensive as possible. This year's Report therefore uses the same wide range of approaches to assessing long-term fiscal sustainability as last year's Report. These are: net debt, intertemporal budget constraint/gap, fiscal gaps and an alternative fiscal indicator based on the fiscal gap concept. As in 2002 and 2003, this year's Report also uses the top-down approach used for the illustrative long-term fiscal projections in Annex A of the EFSR. Chapter 3 presents these approaches.

**An additional sustainability indicator: net liabilities** I.16 To further help assessment of long-term fiscal sustainability, this year's Report presents an indicative estimate of accruals-based net liabilities. Last year's Report introduced the concept of the GAAP-based<sup>6</sup> balance sheet that the Government is developing as part of the Whole of Government Accounts (WGA) programme, and showed how it complements the other measures of long-term fiscal sustainability. WGA will use best practice accounting methods to produce a single set of commercial-style financial statements for the whole public sector. Chapter 3 discusses the assets and liabilities on the GAAP-based balance sheet, while Annex A of this Report looks at the differences between WGA and national accounts. Based on this discussion, it is possible to illustrate the concepts with indicative estimates for net liabilities based on national accounts. These are not the full GAAP-based WGA, which are still being developed, but do provide a richer picture of the public sector's long-term financial position than the most comparable national accounts indicator, net worth.

**Modelling refinements** I.17 This year's Report also introduces a number of modelling innovations. Chapter 4 presents, as an alternative scenario, a refined approach to projecting future employment rates and levels. This new approach complements the modelling assumption used in the 2002 and 2003 reports and which is again used in this Report for the baseline projections. Based on the health discussion presented in Chapter 2, this Report also uses a new approach to model future health trends. This has an effect on the health and long-term care spending projections. The Report also uses projections for public service pensions provided by GAD. These projections take account of factors such as the maturing of different public service pension schemes.

**The UK's fiscal position remains relatively favourable** I.18 Using the latest medium-term public finance projections, Chapter 5 presents updated long-term projections and compares them with those published in last year's *Long-term public finance report*. Age-related spending is projected to rise by slightly more than presented in the 2003 Report, partly reflecting the fact that the latest population projections show more pronounced ageing than those used previously. On the basis of current policies and a range of reasonable assumptions, the public finances nonetheless remain sustainable over the long term. The information on net debt and the forward-looking indicators is complemented by indicative balance-sheet data, which provide an illustration of the favourable trends in the Government's net liabilities. Updated international comparisons also show that the UK, based on current policies, remains in a relatively strong position to deal with the fiscal challenges arising from an ageing population.

<sup>6</sup> Generally Accepted Accounting Practice.

## INTRODUCTION

**2.1** This chapter presents potential long-term socio-economic trends that could affect current and future fiscal policies. The main focus, as in the previous two Long-term public finance reports, is on demographic changes in general and population ageing in particular. Since last year's Report, the Government Actuary's Department (GAD), which is the producer of the official population projections for the UK and its constituent countries, has updated its projections. This chapter therefore presents the long-term demographic trends based on the latest population projections and compares these with the trends discussed in last year's *Long-term public finance report*.<sup>1</sup>

**2.2** This chapter also discusses the potential evolution of future living standards and health trends, in particular the concept of compression and expansion of morbidity. This is an important area of research, not least because future health status will have an effect on future public spending. The findings in this chapter are used to motivate some of the assumptions used in this Report.

## THE CHANGING STRUCTURE OF THE UK POPULATION

### 2003-based interim population projections

**2.3** One of the most important long-term challenges facing the UK economy is the changing structure of the country's population. In the UK, GAD produces the official population projections. GAD published its latest principal population projections, the 2003-based interim projections, in September 2004.<sup>2</sup> These projections are based on the latest population revisions produced by the Office for National Statistics (ONS)<sup>3</sup> and replace the 2002-based projections, which were released in December 2003 after the publication of the 2003 *Long-term public finance report*. Since the publication of last year's Report, there have therefore been two revisions to the population projections.

### Variant population projections

**2.4** While there is general agreement that the population structure will change over the coming decades, it is impossible to have precise estimates. The uncertainty surrounding population projections have to do with future trends of longevity (life expectancy), fertility rates (the number of children per woman) and net migration rates (the difference between inflow and outflow of people and other adjustments). Even small changes (especially to the fertility rate assumption) can make a significant difference to the outcome in the long term.<sup>4</sup> As part of its revisions, GAD also updated its variant population projections, which vary these key determinants to examine their impact on the level and structure of the population. Table 2.1 summarises GAD's main assumptions for the principal and high variant population projections.<sup>5</sup>

<sup>1</sup> See 2003 *Long-term public finance report: fiscal sustainability with an ageing population*, HM Treasury, December 2003, page 5.

<sup>2</sup> <http://www.gad.gov.uk/Population/index.asp>.

<sup>3</sup> <http://www.statistics.gov.uk/pdfdir/pop0904.pdf>.

<sup>4</sup> See also *Fiscal Challenges Posed by Aging Populations*, Frank Eich, 2004.

<sup>5</sup> GAD also produces low and other variants. These are not shown in Table 2.1.

**Table 2.1: Assumptions for principal and high variant population projections**

	Principal	High Fertility	High Longevity	High Migration
Fertility rate <sup>1</sup>	1.74	1.94	1.74	1.74
Life expectancy (years) <sup>2</sup>				
Males	80.6	80.6	82.5	80.6
Females	84.6	84.6	85.9	84.6
Long-term annual net migration	130,000	130,000	130,000	190,000

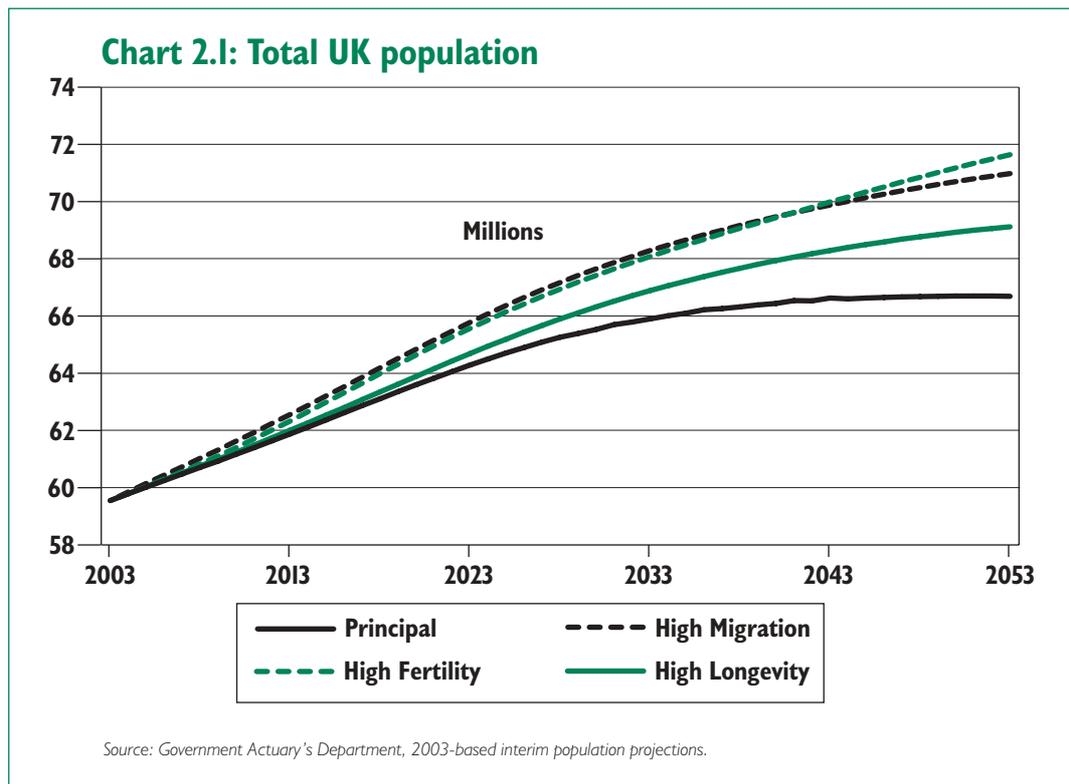
<sup>1</sup> Long-term average number of children per woman.

<sup>2</sup> At birth in 2027.

Source: Government Actuary's Department, 2003-based interim population projections.

### Total population projected to increase 2.5

According to the latest principal population projections, the UK's population will increase from 59.6 million in 2003 to around 66½ million by 2035, and then stabilise. With the fertility rate assumed to remain below the replacement rate of 2.1 children per woman (the rate which is necessary to stabilise the population size naturally), the increase in the total population is mainly due to assumed long-term net migration of around 130,000 people per year.<sup>6</sup> The total population size is projected to increase by more in GAD's high population variants, and by the most in the high fertility variant, reaching nearly 72 million by 2053. The high longevity assumption makes the smallest difference. Chart 2.1 shows the projected evolution of the total population size in the different variants.

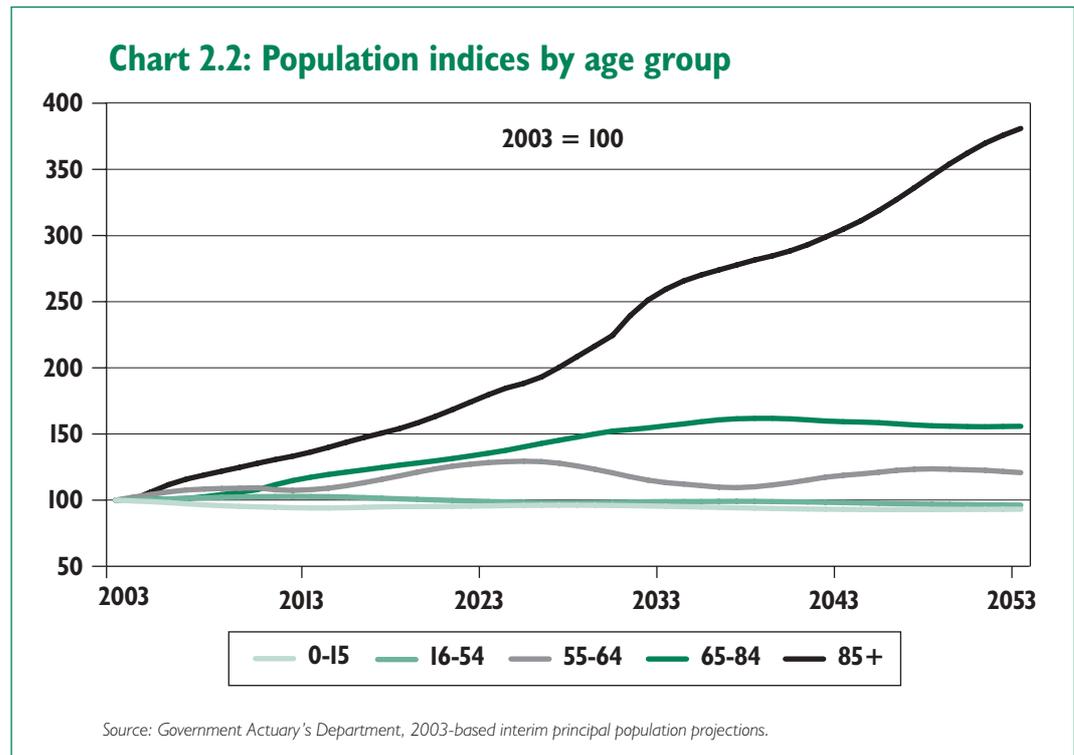


### An ageing population 2.6

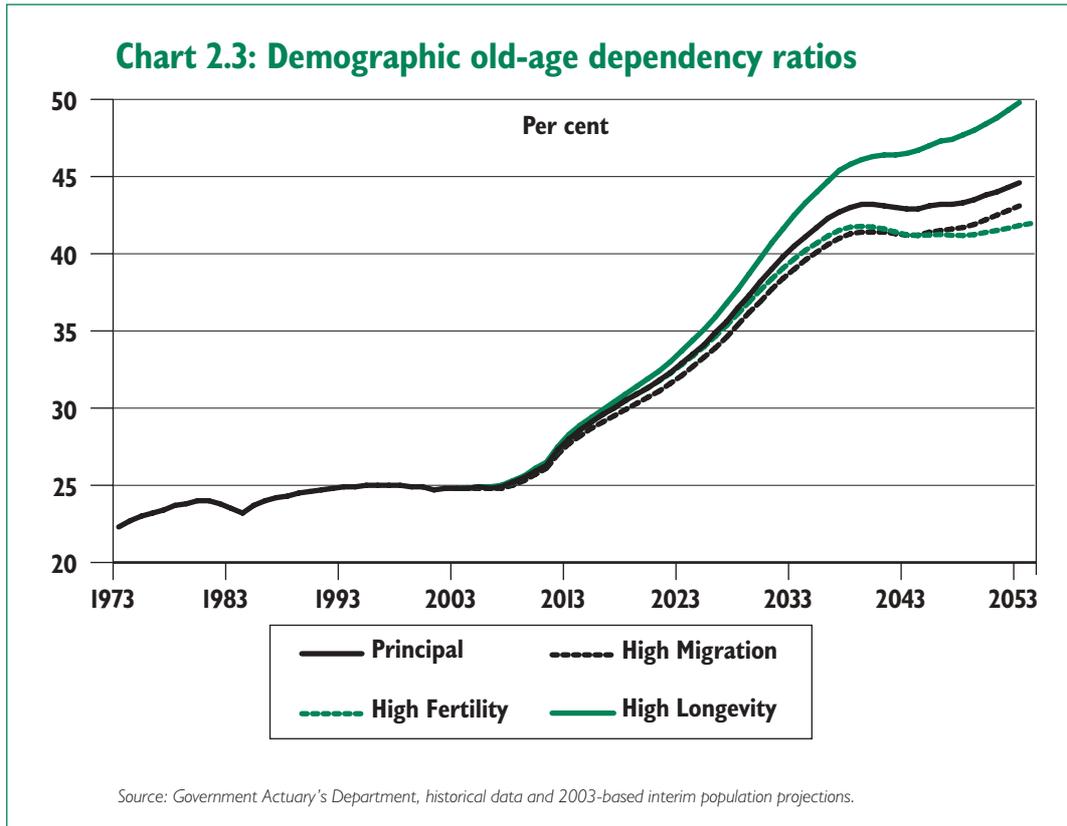
In addition to the projected rise in the number of people living in the UK, GAD's projections also show a marked change in the composition of the population over the coming decades, with the share of older people in the total population rising gradually. As a result the median age is projected to rise from 38.4 years currently to 45 years by 2045 in the principal projections, before stabilising.

<sup>6</sup> According to the Office for National Statistics, net migration stood at 154,000 in 2002.

**2.7** As shown in Chart 2.1 the total population is projected to rise by just over 10 per cent over the next 50 years in the principal case. However, this overall increase masks wide variations between the growth rates of different age groups. Chart 2.2 shows that the younger working-age population and number of children are projected to remain relatively stable over the period, while the 55-64 year olds show a moderate rise of 20 per cent by 2053. This contrasts with large projected increases for the older age-groups: the 65-84 year olds will have grown by around 55 per cent, and the 85+ group will have grown by nearly 400 per cent by the end of the period.



**2.8** The effect of these changes can be best illustrated by the evolution of the demographic old-age dependency ratio. This ratio shows the number of people aged 65 years and over relative to the number of people aged 16 to 64 years. As can be seen from Chart 2.3 the demographic old-age dependency ratio has edged up slightly since the early 1970s, reaching around 25 per cent in the mid 1990s. The ageing process is expected to accelerate significantly after 2010, with the demographic old-age dependency ratio projected to rise to nearly 43 per cent by 2040 and then 45 per cent by the mid 2050s in the principal projections. In the high longevity variant, the old-age dependency ratio is projected to reach 50 per cent by 2053, due to the larger number of people aged 65 years and over. The demographic old-age dependency ratio is projected to rise by slightly less in the high migration and high fertility variants than in the principal case. For the former, this reflects the fact that migrants are assumed to be mainly of working age. For the latter, this is because the size of the working-age population will be boosted by an inflow of more young people in the coming decades.

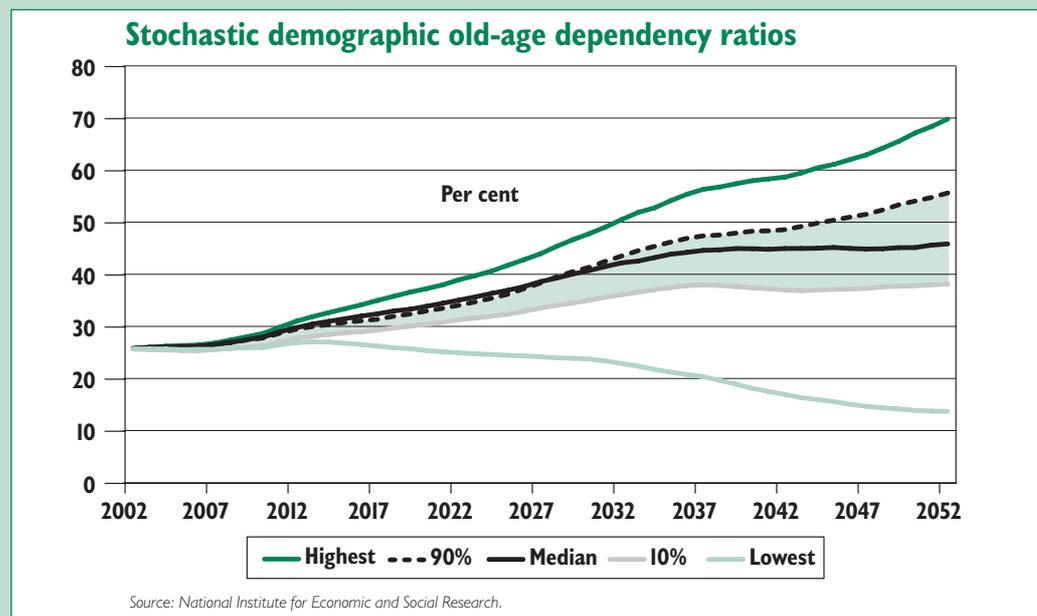


**2.9** A general shortcoming of a deterministic approach to modelling is that it is difficult to say which outcome is the most likely. GAD's methodology is based on a deterministic approach, Box 2.1 presents an alternative approach, called stochastic modelling, that can be used to generate projections, including population projections.

### Box 2.1: Deterministic versus stochastic population projections

The Government Actuary's Department's (GAD) variant population projections provide a useful spectrum of how the UK population might evolve over the coming decades. They show that even small changes in assumptions can lead to substantial differences in outcomes over the longer term. However, how probable are any of these variants? The approach used by GAD (and most official population forecasters) does not give an answer to this question. Rather, it is based on simply varying the underlying parameters by a certain amount around the baseline assumption; in the case of fertility rates from 1.54 (low variant) to 1.94 (high variant) children per woman.

Another approach is that of stochastic modelling, which has been developed for use in population projections by Juha Ahlo.<sup>a,b</sup> In the UK, the National Institute for Economic and Social Research (NIESR) is applying his techniques as part of a project funded by the European Commission. The work at NIESR is involved in exploring the implications of uncertain population projections for assessing a country's long-term fiscal position, and also assessing appropriate precautionary policies as responses to demographic uncertainty. The chart below illustrates the uncertainty which may surround projections of the demographic old-age dependency ratio.<sup>c</sup> It shows the dispersion of the ratios generated by 800 simulations of a demographic model of the UK in which the key vital parameters (fertility rates, morbidity rates and migration flows) are shocked at random; a different realisation is used to generate each projection. For example, the chart shows that 80 per cent of the simulations (in other words those within the shaded area) project an old-age demographic dependency ratio of between 38½ and 56½ per cent by 2052.



Obviously the outcome depends not only on the core forecast but also on the assumptions made about the random processes influencing the key vital parameters. Before simulations of this type can be used for serious policy analysis, it is necessary to ensure that they represent an appropriate consensus about the sorts of shocks which can affect the vital parameters, as well as suitable baseline values of these parameters.

<sup>a</sup> The practical specification of the expected error of population forecasts, Juha M. Ahlo and Bruce D. Spencer, *Journal of Official Statistics*, 1997. See also <http://www.joensuu.fi/statistics/juha.html>.

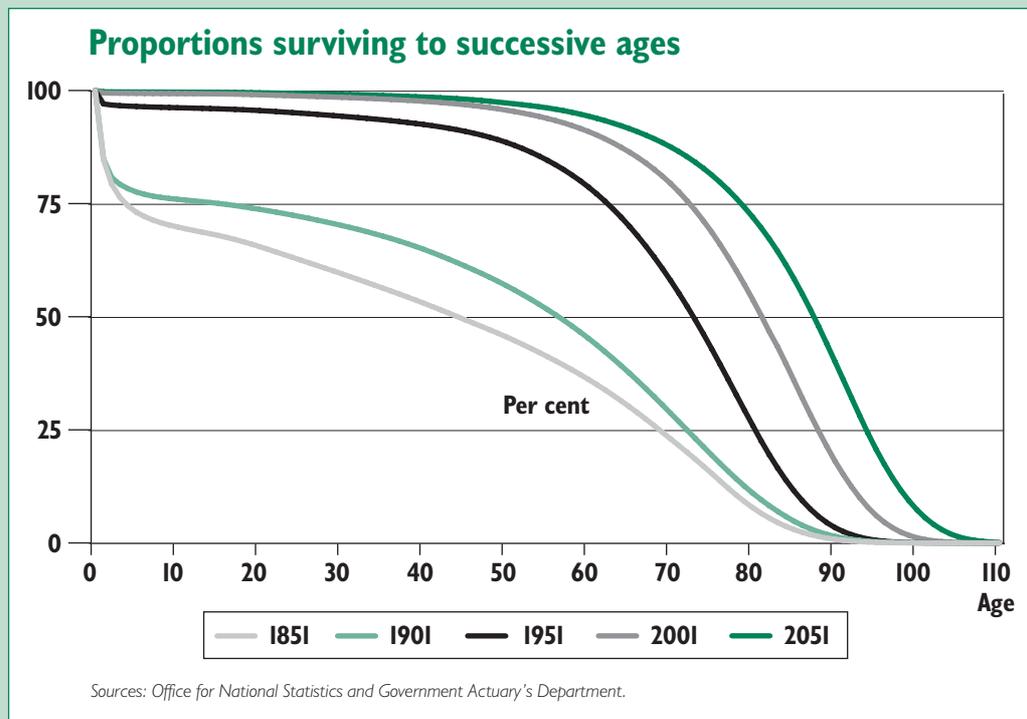
<sup>b</sup> For an illustration of how stochastic modelling is used to predict future population trends, see for example *Australia's uncertain future*, Tom Wilson and Martin Bell, 2004.

<sup>c</sup> The chart was generated by the NIESR, using assumptions and a modelling structure provided by Professor Juha Ahlo but modified by the institute. Note that the NIESR uses a slightly different classification for working age (18 years to 64 years) than used elsewhere in this Report (16 years to 64 years). Everything else equal, the demographic old-age dependency ratio will therefore be marginally higher than using the classification of 16 years to 64 years.

**Three distinct population trends** **2.10** The gradual ageing of the population is due to three distinct population trends. First, the post-war baby boom generation is gradually reaching retirement age. As a result, the number of people above working age will rise. Second, life expectancy is expected to continue to rise over the coming decades, leading to a larger number of older people. Third, the fertility rate is expected to remain below the replacement rate. In the UK, these three trends are moderated by projected continued net migration, with the migrant population expected to be on average younger than the resident population.<sup>7</sup> Box 2.2 shows the gradual increase in life expectancy over the last century and what is projected over the coming decades.

### Box 2.2: Increases in life expectancy

The ageing process can be illustrated by what is referred to as the ‘rectangularisation of the life curve’. The chart shows the proportion of an age cohort surviving to successive ages. Of the generation born in 1851, around half survived until 50 years, while a quarter survived until 70 years. Between 1901 and 1951, life expectancy rose markedly, with around half of a cohort born in 1951 expected to reach 73 years. To a large extent the increase in life expectancy is due to the near elimination of infant mortality.



With infant mortality now down to very low rates, future gains in life expectancy are expected to come from higher life expectancy in old age. The Government Actuary's Department projects that half of those born in 2001 will survive to 82 years, while half those born in 2051 will survive to 87 years. The maximum age that people are predicted to reach is also projected to rise.

<sup>7</sup> The gradual ageing of the post-war baby boom generation would, everything else equal, only have a temporary effect on the population structure as it is a pure cohort effect. By contrast, the increase in life expectancy and a fertility rate below replacement rate will have a permanent effect on the population structure. However, in particular the fertility rate can, at least in theory, change rapidly.

**Changes from previous population projections** **2.11** The latest set of population projections differs only slightly from the 2002-based population projections, which they replaced, but more fundamentally from the 2001-based interim projections that were used for last year's *Long-term public finance report*. The changes affect the assumptions regarding the long-term annual net migration rate and life expectancy at birth. Table 2.2 summarises the underlying assumptions used for the 2001-based interim, 2002-based and 2003-based interim baseline population projections produced by GAD.

**Table 2.2: Assumptions for principal population projections**

	2001-based <sup>1</sup>	2002-based	2003-based <sup>2</sup>
Fertility rate <sup>3</sup>	1.74	1.74	1.74
Life expectancy (years) <sup>4</sup>			
Males	79.1	80.6	80.6
Females	83.3	84.6	84.6
Long-term annual net migration <sup>5</sup>	100,000	100,000	130,000

<sup>1</sup> Used in the 2002 and 2003 Long-term public finance reports.

<sup>2</sup> Used in this year's Report.

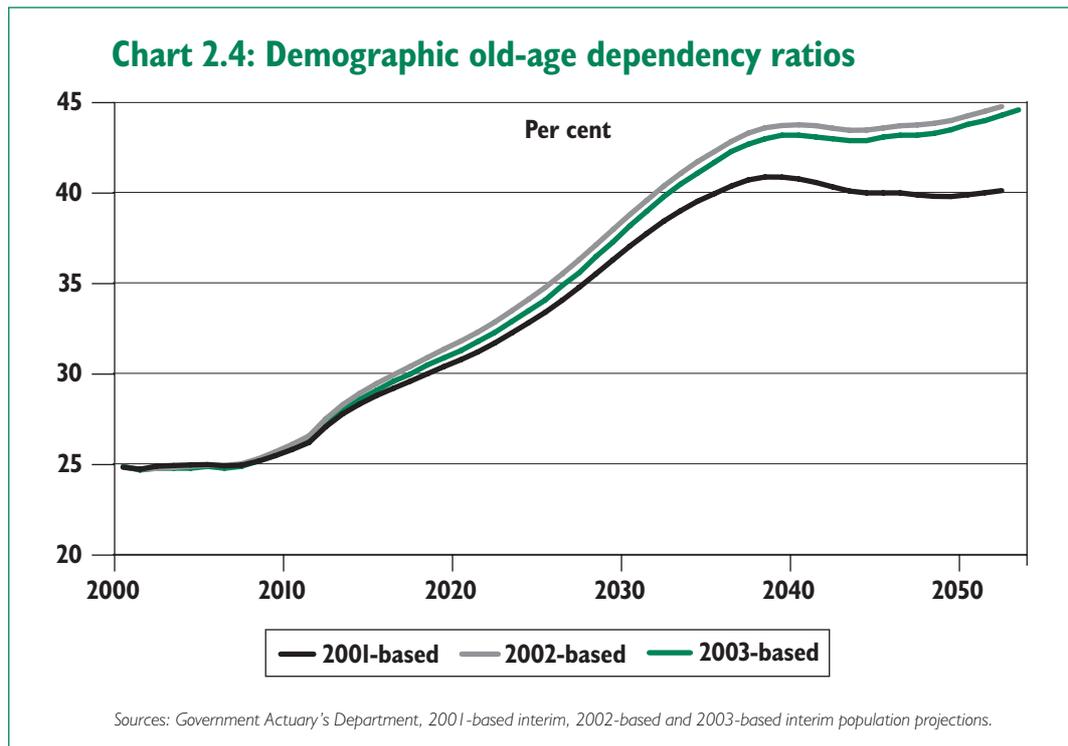
<sup>3</sup> Long-term average number of children per woman.

<sup>4</sup> At birth in 2027.

<sup>5</sup> Includes net migration adjustments of –80,000 in 2001-based and –27,000 in 2002-based projections.

Sources: Government Actuary's Department, 2001-based interim, 2002-based and 2003-based interim population projections.

**2.12** Table 2.2 shows that the fertility rate assumption has remained unchanged since the 2001-based interim projections, which were used for the 2002 and 2003 Long-term public finance reports. However, the 2003-based interim principal projection is based on a substantially higher life expectancy assumption than used in the 2001-based projections. Everything else equal, the share of older people in the population is therefore projected to be larger than previously. The latest set of population projections therefore suggests that the long-term challenges posed by an ageing population on the public finances could be greater than previously thought. This is well illustrated by the projected evolution of the demographic old-age dependency ratio. As can be seen in Charts 2.3 and 2.4, the demographic old-age dependency ratio is now projected to rise to nearly 45 per cent in the principal case, nearly 5 percentage points higher than in the 2001-based interim population projections. The 2003-based interim principal projections are therefore very similar to the high longevity variant published as part of the 2001-based interim projections. In addition, and mainly due to the higher net migration assumption compared with the 2001-based dataset, the total population is also projected to rise more rapidly, stabilising at around 66½ million rather than 63½ million.



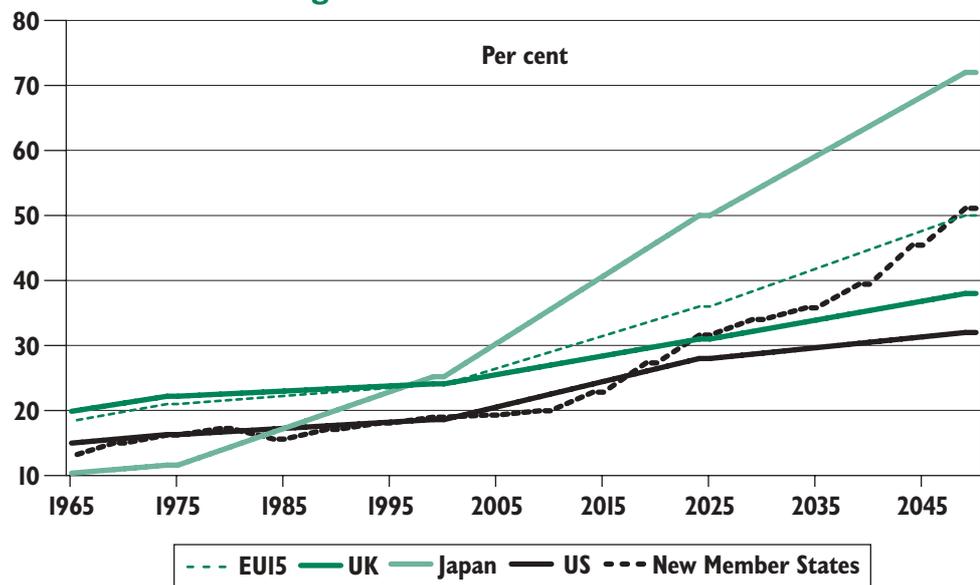
### The need for regularly-updated fiscal projections

**2.13** The new population projections demonstrate the need to update long-term fiscal projections and to assess the sustainability of the public finances on a regular basis. It is likely that our understanding of future demographic trends will continue to change in the years ahead, with the result that future population projections might look very different from today's. One area in which the assumptions have changed dramatically over time is that of life expectancy. For example, in 1981 GAD projected that by 2004 a male aged 65 years could expect to live another 15 years. In the event GAD underestimated the increase in life expectancy, and today's expectation is closer to 19 years. It is possible that future increases in life expectancy will exceed those assumed by GAD in its current population projections.

### Ageing: a global phenomenon

**2.14** The UK is not the only country with an ageing population; ageing is a trend seen in most developed countries. In fact the populations of many developed countries are projected to age more rapidly than the UK's. Chart 2.5 shows the historical and projected evolution of the demographic old-age dependency ratio between 1965 and 2050 in the UK, Japan and the US. The chart shows that Japan's population is projected to age the most, with the old-age dependency ratio projected to rise to above 70 per cent by 2050. In addition, the chart also shows the (weighted) average old-age dependency ratio in the 15 EU Member States at the beginning of 2004 and the (weighted) average in the ten new Member States that joined in May 2004. It can be seen that the new Member States face very similar demographic developments to the EU15.

**Chart 2.5: Demographic old-age dependency ratios in selected countries and regions**



Source: United Nations, *World Population Prospects: The 2002 Revision*.

**2.15** However, it is not only developed countries that can expect an ageing population over the coming decades. Similar trends are also expected to occur in many less-developed countries. For the two most populous countries in the world, for example, the United Nations projects that the old-age dependency ratio will rise from around 8 per cent in 1965 to 22 per cent by 2050 in India and to 37 per cent in China.<sup>8</sup> These developments are driven by projected increases in life expectancy and, in the case of India, a sharp projected decline in the fertility rate. The more pronounced ageing process in China can be explained mainly by the fact that fertility rates dropped below the replacement rate during the 1980s and 1990s, while in India it is projected to do so only by the 2030s.

## THE EVOLUTION OF FUTURE LIVING STANDARDS

**Different measures of 'well being'**

**2.16** A number of indicators exist that attempt to measure human 'well being'. One of the more comprehensive measures is the United Nations' Human Development Index (HDI), which takes into account per capita income, educational levels and life expectancy. Everything else equal, rising life expectancy would then raise living standards. Other measures could also include the quality of the environment and the amount of natural resources per capita. However, the most commonly-used measure for living standards is Gross Domestic Product (GDP) per capita. While relatively narrow in its coverage, it is easily quantifiable and can be easily compared across countries.

<sup>8</sup>For a study on the likely consequences of an ageing population in China on the country's pension system, see *The Graying of the Middle Kingdom*, Richard Jackson and Neil Howe, April 2004.

**Productivity growth is key driver**

**2.17** Future increases in GDP depend on the long-term potential growth rate of the economy, which in turn depends on productivity growth (output per worker) and employment growth. While it is not obvious that a change in the size and/or composition of the population will have an effect on productivity growth (see Box 2.3), it is clear that it will affect employment growth. Everything else equal, an increase in the working-age population will lead to higher employment growth, in turn leading to higher trend growth. What matters though for the evolution of future living standards is GDP per capita. This depends on productivity growth, employment growth and also the compositional change of the population. If the population of non-working age (the young and the old) grows faster than the working-age population, then GDP per capita will rise less rapidly than GDP per worker. The main driver of long-term trend GDP (and GDP per capita) growth though is productivity growth. Even on reasonably cautious assumptions regarding future productivity growth, GDP per capita is projected to more than double in most developed economies and to rise by around 2½ times in the case of the UK between 2000 and 2050.<sup>9</sup>

**Box 2.3: Demographic change, productivity growth and the global economy**

There is a growing body of literature that analyses the potential impact of demographic change on long-term productivity growth, and hence trend growth and the global economy more generally.

An important question is whether an ageing population in general and an ageing workforce in particular could have an effect on overall productivity growth. One often-expressed view is that an ageing population, among other factors such as the level of regulation and product market integration, is a key determinant of productivity growth. It has been suggested that an older workforce might be less adept in creating new technologies and therefore economically less dynamic (for example as their skills are not as up-to-date as those in a younger workforce), with a potentially adverse effect on productivity growth.<sup>a</sup> By contrast, others have argued that an older workforce will have more experience and that productivity growth should therefore be unaffected or even enhanced.

In its September 2004 World Economic Outlook, the International Monetary Fund (IMF) investigates the potential effects of demographic change on the global economy, using econometric and multi-country modelling approaches.<sup>b,c</sup> The IMF's study goes further than most in that it deals with developed and less-developed countries at the same time. In developed countries, demographic change equates mainly to population ageing (and a fall in the working-age population), whereas in many less-developed countries the working-age population is projected to continue to increase over the next few decades. According to the IMF this could have profound effects across countries on trend growth and capital accumulation, with trend growth expected to slow in developed countries but to accelerate in many less-developed countries. As a result, more of total world GDP is likely to be produced in the less-developed economies in the longer term.

<sup>a</sup> See for example *Drivers of productivity growth* in: *The EU Economy 2003 Review*, European Commission, 2003.

<sup>b</sup> *How Will Demographic Change Affect the Global Economy?* in: *World Economic Outlook September 2004*, International Monetary Fund, 2004.

<sup>c</sup> A thorough analysis of the potential effects of ageing on the global economy and financial markets can be found in *The Economic and Financial Market Consequences of Global Ageing*, Kieran McMorrow and Werner Roeger, 2004.

<sup>9</sup> See 2003 *Long-term public finance report: fiscal sustainability with an ageing population*, HM Treasury, December 2003, pages 11 and 12 for a full discussion.

**2.18** Clearly the future quality of life ('well being') will not only depend on the projected evolution of GDP or GDP per capita. As stated above, the United Nations' Human Development Index also takes into account future life expectancy and other indicators. It could be argued that health status should matter as well. The following section discusses potential future health trends.

## FUTURE HEALTH TRENDS

**2.19** An analysis of possible future health trends has been published in the Wanless Review,<sup>10</sup> an independent review of the trends and resource needs that could affect the health service in the UK up to 2022. The review modelled future health spending based on three different scenarios, which differ in terms of the efficient use of resources and responsiveness of the health service, and the level of public engagement in health issues. These scenarios range from 'slow uptake', with minimal public engagement and inefficient use of resources through to the 'fully engaged' scenario, where there is a high level of public engagement in health-seeking behaviour and the health service sees large productivity gains.

**2.20** The Wanless Review identifies many factors which could influence future health status and spending, which can broadly be separated into demand and supply drivers.

### Demand drivers

- **Demography:** A rapidly ageing society could impose pressures on the health service since the majority of consumption of health services occurs in old age.
- **Health status:** Future levels of ill health could clearly have direct implications for the demand for health services.
- **Health promotion and disease prevention:** Improved public health, through health promotion and disease prevention could have a significant impact on health status and ultimately the demand for health services.
- **Health seeking behaviour:** Changes in social attitudes towards health seeking behaviour could impact on the demand for care. For example, developments in medical technology may result in greater demand for health services as the public becomes less tolerant of minor disorders.

### Supply Drivers

- **Technology and medical advance:** Technological and medical advance could positively affect the public finances by reducing unit costs, but could also contribute to upward pressure on health spending since it may enable more people to be treated for longer periods of time.
- **Information and communication technology (ICT):** The level of investment in ICT and its effectiveness at delivering a more responsive health service and in reducing costs could contribute to a more efficient supply of health services.
- **Health service workforce:** The pay and productivity of the health service workforce could be an important driver of the financial resources required to deliver a high quality service.
- **Productivity:** The efficiency and responsiveness of the health service in the future could affect the cost of producing output for a given level of demand for health.

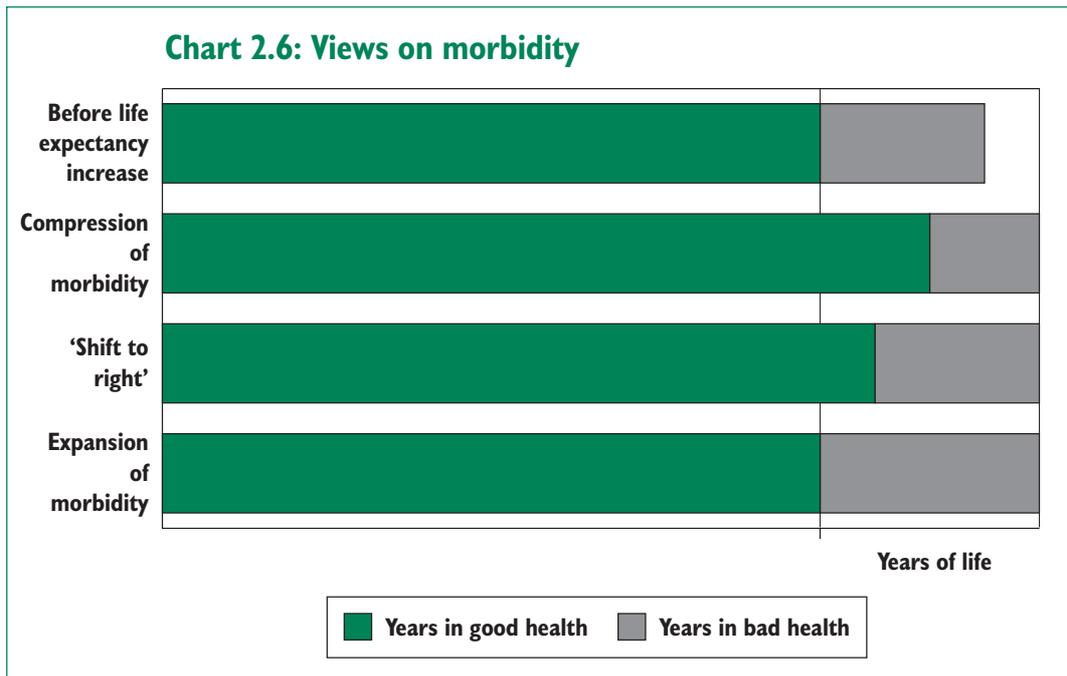
<sup>10</sup> *Securing our Future Health: Taking a Long-Term View*, Derek Wanless, 2002.

## Health trends beyond 2022

**2.21** Beyond 2022 demographics will play a more important part in the cost of health care as the population is projected to age rapidly (see Chart 2.2), as those born during the baby-boom start to enter retirement age. However, there is some evidence to suggest that the continued ageing of the population may have a more limited impact on the future health status of the elderly and therefore health spending than assumed in the 2002 and 2003 Long-term public finance reports.

**Compression and expansion of morbidity**

**2.22** As identified in the 2002 *Long-term public finance report*,<sup>11</sup> past experience suggests that the continued rise in life expectancy could be accompanied by an even further increase in the number of years people enjoy in good health, so that the absolute number of years spent in ill health declines. This trend is known as the compression of morbidity<sup>12</sup> and was first identified in the seminal work by Fries.<sup>13</sup> Fries observed that illnesses were being compressed towards the latter part of life, and further studies by Olshanky and Ault<sup>14</sup> found that, since 1970, deaths from degenerative diseases were coming at progressively older ages. Compression of morbidity is represented in the second bar of Chart 2.6, which shows that both the absolute and relative number of years in ill health are in decline (the first bar shows the split of years in good and bad health before the assumed increase in life expectancy). Alternatively, if the absolute number of years in ill health were to remain constant (which still implies a relative decline), Fries<sup>15</sup> says there has been a ‘shift to the right’ of the morbidity curve, represented in the third bar of Chart 2.6.



<sup>11</sup> 2002 *Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, November 2002, page 16.

<sup>12</sup> ‘Morbidity’ is generally defined in this context as a measure of the incidence of illnesses and diseases (normally chronic) within the population. Measurements of morbidity are a point of contention between academics since, in the context of the compression of morbidity, variations of morbidity definitions can lead to different results and conclusions.

<sup>13</sup> *Ageing, natural death and the compression of morbidity*, James Fries, *The New England Journal of Medicine*, 1980.

<sup>14</sup> *The fourth stage of the epidemiological transition: the age of delayed degenerative disease*, Jay Olshanky and Brian Ault, *The Millbank Quarterly*, 1986.

<sup>15</sup> *The Workspan and the Compression of Morbidity*, James Fries, in A.H. Mummel (ed.): *Retirement and Public Policy. Proceedings of the Second Conference of the National Academy of Social Insurance*, 1991.

**2.23** However, the compression of morbidity hypothesis is not fully accepted within the medical profession and is seen by some as providing only a simplified picture of future aggregate health status. The compression of morbidity hypothesis is underpinned by a particular view regarding the human life span, which is one of a number of views. Additionally it is argued that the hypothesis does not take into account the substitution effects of curing various illnesses and diseases. In the long term there could be developments in medical technology and knowledge that could influence the future composition of diseases and disabilities that people will suffer from. For example, curing cancer will enable more people to live to an old age, increasing the risk of developing diseases such as Alzheimer's. In this context, an opposing theory proposes a more pessimistic view that advancements in medical technology could actually extend the lives of those with disease and disability, leading to an expansion of morbidity. This is represented in the fourth bar of Chart 2.6, where the absolute number of years spent in ill health have increased. Nusselder *et al.*<sup>16</sup> illustrate that the elimination of certain fatal diseases, such as cancer or heart disease, could lead to an increase in years spent with a disability. Similarly, McCallum<sup>17</sup> and Creasey<sup>18</sup> present arguments revealing that increases in life expectancy may allow the further emergence of those disorders that are age-related and non-fatal, particularly mental illnesses including Parkinson's disease and dementia.

**Evidence on the health of the elderly**

**2.24** The evidence on past trends of morbidity can provide some indication of what might be expected in the future. In the UK, research by Bebbington and Comas-Herrera,<sup>19</sup> using the General Household Survey, found that although healthy life expectancy has improved steadily over the last 20 years, total life expectancy has improved further. This implies an increase in the absolute number of years in ill health and some, although not total, expansion of morbidity. The Pensions Commission have also looked at this issue and concluded that: "...the best judgement from available evidence is that for many people ageing is healthy".<sup>20</sup> Recent research in the US<sup>21</sup> has found that health among the older population as measured by most dimensions has improved during the last two decades, which suggests that a total expansion of morbidity is unlikely. The assumptions on morbidity used in this Report can be found in Chapter 4, paragraphs 4.29 to 4.30.

<sup>16</sup> *The elimination of selected chronic diseases in a population: the compression and expansion of morbidity*, Wilma Nusselder, Koos van der Velden, Jan van Sonsbeek, Maria Lenior and Geertrudis van den Bos, *American Journal of Public Health*, 1996.

<sup>17</sup> *The New morbidity picture: substitution versus compression?*, John McCallum, 1999.

<sup>18</sup> *Compression of morbidity: evidence in relation to the age of onset of neurological disorders*, Helen Creasey, 1999.

<sup>19</sup> *Health Life Expectancy: Trends to 1998, and the implication for long term care costs*, Andrew Bebbington and Adelina Comas-Herrera, *PSSRU discussion paper 1695*, 2000.

<sup>20</sup> *Pensions: Challenges and Choices*, Pensions Commission, 2004, page 28.

<sup>21</sup> *Trends in the health of the elderly*, Eileen Crimmins, *Annual Review of Public Health*, 2004.



## INTRODUCTION

**3.1** This chapter sets out different methodologies that can be used to assess the long-term sustainability of the public finances. The chapter provides a summary of three complementary approaches to assessing sustainability: national accounts measures of debt, GAAP-based<sup>1</sup> balance sheets and indicators based on comprehensive projections.<sup>2</sup> Building on the discussion in last year's *Long-term public finance report* on the GAAP-based balance sheet, this chapter also presents recent developments in public finance reporting, which help to further understanding of long-term sustainability issues.

## ASSESSING LONG-TERM FISCAL SUSTAINABILITY

### Defining long-term fiscal sustainability

**3.2** Any assessment of long-term fiscal sustainability will have to be made against a benchmark. There are many possible definitions of sustainability. One definition is that a government should be able to meet its obligations if and when they arise in the future. 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. The ability to meet obligations when they arise implies that a government should consider debt financing only as long as the debt burden remains at a prudent level. The definition is therefore in the spirit of the Government's fiscal sustainable investment rule.

**3.3** The 2003 *Long-term public finance report* presented different approaches that could be used to assess long-term fiscal sustainability. These approaches were:

- national accounts measures of debt;
- GAAP-based balance sheets, which will be prepared as part of Whole of Government Accounts (WGA); and
- indicators based on comprehensive projections of future spending and revenue.

**3.4** These different approaches have their respective advantages and disadvantages. Box 3.1 summarises these characteristics.

<sup>1</sup> Generally Accepted Accounting Practice.

<sup>2</sup> For more details of these approaches, see 2003 *Long-term public finance report: fiscal sustainability with an ageing population*, HM Treasury, December 2003, Chapters 3 and 4. A more technical discussion of the comprehensive indicators can be found in the 2002 *Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, November 2002. See also *The role of public debt in the UK fiscal rules*, Robert Woods, Bank of Italy workshop on public finances, April 2004.

**Box 3.1: Approaches to assessing long-term fiscal sustainability****National accounts measure of net debt**

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 effect of past borrowing, and as such provides a measure of obligations created in the past that have been accumulated to date. One particular advantage 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. Furthermore, debt can easily be understood and interpreted as a concept, helping to improve transparency. Obviously, debt is a backward-looking indicator and cannot answer the question of whether a government will be able to meet its obligations if and when they arise in the future.

**GAAP-based balance sheets**

Accounts based on Generally Accepted Accounting Practice (GAAP) look at past transactions and the extent to which these have already committed future funding flows; they therefore provide a fuller picture of an entity's position than a simple cash statement by including all of that entity's assets and liabilities. The Government has announced that it will publish a GAAP-based balance sheet as part of its move towards publishing Whole of Government Accounts. 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 events. 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 events, which limits the balance sheet's usefulness in assessing long-term fiscal sustainability.

**Indicators based on comprehensive projections**

Indicators based on comprehensive projections will generally take account of existing liabilities (for example debt) and will include information about future spending and revenue streams. As such they can provide an answer to the question 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 important.

**RECENT DEVELOPMENTS IN PUBLIC FINANCE REPORTING****New information from GAAP-based accounts**

**3.5** The Government announced in 2003 that it will publish WGA for the 2006-07 financial year onwards, once the methodological issues that have been raised by the development work have been addressed through the dry-run processes. WGA will be prepared under Generally Accepted Accounting Practice (GAAP) and will be a single set of commercial-style financial statements for the whole public sector – central government, local government and public corporations. WGA will include new information on areas such as provisions and contingent liabilities, and will provide new ways of looking at existing information, for example on public service pension liabilities. Internationally, information developed using a GAAP-based system has been used in different ways by governments, see Annex A, Box A2.

**GAAP-based balance sheet 3.6** The 2003 *Long-term public finance report* introduced the concept of the GAAP-based (also known as accruals-based) balance sheet. The 2003 Report argued that the GAAP-based balance sheet complemented other financial indicators such as net debt and comprehensive projections, and provided useful information to assess the long-term sustainability of the public finances. The GAAP-based balance sheet records assets and liabilities accumulated to date as a result of past transactions or events.<sup>3</sup>

**Assets 3.7** The Government's assets take two main forms: fixed (or long-term) and current. The Government holds many fixed assets for long-term policy reasons. These include physical (or tangible) assets such as buildings, roads, and military and other specialist equipment. Fixed assets also include non-physical (or intangible) assets such as expenditure incurred in the development of physical assets, and patents. Finally, there are long-term financial assets (or fixed asset investments) such as student loans.

**3.8** Current assets consist of cash holdings and other amounts receivable in the short term (known as debtors). They also include investments that are not held for long-term policy reasons – typically securities issued by other governments and supra-national organisations – and stocks such as military equipment and land or buildings that are being redeveloped.

**Liabilities 3.9** The Government has many different types of liabilities. National accounts, which have been prepared for many years to internationally agreed standards by the Office for National Statistics, include those liabilities with the greatest degree of certainty. These are the formal, legally enforceable liabilities to transfer known amounts at known times to third parties – hereafter this type of liability is referred to as a creditor. Government debt is one example of such a liability. The Government is interested in developing information on additional types of liability to complement those already available in national accounts. The Whole of Government Accounts (the GAAP-based accounts) will include information on liabilities that have some degree of uncertainty surrounding them. Box 3.2 provides more information.

<sup>3</sup>For an illustration of the accruals-based balance sheet, see 2003 *Long-term public finance report: fiscal sustainability with an ageing population*, HM Treasury, December 2003, Chart 3.2.

**Box 3.2: Liabilities in Whole of Government Accounts<sup>a</sup>**

Whole of Government Accounts will include information on four types of liability: creditors, which also appear in national accounts, provisions, contingent liabilities and remote contingent liabilities. Determining whether a particular transaction is a creditor, provision or contingent liability requires a two-stage test. First, is there a liability? Second, which type of liability is it?

A liability is a present, unavoidable, obligation to pay a third party as the result of a past event. Generally it is clear when a liability arises. A supplier delivers goods (the past event), with the buyer having a contractual obligation to pay for them (the present obligation). However, in more complicated cases it can be less clear that there is a liability. For example, a nuclear generator will not have to pay decommissioning costs until they stop generating electricity and start the decommissioning work. However, they are statutorily obliged to pay for clean up costs as soon as nuclear energy starts to be generated. Therefore the past event creating the obligation is the commencement of power generation and not the end of power generation.

The past event concept is critical to deciding whether or not a liability exists at the balance sheet date. For example, as an employer, the government knows it will need to pay salaries to its employees in the future. However, only when an employee has completed a day's work, has an unavoidable obligation to pay been incurred that would be recognised as such in GAAP-based accounts.

If there is a liability, then it still needs to be determined whether it is a creditor, provision or (remote) contingent liability. This depends on the level of certainty that can be attached both to whether there is a present obligation, and the timing and amount that will have to be paid. Nuclear decommissioning again provides an example of this: once power generation begins then there is an unavoidable obligation to pay but the timing and amount of this will not be clear until many years later. The differences are set out in the table below.

**Defining creditors, provisions and contingent liabilities**

Concept	Level of certainty	Example
Creditor	Certain transfer	Government debt
Provision	Certain or probable transfer but uncertain about amount or timing	Nuclear decommissioning liabilities
Contingent liability	Possible transfer, may be uncertainty about existence of past event	Guarantees on private sector borrowing
Remote contingent liability	Possible transfer, but unlikely to occur	Guarantees to exporters under the export credit guarantee scheme

These items will be treated differently in Whole of Government Accounts. Creditors and provisions will both be included, but separately identified, in the GAAP-based balance sheet and will count fully towards the balance sheet totals. By contrast, contingent liabilities and remote contingent liabilities will be disclosed as a note to the accounts and will not count towards the balance sheet totals. In some cases it is not possible to quantify contingent liabilities and, when this occurs, only a narrative description will be included.

<sup>a</sup> For fuller explanation see *Financial Reporting Standard 12: Provisions, contingent liabilities and assets*. Accounting Standards Board.

**3.10** Even more information on the Government's liabilities are available from comprehensive measures that consider not just those liabilities arising from past events but also those arising from future events. Box 3.3 considers how past and future liabilities relate to each other.

**Box 3.3: Comprehensive framework for liabilities**

GAAP-based accounts reflect events that have happened by the balance sheet date. A fuller understanding of liabilities at a particular moment in time is reached by comprehensive measures, which take account of future events as well. The table below shows how the concepts presented in Box 3.2 could be further delineated into past events and future events.

**Past and future liabilities**

	Certain transfers	Certain or probable transfer but uncertain about amount or timing	Possible transfers (including those unlikely to occur)
<b>Payment in the future but obligation (legal or constructive) to pay incurred through past activities</b>	Creditors, e.g. government debt	Provisions, e.g. nuclear decommissioning liabilities	Contingent liabilities (including remote), e.g. government guarantees
<b>Payment in the future and obligation to pay incurred in the future</b>	Executory contracts such as contracts of employment	Transfers such as Jobseeker's Allowance	Reconstruction costs following natural disaster

The European Commission's publication *Public Finances in EMU – 2004*<sup>a</sup> explores this theme of present and future obligations, which it terms explicit and implicit, and how they might be used within a budgetary framework. The taxonomy developed in the Commission publication is similar, but not identical, to that above.

<sup>a</sup> *Public Finances in EMU – 2004*, European Commission, 2004.

**Public service pensions 3.11** National accounts show public service pension schemes as annual flows in from current employees and out to current pensioners. This matches the liability to the cash outflow. WGA will recognise pension liabilities as public service employees earn their entitlement, which can be 40 or more years before pension payments commence. These liabilities will be reduced each year as payments are made to pensioners. The WGA approach matches the liability to the entitlement to a future cash outflow.

**3.12** Clearly there is a significant degree of uncertainty in factors determining future pension entitlements, such as life expectancy and salary development, which are not known early in an individual's career. As a result, public service pension scheme liabilities are in effect very large provisions, although any assets held by the pension scheme are netted off against them in the balance sheet.

**3.13** There is an obvious synergy between the information needed for Whole of Government Accounts and that needed for long-term comprehensive fiscal projections – both need high quality data on the anticipated pension payments in each year. As with other provisions though, Whole of Government Accounts will only look at a sub-set of the information needed for long-term comprehensive projections as, for example, future employment and the resulting future build-up of pension entitlements are not considered. This becomes more significant as the time frames get longer.

**3.14** The new information on liabilities is just one way in which the Government expects to benefit from the Whole of Government Accounts programme. Other ways include: using WGA as a catalyst to converge the different accounting policies within the public sector and so improve the comparability of public sector finance data; improving the transparency of the data; and demonstrating the integrity of the data by opening them to greater external scrutiny through the external audit process. Once complete, Whole of Government Accounts will represent one of the most complex consolidations in the world and place the UK at the forefront of public sector financial reporting.

## INDICATORS BASED ON COMPREHENSIVE PROJECTIONS

### Top-down approach: updated illustrative long-term fiscal projections

**3.15** Within the Economic and Fiscal Strategy Report (EFSR), the *Code for Fiscal Stability*<sup>4</sup> requires that illustrative long-term projections of the outlook for the key fiscal aggregates are presented for a period of no less than ten years into the future, based on a range of plausible assumptions, so as to shed some light on the inter-generational impact and sustainability of fiscal policy.

**3.16** These projections are presented in Annex A of the EFSR and have in practice covered a 30-year horizon. The projections are derived using a top-down approach. One of the main strengths of this approach is that it can be based on the assumption that the fiscal rules are met. As such, the top-down approach answers the question: what resources are available for future spending, assuming that the fiscal rules are met? In particular, the illustrative long-term fiscal projections presented in Annex A of the EFSR calculate at what rate current consumption (for example current spending on health and education) can grow while allowing the Government to meet its fiscal rules. An added advantage of the illustrative long-term fiscal projections is that they explicitly show the evolution of the debt to GDP ratio over time. Chapter 5 provides updated illustrative long-term fiscal projections.

### Bottom-up approach

**3.17** A different approach is to calculate bottom-up projections. The bottom-up approach is a popular technique that can be used to project the path of individual spending and revenue items, either in absolute terms or as a share of GDP, into the future. Bottom-up projections can be constructed using a wide range of factors, including demographic developments, cost and demand drivers, and investment requirements. These projections can then be used to identify future fiscal pressures, and various ‘what if’ scenarios can be simulated.<sup>5</sup>

### Comprehensive bottom-up projections

**3.18** In order to assess the long-term sustainability of the public finances, bottom-up projections need to be comprehensive on the spending and revenue side. This can either be achieved by generating a full set of projections or by assumption. The latter approach is frequently taken, for example to keep the projection exercise simple or because there is *ex-ante* a good reason to believe that a particular item will evolve in a specific way over time. Chapter 5 provides the results of this year’s comprehensive bottom-up projections.

<sup>4</sup> *Code for Fiscal Stability*, HM Treasury, March 1998.

<sup>5</sup> A combination of the top-down and bottom-up approaches is possible. The illustrative long-term fiscal projections published in Annex A of the EFSR, for example, incorporate bottom-up projections of transfer spending (e.g. social security transfers) in the overall top-down framework.

**3.19** A comprehensive set of bottom-up spending and revenue projections can be used to derive future primary balances. With these it is possible to identify any changes in specific spending and revenue items over the long term, and assess the long-term sustainability of the public finances. Countries such as Australia have used this technique in evaluating the outlook for the long term.<sup>6</sup> The change in projected expenditure on the programmes studied can provide an indication of what might need to happen to spending and/or taxation to reduce or even eliminate any projected fiscal imbalance. As such the bottom-up approach is well-suited to alert policy makers to potential changes in spending and revenue over the long term, and provides useful insights into the long-term sustainability of the public finances.

**3.20** A number of fiscal sustainability indicators are based on the relationship of projected primary balances in the long term and the initial debt stock. These indicators are discussed below and include the intertemporal budget constraint and fiscal gaps. These indicators form an integral part of the assessment of long-term fiscal sustainability presented in this Report.

### Intertemporal budget constraint/gap

**3.21** To formalise the assessment of sustainability, the government's obligations over time can be represented by the intertemporal budget constraint (IBC).<sup>7</sup> The IBC states that the present discounted value (PDV) of all future revenue should be equal to the PDV of future spending and today's outstanding debt burden. Put differently, the current level of debt must be equal to the PDV of all future primary balances.

**Intertemporal budget gap** **3.22** If the present discounted value of future primary balances is not sufficient to cover the current debt burden (and hence the intertemporal budget constraint is not met), then the extent of the imbalance is called the intertemporal budget gap (IBG). The IBG can be used to calculate the immediate and permanent change in the fiscal stance that is needed to meet the intertemporal budget constraint, in other words so that the present value of revenue is equal to the present value of spending over an infinite horizon plus current debt. Meeting the intertemporal budget constraint does not mean that debt is ever fully paid off. What it means is that debt cannot, on average, grow at too fast a rate, given the levels of interest rates and economic growth rates, and will hold as long debt is growing at a rate lower than the real interest rate. Effectively, sustainability is measured not in terms of a debt to GDP ratio but in terms of a government's ability to service its debt.

**3.23** To get a feel for the relative magnitude of the imbalance (if any), the intertemporal budget gap is often expressed either as a percentage of GDP or in terms of revenue. The latter interpretation is that to restore balance, revenue would have to be raised (or lowered if there is a negative gap) by a certain percentage today, and this increase (decrease) to be carried forward into the future. This does not mean though, that the required adjustment would have to come from the revenue side. A change in spending of the same size would also work, as would a combination of the two.

**3.24** More generally, even if the IBG points to an imbalance, it does not necessarily imply that fiscal action should be taken. Over these very long time horizons, many policy levers are available and in general structural policies, including those that help to raise trend growth, for example through higher employment rates or reforms to specific spending programmes, will be at least as important.

<sup>6</sup> *Intergenerational Report 2002-03*, Department of the Treasury of Australia, May 2002.

<sup>7</sup> For a more technical discussion of the intertemporal budget constraint and the other approaches introduced in this chapter see 2002 *Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, November 2002, Chapter 4 and Annex A.

**3.25** The key strength of the intertemporal budget constraint approach is that it is comprehensive in the spending and revenue items covered, and in the time horizon over which it is calculated. The intertemporal budget constraint approach also has a number of weaknesses though. First, the results are sensitive to the starting position of the projection and the discount rate chosen. Second, as long as the IBC is satisfied, there are no further constraints on the evolution of the debt to GDP ratio over time, in other words the ratio can take any value. This potentially raises compatibility issues with existing debt targets such as the UK's sustainable investment rule or the 60 per cent gross debt to GDP criterion in the EU's Stability and Growth Pact. It also implies that the IBC does not necessarily ensure that a government can meet its future obligations *if and when they arise* in the future.

**3.26** Meeting its obligations if and when they arise might require substantial inter-generational transfers as future generations might have to pay off debt built up by earlier generations. The IBC therefore provides limited information on generational fairness aspects of fiscal policies. Third, being a stock indicator, the IBC does not reveal when pressure on the public finances might be greatest in the future. Fourth, when covering an infinite time horizon, the IBC and IBG face a high degree of uncertainty, which makes them inevitably imprecise. The IBC and IBG share this characteristic with other indicators that are based on very long horizons.

## Fiscal gaps

**3.27** The fiscal gap approach calculates the immediate and permanent change in the primary balance needed to achieve a certain, pre-determined debt target in the future.<sup>8</sup> The required change in the primary balance to GDP ratio depends on the initial and desired target ratios, the time horizon (the end point of which is often called the 'target year'), and the projected primary balance. Various countries such as the US and New Zealand<sup>9</sup> have estimated the magnitude of their fiscal gaps.

**3.28** One of the main differences between the fiscal gap and intertemporal budget constraint approaches is that the former is based on a finite (pre-determined) horizon whereas the latter covers an infinite horizon. This means that any information on the future evolution of the primary balance beyond the target year is ignored in the calculations of fiscal gaps. Choosing the horizon for the fiscal gap calculations therefore involves a trade-off in that it should be long enough to capture all the major future developments which might impact on the primary balance, but also short enough to minimise the degree of uncertainty. In practice, it is best to present fiscal gaps over a range of horizons.<sup>10</sup>

<sup>8</sup> This definition follows *The US fiscal problem: where we are, how we got there, and where we're going*, Alan Auerbach, in NBER Macroeconomics Annual, edited by S. Fischer and J. Rotemberg, 1994.

<sup>9</sup> See *The Long-Term Budget Outlook*, Congressional Budget Office, 1998 and *The Long-Term Budget Outlook: an Update*, Congressional Budget Office, 1999, and *Long-term fiscal projections and their relationship with the intertemporal budget constraint: an application to New Zealand*, John Janssen, New Zealand Treasury, 2002.

<sup>10</sup> Blanchard *et al.* suggest the use of a range of short-, medium- and long-term indicators to assess fiscal policy, as in practice it is best to present calculations over a range of time horizons. They propose a three-tiered indicator, where sustainability is assessed 1, 5 and 40 years ahead. Assessing sustainability over the current year has the advantage of not requiring forecasts, and hence being constructed from publicly available data. However, the resulting snapshot would not be very informative, as it would include the effect of the cyclical position of the economy in that particular year. A medium-term indicator would capture the impact on the primary balance of cyclical movements, and would draw on widely available medium-term forecasts but could still miss longer-term pressures, e.g. those related to demographic developments. An assessment over a 40-year horizon would complete the analysis by including the long-term trends in spending and revenue. See *The Sustainability of Fiscal Policy: New Answers to Old Questions*, Olivier Blanchard, Jean-Claude Chouraqui, Robert P. Hagemann and Nicola Sartor, OECD Economic Studies 15, 1990.

**3.29** One of the main strengths of fiscal gaps is that they are intuitive and can be easily explained and interpreted in the context of existing policy rules. An additional strength is that fiscal gaps can be calculated using a range of target years and target debt to GDP ratios. There are also a number of limitations. For example, Kennedy and Matier argue that: “It is important to be clear about what we can and cannot conclude from fiscal gap estimates. A fiscal gap of zero indicates that current fiscal policy is sustainable... However, this does not necessarily mean that current fiscal policy is on an optimal path”.<sup>11</sup> Another limitation, especially for fiscal gaps with distant target years, is that the debt to GDP ratio might exceed the desired target value at some point during the projection period. This is likely to happen if revenue and/or spending develop in a non-linear way, which is possible over longer time periods, for example due to the retirement of the baby-boom generation. Box 3.4 discusses two fiscal indicators used by the European Commission to assess long-term fiscal sustainability in the EU Member States.

#### **Box 3.4: The European Commission’s sustainability indicators**

The European Commission regularly publishes assessments of the long-term sustainability of the public finances of Member States.<sup>a</sup> As part of this assessment two quantitative indicators are used, which are known as ‘sustainability gaps’, S1 and S2.

The S1 indicator is similar to the fiscal gap concept, in that it measures by how much taxes need to rise, or spending cut, to achieve a specific debt target in the future. However, there are a number of differences to the fiscal gaps presented in the Long-term public finance report. Perhaps most importantly, the debt target is not an explicit target (such as the current level of debt or 40 per cent of GDP) but an implicit target, which would result if a balanced budget were run until the target year, 2050. In practice for the UK, and other low debt countries, this means a debt target close to zero. Additionally different assumptions are made, for example Eurostat, rather than GAD, population projections are used and revenue is held constant as a share of GDP over the projection period. An alternative to the S1 indicator would involve aiming for a common debt target for all Member States, independent of their current level of debt. For example, a natural target would be the 60 per cent gross debt to GDP criterion set by the Stability and Growth Pact.

The S2 indicator is the intertemporal budget gap, in that it measures by how much taxes need to rise, or spending cut, so that the present value of revenue is equal to the present value of spending over an infinite horizon plus current debt. Again there are a number of differences with the intertemporal budget gap presented in this Report. A significant difference is that spending and revenue are only projected up to 2050, and then held constant as a share of GDP for infinity, whereas in this Report the projection horizon is 100 years.

<sup>a</sup> *Public Finances in EMU – 2004*, European Commission, 2004.

### **Alternative fiscal gap indicator**

**3.30** It is possible to imagine other indicators of long-term fiscal sustainability. Last year’s Report introduced another indicator, which is related to the fiscal gaps approach. This alternative fiscal gap indicator calculates the immediate and permanent change in the primary balance necessary so that the debt to GDP ratio *never* exceeds a certain limit. This indicator therefore addresses one of the limitations of the intertemporal budget constraint and fiscal gaps, which put no explicit restrictions on the evolution of the debt to GDP path over the projection period. Chapter 5 shows the evolution of net debt as a share of GDP over a 100-year period, using this alternative indicator.

<sup>11</sup> *Comparing the Long-term Fiscal Outlook for Canada and the United States Using Fiscal Gaps*, Suzanne Kennedy and Chris Matier, Department of Finance Canada, 2003, page 4.

## Generational accounting

**3.31** Generational accounting provides a different approach to thinking about long-term fiscal issues.<sup>12</sup> It is based on the notion that fiscal policies should be generationally fair. To assess whether policies are generationally fair, generational accounting compares the projected net lifetime tax transfers faced by newborns born in different years. If the projected net transfers of these different groups are similar,<sup>13</sup> then current policies are considered to be generationally fair.

**3.32** The generational accounts' inter-generational balance gap (IGG) indicates by how much current taxes have to rise (or fall), or spending has to fall (or rise), so that a current newborn and a future newborn are equally well off.<sup>14,15</sup> One strength of generational accounts, which are generally based on national accounts classifications, is that they provide a comprehensive picture of the long-term sustainability of the public finances. Furthermore the generational accounts provide a single, consolidated indicator of the inter-generational fairness aspects of current policies. The main drawback is arguably that the inter-generational balance indicator is difficult to interpret, which makes it difficult to communicate. Moreover, generational accounting is very different from the other forward-looking indicators, which makes comparisons more difficult, and data intensive. Chapter 5 provides this year's estimate of the IGG.

## OVERVIEW OF APPROACHES

**3.33** Chart 3.1 provides an overview of the approaches used in this Report. The chart shows that the top-down approach is distinct from the other approaches in that it is based on desired future fiscal policy settings rather than underlying future cost, revenue and demand drivers. The fiscal gap and generational accounts can be derived from the same comprehensive bottom-up projections.

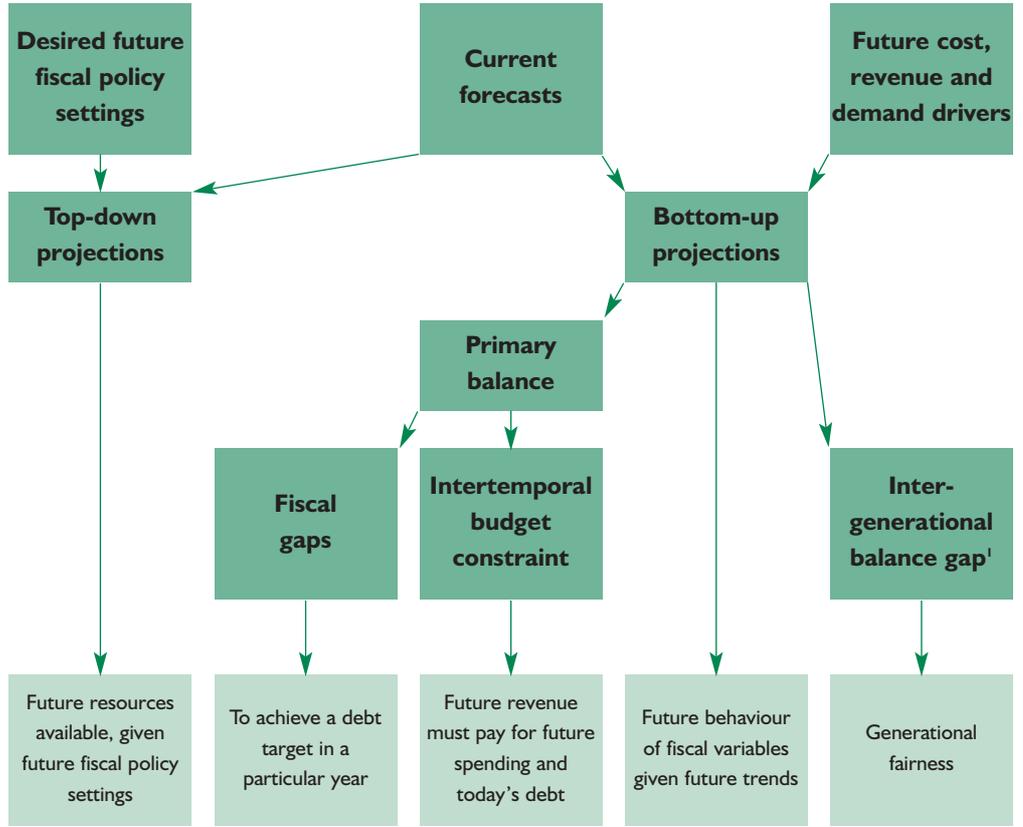
<sup>12</sup> See *Generational accounts: a meaningful alternative to deficit accounting*, Alan Auerbach, Jagadeesh Gokhale, and Laurence J. Kotlikoff, in *Tax Policy and the Economy*, edited by David Bradford, 1991.

<sup>13</sup> Net tax payments are the difference between taxes paid to the government and transfers received from the government. To be comparable, the generational accounts for different age cohorts need to be growth adjusted. It is also possible to express net tax payments in terms of income to make the comparison.

<sup>14</sup> The comparison is made with current newborns, rather than all past newborns (existing generations), since although the current government can affect the lifetime tax burden for current and future newborns, it can only partially affect the lifetime tax burden for existing generations. This is because existing generations have already faced past tax regimes, set by previous governments. The technical details for the calculation of the inter-generational balance gap can be found in Annex A of the 2002 *Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, November 2002.

<sup>15</sup> For the UK, the IGG therefore provides one indication of how far the Government is achieving its fiscal policy objective of ensuring that spending and taxation impact fairly between generations. Clearly, generational accounting only provides one way of thinking about generational fairness. See 2003 *Long-term public finance report: fiscal sustainability with an ageing population*, HM Treasury, December 2003, Box 4.2 for a discussion of what constitutes generational fairness.

**Chart 3.1: Overview of approaches**



<sup>1</sup> Bottom-up projections need to be broken down in age groups.



# 4

## ASSUMPTIONS

### DEMOGRAPHY

**Updated population projections** 4.1 The population projections used in this Report are based on the Government Actuary's Department (GAD) 2003-based interim principal population projections, which were published in September 2004. This year's Report therefore incorporates the latest population projections available. The main results and differences from previous projections are presented in Chapter 2.

### LABOUR MARKET

4.2 The Report requires assumptions on labour market participation rates and the unemployment rate. These are needed for a number of reasons, including:

- transfers such as unemployment benefits depend on unemployment rates;
- future state pension expenditure depends on entitlements.<sup>1</sup> For example, the gradual rise in female participation rates will, everything else equal, lead to higher pension spending in the future as these women build up higher pension entitlements; and
- 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 and hence future GDP levels.

**Baseline employment projection** 4.3 As in previous reports, and to improve comparability, the baseline projections underlying the main results set out in Chapter 5 assume that the overall employment rate remains unchanged beyond the medium term.<sup>2</sup> This means that changes in employment levels are entirely due to changes in the size of the working-age population. Up to 2009-10, the projections are consistent with medium-term projections in the 2004 Pre-Budget Report.<sup>3</sup>

**Alternative employment projection** 4.4 However, although simple and transparent this method does not account for either the effect of an ageing population on participation rates, or the current trend of increasing female labour market participation. This year an alternative employment projection is also presented, using the so-called 'cohort' method, which attempts to take account of both these factors. The effect of using this alternative assumption on the projections of spending is shown in Box 5.4.

**An ageing workforce** 4.5 An ageing population is, other things equal, likely to lead to a fall in overall participation in the labour market. This is because older workers generally have lower participation rates than younger workers due to, for example, early retirement and ill health. A simple way to account for this would be to hold age-specific participation rates constant (e.g. for the cohorts aged 20-24 years, 25-29 years etc) and then apply these rates to the population projections. However, the ageing of the workforce is only one of many future developments that could impact on future participation, and therefore only including this

<sup>1</sup> To be entitled to the full basic state pension, individuals must have reached state pension age, 65 years for males and 60 years for females (the latter will be raised to 65 years between 2010 and 2020). In addition, individuals are generally required to have paid, and/or have been credited as having paid, National Insurance Contributions for about 90 per cent of their working life in order to receive the full basic state pension.

<sup>2</sup> See 2002 *Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, November 2002, page 31.

<sup>3</sup> 2004 *Pre-Budget Report*, HM Treasury, December 2004.

downward impact could lead to biased projections. Recent work by the Organisation for Economic Co-operation and Development (OECD)<sup>4</sup> identified that in almost all OECD countries, including the UK, the two most important factors for future participation rates are likely to be the age structure of the population and the cohort effect.

**The cohort effect 4.6** The cohort effect describes the effect of current young cohorts gradually replacing current older cohorts. In essence, it implicitly takes into account that individuals belonging to any given generation or cohort have their own specific level of participation, that is usually different from the corresponding level of participation of preceding generations. This is likely to have important implications for future participation rates. In the case of females, younger females today are much more likely to participate in the labour market than females of the same age were, say, 20 or 30 years ago. This increase in participation is due to a number of factors, including social change, increasing educational attainment of women and sex-discrimination legislation. It is reasonable to expect that the current generation of young females will participate in the labour market more *over their entire working lives* than their predecessors. For example, females aged 25 years today are likely to have a higher participation rate when they are 55 years old (in 2034) than today's 55-year olds. For females the cohort effect is therefore likely to have a positive effect on participation rates in the future. In the case of males the cohort effect is likely to have a negative effect, due to the trend over the past twenty years of falling male participation,<sup>5</sup> but this effect is negligible.

**4.7** The modelling approach used in the alternative scenario follows that of the OECD and explicitly takes into account the ageing of the population and the cohort effect. It also implicitly accounts for other explanatory variables on future participation rates, such as increasing educational attainment, as these are part of the cause of the increases in female participation.

**4.8** The modelling approach uses historic lifetime participation profiles of different cohorts to 'track' the current young cohorts through the projection period.<sup>6</sup> This is achieved by calculating the probability of entry or exit from the labour market between each age-band using historical data on participation rates,<sup>7</sup> and then holding this constant over the projection period. It is also assumed that all cohorts entering the labour market in the future have the same characteristics as the most recent cohort for which actual data are available. Therefore, by the end of the projection period, once all cohorts of working age today will have left the labour force, the model will reach a steady state with constant age-specific participation rates. The projected evolution of participation rates for females is shown in Chart 4.1.

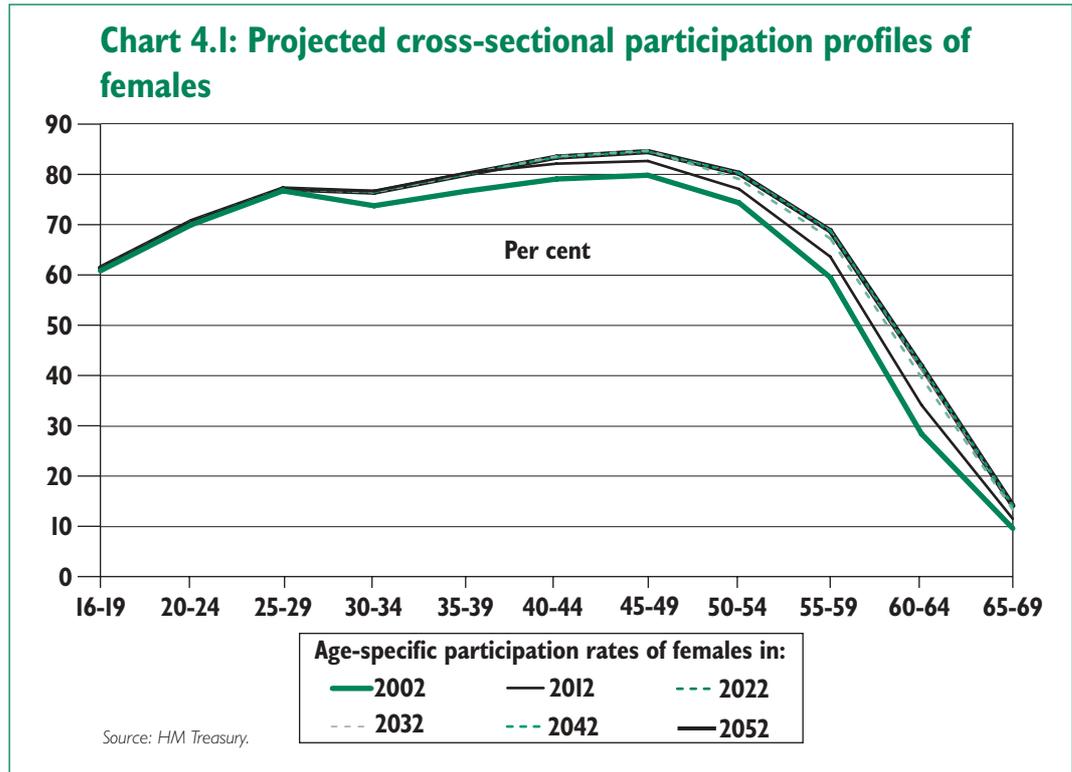
**4.9** Chart 4.1 shows the participation rates of females at different ages and over the projection period. Over time the participation rates of women are shown to be increasing, particularly for those aged 40 years and over. This is due to the current young cohorts with historically high participation rates gradually replacing older cohorts. For males (not shown) there is a very slight fall in participation rates over time, reflecting the trend over the past 20 years of early retirement.

<sup>4</sup> *Coping with Ageing: A Dynamic Approach to Quantify the Impact of Alternative Policy Options on Future Labour Supply in OECD Countries*, OECD, June 2004.

<sup>5</sup> Note that the most recent data have shown a slight reversal of this trend, with some increase in participation rates of older males.

<sup>6</sup> Full details of the method used can be found in *Coping with Ageing: A Dynamic Approach to Quantify the Impact of Alternative Policy Options on Future Labour Supply in OECD Countries*, OECD, June 2004.

<sup>7</sup> To remove the impact of the economic cycle on participation rates, the change in participation between 1997 and 2002, close to on-trend points, is used to calculate the entry/exit probabilities.



**4.10** This method also allows for the projection of participation rates for workers above the state pension age, 65-69 year olds. Under the baseline projection it is assumed that all individuals leave the labour force at state pension age. However, given the projected increases in life expectancy this assumption will become increasingly unreasonable, and it is expected that the current trend of increasing participation rates of this age group will continue in the future. Chart 4.1 shows that the participation rate of 65-69 year old females is projected to rise from around 10 per cent currently to around 14 per cent by 2052.

**Modelling the increase in female state pension age** **4.11** As this method is based on purely historical data it does not account for the increase in the female state pension age from 60 years to 65 years between 2010 and 2020, which can be expected to increase labour market participation of older females. However, the cohort model can be adjusted to pick up this effect.

**4.12** The model is adjusted by gradually reducing the probability that females aged 55-59 years and 60-64 years will leave the labour market between 2010 and 2020. By 2020 the probability of exit for these age-groups has been reduced under the assumption that the gap between female and male exit probabilities has halved. For example, before the rise in the state pension age the probability of exiting the labour market between the ages of 55-59 years and 60-64 years for females is just over 45 per cent, and for males just under 32 per cent, a difference of around 13 percentage points. It is assumed that the exit probability for females falls by half of this difference,  $6\frac{1}{2}$  percentage points, to around 39 per cent by 2020. The probability of exiting the labour market between the ages of 60-64 years and 65-69 years is then increased using the same method. Table 4.1 shows how participation rates change for females over this period, with male rates shown for comparison.

**Table 4.1: Projected participation rates before and after change in female state pension age (per cent)**

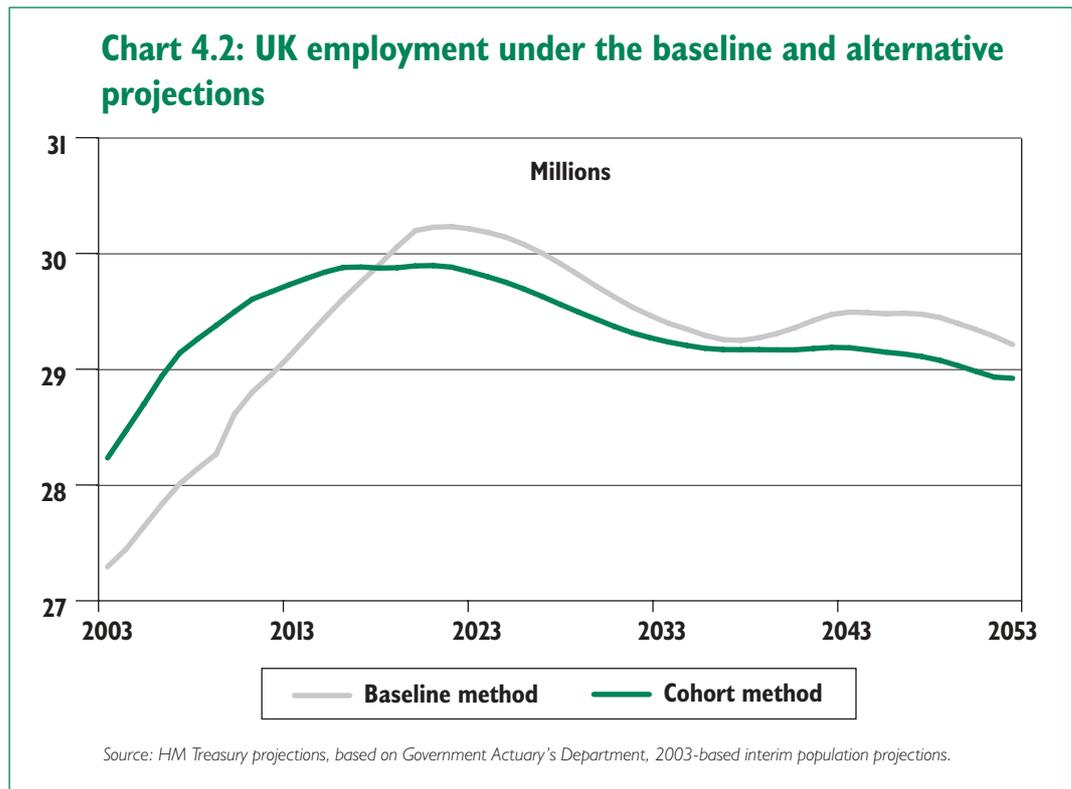
Age	Male		Female	
	2010	2020	2010	2020
55-59	76½	76½	62	66
60-64	52	52	32½	38½
65-69	16½	16½	10½	12½

**From participation rates to employment levels** **4.13** The cohort model therefore takes into account a positive future effect on participation rates, as the large rise in female participation more than outweighs the slight drop in overall male participation.<sup>8</sup> However, as mentioned above, an ageing population, everything else equal, will lead to a drop in employment levels. This effect is captured when the projected participation rates are used to project future employment levels.

**4.14** This is achieved by applying the projected participation rates to the population projections provided by GAD of 16-69 year olds. For example, in 2022 GAD project there will be around 2.2 million females aged between 30-34 years, and the cohort model projects their participation rate will be 76 per cent, therefore the labour force for that particular age and sex group will be approximately 1.7 million. The number of people in employment is then projected by reducing those participating in the labour market by the unemployment rate, which is the same for all ages/sexes and held constant in line with the NAO-audited assumption underlying the medium-term forecast.

**4.15** Chart 4.2 shows the evolution of employment levels under both the baseline and alternative assumptions. The chart shows that total employment is projected to evolve in a similar way under both assumptions. This is because, although participation rates for all female age-groups is increasing through the cohort effect, an ageing population means there will be more people in the older age bands who have lower participation rates. These two effects roughly cancel out, leaving the evolution of employment levels similar to baseline projection. However, there is a more pronounced rate of growth under the baseline projection, especially in the period 2010-20 due to differences in the way the rise in the female state pension age is modelled. Additionally, employment levels are higher at the beginning of the projection period using the alternative projection, as individuals working above the state pension age are included in this case.

<sup>8</sup>For example, the participation rate for males aged 40 to 44 years falls slightly from 92 per cent in 2002 to 90 per cent in 2053.



## PRODUCTIVITY

**4.16** The productivity growth assumption (output per person) used in the baseline scenario is 2 per cent per year as in previous reports. This is the average long-term productivity growth rate for the UK since the mid 1950s.

**4.17** However, lower and higher productivity growth assumptions of  $1\frac{3}{4}$  per cent and  $2\frac{1}{4}$  per cent per year respectively are also used to provide some sensitivity analysis. Annex A of the *Economic and Fiscal Strategy Report*<sup>9</sup> stresses that the lower productivity growth assumption is cautious. The higher productivity growth assumption is included, partly as there is upward pressure to productivity growth in the medium term.<sup>10</sup>

## GROSS DOMESTIC PRODUCT (GDP)

**4.18** Given assumptions regarding productivity and projections of employment growth, it is possible to project GDP growth beyond the end of the medium-term forecast period. Table 4.2 shows average real GDP growth in the coming decades for the baseline scenario.

<sup>9</sup> Economic and Fiscal Strategy Report in *Budget 2004: Prudence for a purpose: A Britain of stability and strength*, HM Treasury, March 2004.

<sup>10</sup> See *Trend Growth: Recent Developments and Prospects*, HM Treasury, April 2002 and *2004 Pre-Budget Report*, HM Treasury, December 2004.

**Table 4.2: Real GDP growth rate and its components in the baseline scenario (per cent)<sup>1</sup>**

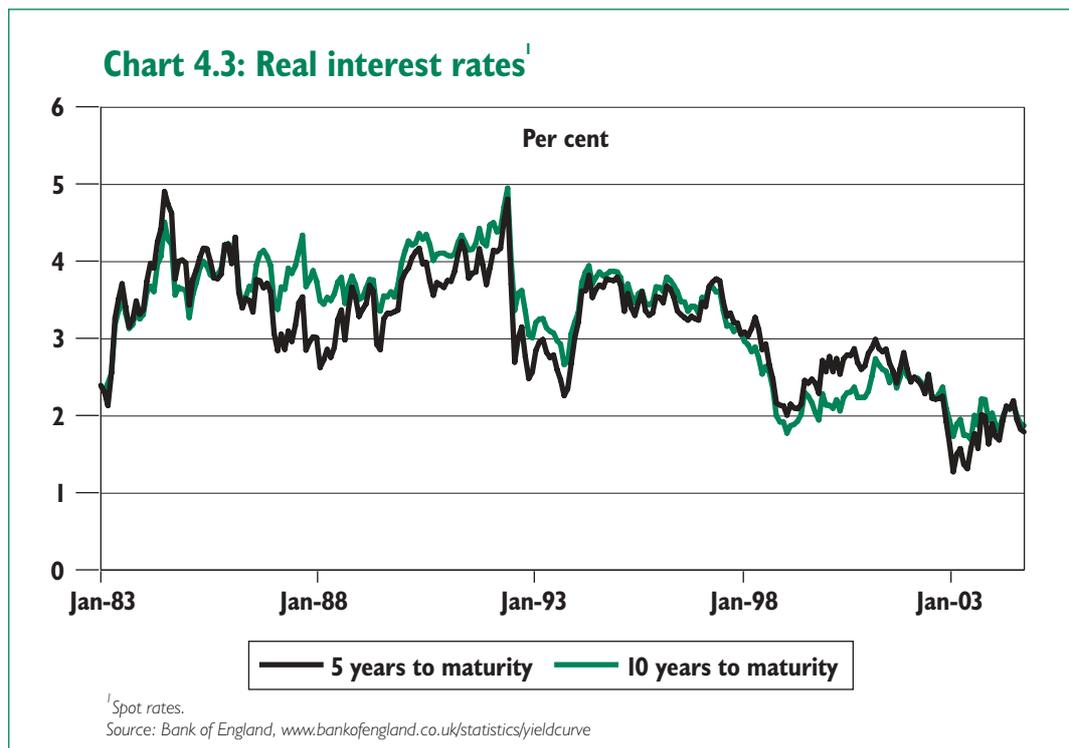
Year	2013–14 to 2022–23	2023–24 to 2032–33	2033–34 to 2042–43	2043–44 to 2052–53
Productivity	2	2	2	2
Employment	½	–¼	0	0
<b>Real GDP</b>	<b>2½</b>	<b>1¾</b>	<b>2</b>	<b>2</b>

<sup>1</sup> Productivity growth is 1¾ per cent and 2¼ per cent in the high and low productivity scenarios respectively.

## DISCOUNT/DEBT INTEREST RATE

**4.19** The forward-looking approaches to long-term fiscal sustainability (see Chapter 3) require a discount/debt interest rate assumption. This is necessary either to calculate the present discounted value of future spending and revenue flows or to project debt into the future.

**4.20** A discount rate can be derived from data on long-term real interest rates based on index-linked gilts. As Chart 4.3 shows real interest rates have varied between 1 per cent and 5 per cent since 1982, and have remained between 1 per cent and 3 per cent since 1998, averaging less than 2½ per cent since 2000. The Report presents results based on discount rate assumptions of 2½ per cent, 3 per cent and 3½ per cent.



**4.21** The discount rate assumptions are in line with the recommendations of the 2003 Green Book.<sup>11</sup> 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

<sup>11</sup> *The Green Book: appraisal and evaluation in central government*, HM Treasury, 2003.

calculations of long-term fiscal sustainability), in which a lower discount rate may be appropriate. The discount rate assumptions are also similar to those used in recent academic studies.<sup>12,13</sup>

## SPENDING AND REVENUE

### Current policies are assumed

**4.22** 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 prejudice future Government policy. This assumption is frequently used in long-term projections, for example in the illustrative long-term fiscal projections in Annex A of the EFSR and by the European Union's Economic Policy Committee.<sup>14</sup>

**4.23** Current policy has been interpreted as all policy already in place or announced in this year's Pre-Budget Report. Current policy refers to the level of per capita spending and revenue rather than the real growth rate in 2009-10, in other words what is used for the projections is the level of spending and revenue per head at the end of the medium term, and not the growth rate of spending and revenue in that particular year.

### Spending and revenue items have specific age profiles

**4.24** The majority of the spending and revenue projections are based on the same separate spending and revenue profiles for males and females as used in the 2002 and 2003 Reports. These profiles have been calculated by the National Institute of Economic and Social Research (NIESR), and used before in the context of generational accounts for the UK, derived from household or individual micro-data.<sup>15</sup>

**4.25** The profiles represent normalised per capita spending or revenue over different ages, and vary according to sex. They are normalised so that the sum of the proportion of spending on each age equals to one. This is important when the total spending is already known or provided by another source, for example pension spending, or total spending would not match the sum of spending on individual ages. The age aspect of the profiles allows the inter-generational aspects of the public finances to be examined. The profiles are best explained with the help of an illustrative example. Chart 4.4 shows the income tax profile for males.<sup>16</sup> As can be seen from Chart 4.4, males aged 15 years or less do not contribute to overall income tax revenue, whereas males 65 years and older only contribute a small proportion. The former observation is explained by the fact younger males are generally in education and do not earn income on which to pay income tax. The second is explained by the fact males reach state pension age at 65 years, with participation rates falling rapidly from then on. Males between 30 and 50 years contribute the most to overall income tax revenue. The gradual decline between 50 and 65 years is due to the fact that labour-market participation rates for males of these age groups fall.

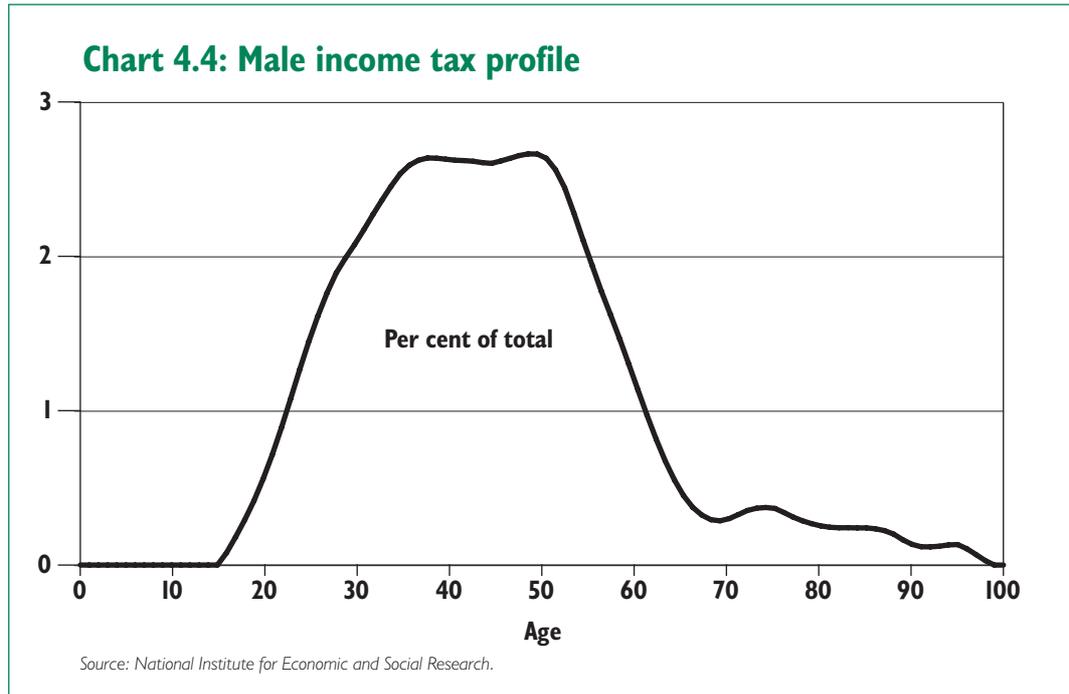
<sup>12</sup> Cardarelli *et al.* assume discount rates of 3, 5 (as their central case) and 7 per cent. See *Generational accounting in the UK*, Roberto Cardarelli, James Sefton, and Laurence J. Kotlikoff, *Economic Journal*, 2000.

<sup>13</sup> Gokhale and Smetters use a real discount rate assumption of 3.6 per cent, which they derive from the average yield on 30-year US Treasury bonds. See *Fiscal and Generational Imbalances: New Budget Measures for New Budget Priorities*, Jagadeesh Gokhale and Kent Smetters, American Enterprise Institute, July 2003. Auerbach *et al.* use a slightly lower real discount rate assumption of 3.3 per cent. See *Reassessing the Fiscal Gap: Why Tax-Deferred Saving Will Not Solve the Problem*, Alan J. Auerbach, William G. Gale and Peter R. Orszag, The Brookings Institute, July 2003.

<sup>14</sup> *The impact of ageing populations on public finances: overview of analysis carried out at EU level and proposals for a future work programme*, Economic Policy Committee, October 2003.

<sup>15</sup> For more details how the specific profiles have been derived see *Generational accounting in the UK*, Roberto Cardarelli, James Sefton, and Laurence J. Kotlikoff, *Economic Journal*, 2000.

<sup>16</sup> More examples can be found in the 2002 and 2003 Long-term public finance reports.



### Per capita contributions and allocations

**4.26** With these profiles, information on the number of males and females at each age, and the total money amount for the spending and revenue items, 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.

**4.27** The projection model calculates per capita allocations and contributions for all the spending and revenue items, using the spending and revenue profiles and information on total spending and revenue from HM Treasury's medium-term forecast. Where appropriate, the projection model raises the per capita allocations and contributions in line with productivity gains over the projection horizon. These per capita terms are then combined with detailed population projections to generate spending and revenue projections. The projections can then be used to calculate the indicators discussed in Chapter 3.

**4.28** Chapter 2 argued that there is a range of potential long-term socio-economic trends alongside the projected demographic changes. These trends include changing behaviours, expectations and preferences. The majority of these potential trends are not taken into account in the projections.

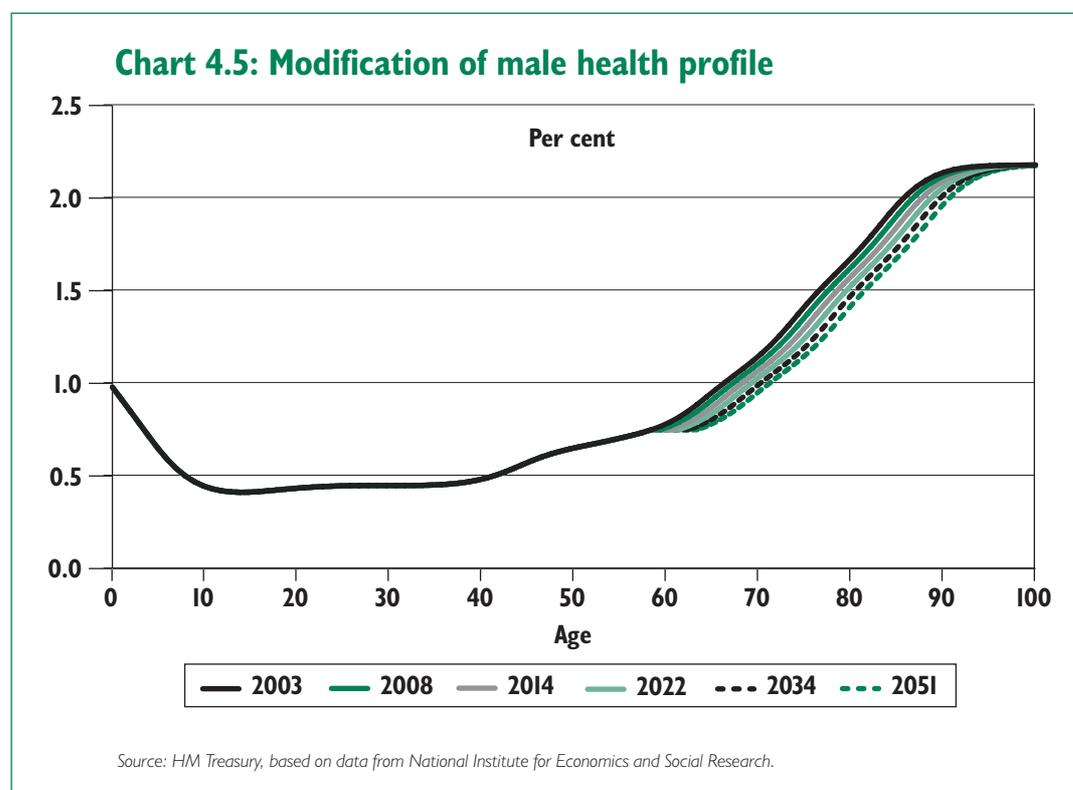
### Modification of health profiles

**4.29** As detailed in Chapter 2, one of the key potential drivers of future health spending is the health of the elderly, and in particular the degree to which there is an expansion or compression of morbidity. Due to the modelling approach adopted in the 2002 and 2003 Long-term public finance reports the health projections implicitly assumed a total expansion of morbidity, the fourth bar in Chart 2.6. This is an extreme assumption, particularly in light of the recent research outlined in Chapter 2. Alternative assumptions have been used, *inter alia*, by the Ageing, Health and Retirement in Europe (AGIR) Project,<sup>17</sup> a pan-European study financed by the European Commission examining whether the trend towards longer life expectancy has been accompanied by comparable increases in the expectancy of a life in good health. They suggest two assumptions, which they believe would capture the likely upper and lower trends one can reasonably expect concerning future advances in healthy life expectancies. An optimistic assumption would be that the number of years spent in bad

<sup>17</sup> *Bio-demographic aspects of population ageing*, Namkee Ahn, Ricard Genova, Jose A. Herce and Joaquin Pereria, AGIR, 2004.

health remains constant as life expectancy increases, the ‘shift to the right’ scenario. A more pessimistic assumption would be that only the proportion of life spent in ill health is constant, which implies some expansion of morbidity, in proportion to the increase in the number of years spent in good health. The health projections in this Report are based on this second, more cautious assumption.

**4.30** This new assumption is implemented by shifting the health spending profiles to the right, so that the increases in expenditure associated with old age are delayed. For example, GAD projects that male life expectancy at birth will have increased by around four years by 2022, and if the same proportion of life is spent in good health as now, this implies a rise in healthy life expectancy of around three years by 2022.<sup>18</sup> Therefore, for the purposes of this exercise, the male health profiles in 2022 are shifted forward three years from age 60 onwards, which is when age-related ill health first becomes significant.<sup>19</sup> Chart 4.5 shows the evolution of a male health spending profile.<sup>20</sup> This profile shift is repeated using the same method for all male and female health profiles.



**Long-term care 4.31** In past reports long-term care spending was held constant as a share of GDP after the medium term under the assumption that there would be a ‘shift to the right’ in the amount of time spent in long-term care. To increase consistency between the health and long-term care projections, the same modelling assumption is used for the latter as it is for the former, in other words, the proportion of life spent in long-term care is now assumed to remain constant. This is a more cautious assumption than was used in past reports.

<sup>18</sup>Based on a starting proportion of life in good health in 1998 of 80 per cent for males and 77 per cent for females, see *Healthy Life Expectancy: Trends to 1998, and the implications for long-term care costs*, Andrew Bebbington and Adelina Comas-Herrera, 2000, page 31.

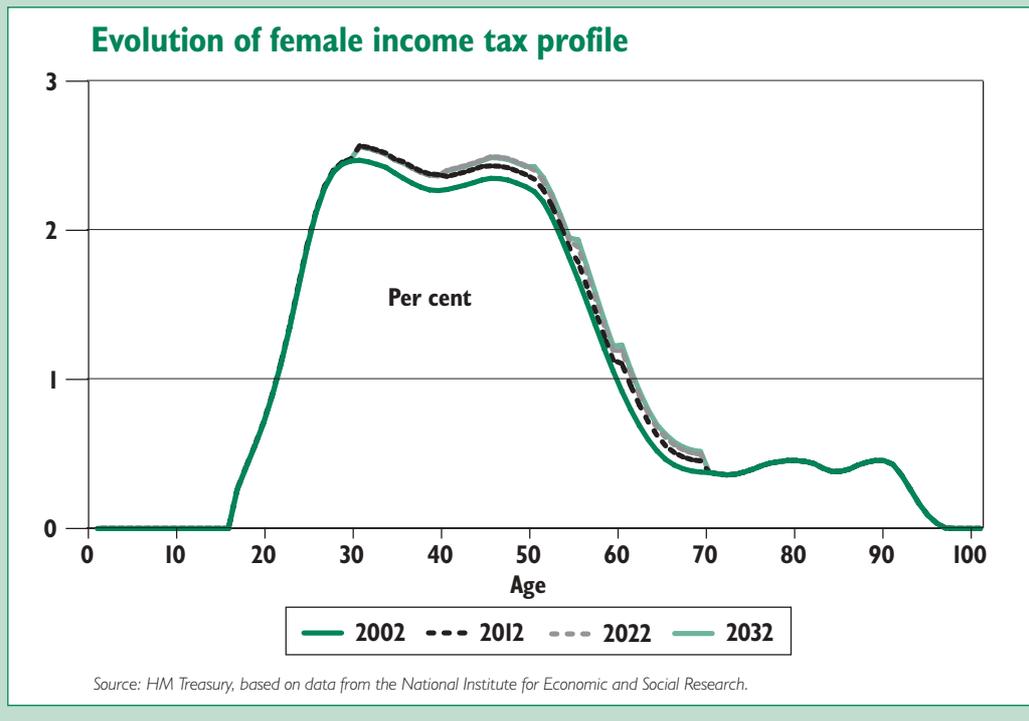
<sup>19</sup>Note that it is no longer necessary to normalise the modified profiles so that they sum to one, as they are projecting health expenditure, rather than just allocating expenditure as in the case of education spending for example.

<sup>20</sup>Because the profiles can only be shifted forward in units of one year, the chart shows that there are only five additional profiles, corresponding to increases in healthy life expectancy of one year.

**4.32** A further modification to the female income tax profile is required if the alternative employment projection is used. This is described in Box 4.1.

**Box 4.1: Changes to female income tax profile**

Under the alternative employment projection described above, the female income tax profile needs to be modified over time. Under the baseline projection this profile is held constant over time, as the total employment rate is constant. This implicitly includes the effect of an ageing population on employment rates and therefore tax revenue as the profile shows a sharp decline at around the age of 55 years. However, as female employment rates are projected to increase due to the cohort effect, holding the income tax profile constant would fail to account for the extra income tax this rise in employment would generate. Therefore the profile is raised every ten years in line with the projected employment rate increase. For example, the cohort model projects the employment rate for females aged 30-34 years to increase from 70 per cent in 2002-03 to 72 per cent by 2012, or a rise of around 3 per cent. The female income tax profile in 2012 is then raised by the same percentage for that age-group, and as in the modified health profiles it is no longer normalised to sum to one. The evolution of the profile is shown in the chart below. The male profile remains unchanged due to the negligible effect of the cohort effect on male employment rates.



**Other exceptions 4.33** There are a number of other spending items for which it is beneficial to rely on external projections, or where an explicit assumption regarding the future can be justified. These spending items are therefore treated differently from others in this Report. The two exceptions are:

- social security spending, which is projected by the Department for Work and Pensions and GAD. This is because the projection approach used in this Report would not capture a number of important trends, for example that future basic state pension spending will be affected by rising female participation rates in the past and the build up of the Pension Credit. The projections include a number of modelling refinements introduced since last year's Report; and

- new for this year, public service pension costs are projected by GAD using a more sophisticated model, which takes into account factors such as the degree of maturity of different public service pension schemes and changes in employment. The projections in the 2002 and 2003 Reports did not capture these factors. See Box 4.2 for more details.

#### **Box 4.2: Projecting public service pensions**

**Most of the major pension schemes for government employees are operated on a pay-as-you-go basis such that the costs of pension payments for retired civil servants, NHS employees, teachers, police, armed forces and fire fighters are a charge on today's taxation. There are over 3 million public service pensioners who receive £16½ billion in pay-as-you-go pensions. It is because these liabilities are met out of current spending that employment decisions must take account of the full cost of pensions and the aggregate net cashflow must be properly reflected in the long-term fiscal projections.**

**To achieve the latter the Government Actuary's Department (GAD) was commissioned to project 50-years ahead the combined costs of the NHS, teachers and civil service schemes. In terms of outstanding liabilities, these schemes cover around three quarters of all unfunded liabilities. This analysis was extended using additional information available about other schemes to gross up to cover all schemes. Inevitably projections over such a long timescale are dependent crucially on the assumptions made, *inter alia*, about workforce behaviour, the evolution of pension schemes, future employment growth and public sector earnings. The projections used in this Report assume that real earnings in the public sector grow in line with productivity in the economy as a whole and assume employment trends consistent with the 2004 Spending Review<sup>a</sup> but no change beyond that. Following the announcement in the 2002 Pension Green Paper,<sup>b</sup> the projections are based on an increase in the normal pension age from 60 years to 65 years for new entrants in 2006 and for the future service of existing staff in 2013. Assumptions about membership longevity are consistent with GAD assumptions elsewhere in this Report. None of these factors were modelled in the 2002 and 2003 projections of public service pension spending.**

<sup>a</sup> 2004 Spending Review: *Stability, security and opportunity for all: investing for Britain's long-term future*, HM Treasury, July 2004.

<sup>b</sup> *Simplicity, security and choice: Working and saving for retirement*, Department for Work and Pensions, December 2002.



## INTRODUCTION

**5.1** This chapter presents the results of this year's *Long-term public finance report*. As in last year's Report, the results are presented in terms of indicators based on historical data and forward-looking indicators. For the indicators based on historical data this Report examines, in addition to net debt and net worth, indicative figures for the GAAP-based balance sheet. The forward-looking indicators are presented on a range of discount rate and productivity growth rate assumptions, thereby illustrating some of the uncertainty regarding long-term projections.<sup>1</sup> In addition, this chapter presents spending and revenue projections based on an alternative employment scenario, that takes into account the cohort effect described in Chapter 4. The results are compared with those presented in last year's Report and other international studies.

**5.2** The analysis in this Report assumes, for modelling purposes, that spending and taxation policies at the end of the medium-term forecast, as presented in the 2004 Pre-Budget Report,<sup>2</sup> are continued into the future. Of course, this does not mean that there will be no changes to spending and taxation in the future, the former, for example, will depend on the results of future Spending Reviews.

### Long-term sustainability and the fiscal rules

**5.3** As discussed in Chapter 3, there are a variety of indicators that can be used to assess long-term fiscal sustainability. What matters from the Government's perspective is meeting its fiscal rules as discussed in Chapter 1.<sup>3</sup> Importantly, the Government sets fiscal policy to meet the fiscal rules over the cycle. It does not make sense to try to set fiscal policy now to meet exactly the fiscal rules over, say, the next 20, 50 or 100 years – the uncertainties are simply too great. Moreover, at these horizons the range of policy instruments available is much greater than simply changing spending plans and tax rates. A wide range of structural reforms could also make a vital contribution. The purpose of this Report is to look ahead beyond the normal medium-term horizon to ensure that current Government policies remain sustainable in the long run.

**5.4** A common starting point for thinking about long-term fiscal sustainability is to consider a sustainable debt to GDP ratio. Indeed, the Government's sustainable investment rule is based on this idea. 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.

## INDICATORS BASED ON HISTORICAL DATA

### Net debt, net worth and indicative net liabilities

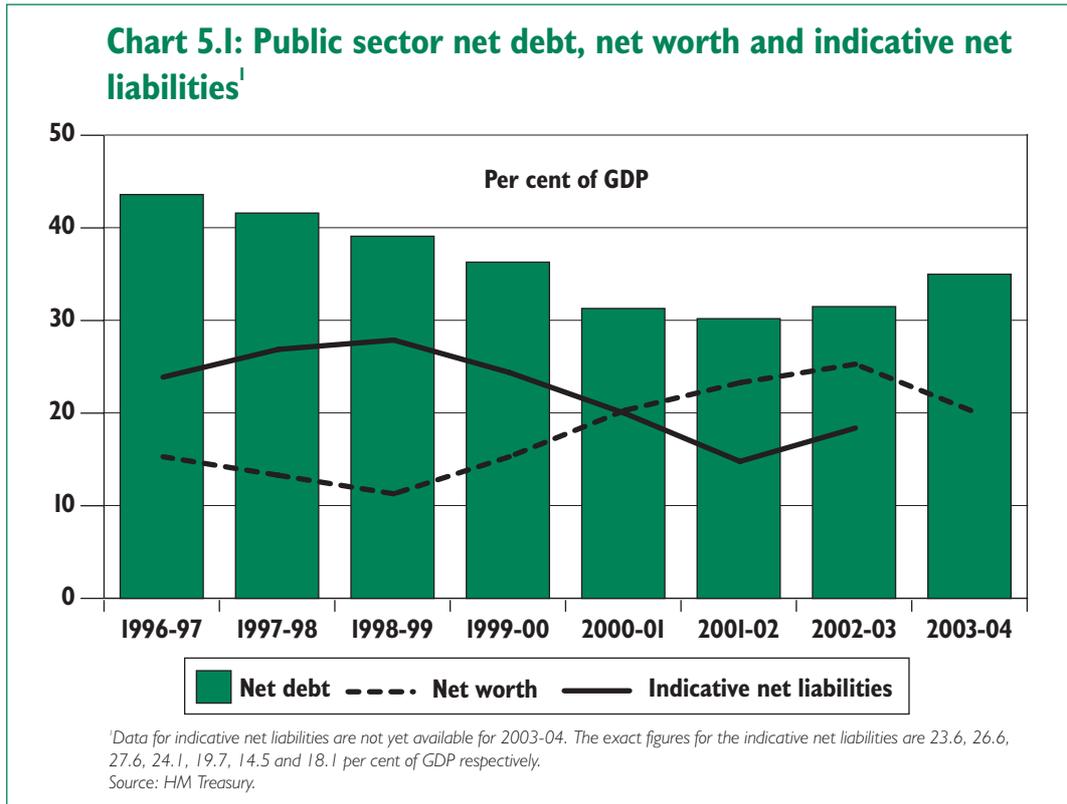
**5.5** The national accounts measure of net debt is one of the key fiscal aggregates and is the basis of the Government's sustainable investment rule. Chart 5.1 shows that the Government reduced net debt, as a share of GDP, from more than 40 per cent in 1997-98 to just over 30 per cent by 2001-02. Chapter 2 of the 2004 Pre-Budget Report provides updated projections of net debt as a share of GDP up to 2009-10.<sup>4</sup> Chart 5.1 also shows the public sector's net worth position, which is also based on the national accounts. Between 1998-99 and 2003-04 net worth doubled as a share of GDP. Unlike net debt, net worth is not used as a key indicator of the public finances as a result of difficulties involved in accurately measuring many government assets and liabilities.

<sup>1</sup> The assumptions used in this Report are stated in Chapter 4.

<sup>2</sup> 2004 *Pre-Budget Report*, HM Treasury, December 2004.

<sup>3</sup> See Chapter 1 for details on the Government's two fiscal rules, the golden rule and the sustainable investment rule.

<sup>4</sup> 2004 *Pre-Budget Report*, HM Treasury, December 2004.



**Net liabilities: indicative figures**

**5.6** Chapter 3 discussed the additional information that Whole of Government Accounts (WGA) will provide. In addition to the evolution of net debt and net worth, Chart 5.1 also shows indicative numbers for net liabilities over the same period. Net liabilities are calculated as the difference between total assets and total liabilities, the former comprises the public sector capital stock including land, buildings and infrastructure, short- and long-term investments and cash holdings, while the latter includes government debt and provisions. These are taken from un-audited indicative figures developed as part of the WGA programme. The indicative figures are not produced using a full Generally Accepted Accounting Practice (GAAP) framework, and are instead based on information available in the national accounts. However, they do include new information, such as public service pension and other provision estimates. Box 5.1 provides more information on the indicative net liabilities and how they compare with the national accounts measures of net debt and net worth, and comprehensive long-term projections.

**Box 5.1: Indicative net liabilities**

Indicative estimates based on national accounts are the first stage of the Whole of Government Accounts programme. The relationship between net liabilities and other sustainability indicators is set out in the table below.

**Coverage of net debt, net worth, comprehensive projections and net liabilities**

	National accounts		Comprehensive projections	Net liabilities
	Net debt	Net worth		
Financial assets	✓	✓	✓	✓
Non-financial assets	X	✓	✓ <sup>1</sup>	✓
Creditors (certain liabilities)	✓	✓	✓	✓
Provisions (probable liabilities)	X	X	✓	✓
Historic events	✓	✓	✓	✓
Future events	X	X	✓	X

✓=Included, X=Excluded.

<sup>1</sup> Sale proceeds from existing non-financial assets and the purchase and sale costs of future assets are included in comprehensive projections but not the opportunity cost of acquiring the existing asset base.

The indicative net liabilities presented in Chart 5.1 are estimates based on national accounts numbers for net worth adjusted for the main reconciling factors: provisions (including public service pensions) and single use military equipment. Annex A of this Report provides further information. Where, in the case of the early years, the available data are insufficient to estimate an adjustment for the main reconciling factors, it is assumed that the adjustment will be similar to that calculated for later years. These numbers are indicative and have not been subject to audit.

**5.7** Since the indicative net liabilities are largely based on national accounts, they currently suffer from the same data quality issues that affect the national accounts measure of net worth. As the WGA programme progresses, these issues will be addressed and more reliable, accurate and audited WGA data will be produced. These data will also be used to improve the quality of the national accounts information so that, for example, more reliable net worth data can also be produced. The Office for National Statistics is currently reconciling the dry run Central Government Accounts fixed asset data with their own non-financial asset data to see whether they can make use of the former for both their net worth calculations and depreciation estimates. This is discussed further in Annex A.

**5.8** Chart 5.1 shows that net liabilities as a share of GDP have been lower than net debt since 1996-97 (the earliest available year for the indicative figures). This suggests that the value of the Government’s non-financial assets has exceeded that of its provisions, including those for public service pensions. Moreover, the decline in net debt, as a share of GDP, since 1997-98 has been largely matched by a decline in net liabilities, indicating that the reduction in debt has not been at the expense of government assets or an increase in provisions.

**5.9** The 2003 *Long-term public finance report* introduced a range of historic and forward-looking approaches that can be used to assess the long-term sustainability of the public finances.<sup>5</sup> The 2003 Report argued that the GAAP-based (also known as accruals-based) balance sheet complemented the more established approaches such as net debt and that one of its key outputs (net liabilities) could be used as an indicator to help the assessment of long-

<sup>5</sup> See 2003 *Long-term public finance report: fiscal sustainability with an ageing population*, HM Treasury, December 2003 and Chapter 3, Box 3.1 of this Report for a summary.

term fiscal sustainability. This Report shows that the indicative net liabilities numbers paint a similar picture of long-term fiscal sustainability as net debt.

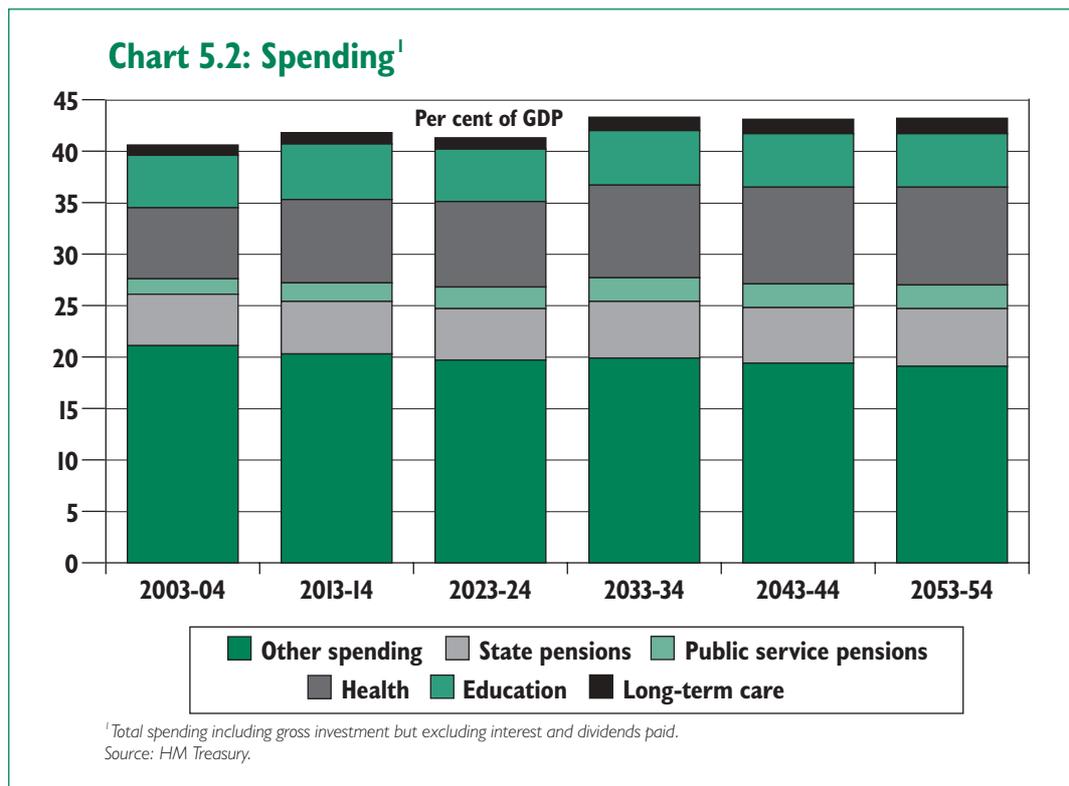
**5.10** The Government has announced that full GAAP-based WGA will be published for 2006-07 onwards, once the methodological issues that have been raised by the development work have been addressed through the dry-run processes. The accounts will cover all public sector entities, be produced using best practice accounting methods and be audited by the Comptroller and Auditor General.<sup>6</sup> As discussed in Chapter 3, WGA will summarise information on provisions, contingent liabilities and remote contingent liabilities currently produced in individual accounts across government.

## ANALYSIS OF FUTURE SPENDING AND REVENUE

**5.11** This section presents the results of the bottom-up spending and revenue projections on the baseline assumption of 2 per cent productivity growth per year, the principal population projections and the baseline approach to projecting employment levels.

### Spending projections

**5.12** Chart 5.2 shows the evolution of total spending and the key spending items as a share of GDP over the next five decades.



<sup>6</sup> As part of its staged approach to producing Whole of Government Accounts, the Government intends to publish the first set of central government accounts for 2003-04. These will start to provide better quality information. However, the full benefits of the programme will only be achieved when Whole of Government Accounts are published, which include local authorities, NHS trusts and public corporations. Further information on the WGA programme is available at <http://www.wga.gov.uk>.

- Education 5.13** Education spending is projected to remain relatively stable over the coming decades, fluctuating around 5¼ per cent of GDP beyond the medium term. This reflects the fact that the number of people of education age (either in schools, higher education or further education) is projected to vary only slightly. The increase from 5.1 per cent in 2003-04 to 5.4 per cent in 2013-14 reflects the substantial increase in education spending over the medium term first announced in the 2002 Spending Review and confirmed in the 2004 Spending Review.
- State pensions 5.14** State pension spending<sup>7</sup> is projected to rise slightly over the next 50 years, increasing from 5 per cent of GDP in 2003-04 to 5.6 per cent by 2053-54. The projections, therefore, confirm earlier findings by the Department for Work and Pensions.<sup>8</sup>
- Health 5.15** This year the health projections are based on the assumption that future increases in life expectancy can be enjoyed partly in good health. Chapters 2 and 4 provide more background. Notwithstanding this change, health spending is projected to increase from 6.9 per cent in 2003-04 to 9½ per cent of GDP by 2053-54 as the population ages.<sup>9</sup> Of this an increase of around 1¼ percentage points of GDP by 2007-08 reflects the substantial increase in NHS spending announced in Budget 2002<sup>10</sup> in response to the Wanless Review.<sup>11</sup> As in previous years though, non-demographic factors that might affect health spending in the future are not modelled.
- Long-term care 5.16** As discussed in Chapter 4, this year's long-term care projections are based on the same morbidity assumption as the health projections. In other words, long-term care is no longer assumed to remain constant as a share of GDP as it was in the 2002 and 2003 Long-term public finance reports. Based on the new assumption, long-term care is projected to rise from 1 per cent of GDP now to 1½ per cent by 2053-54.
- Public service pensions 5.17** Expenditure on public service pensions is projected to increase from around 1½ per cent of GDP now to 2.2 per cent by 2053-54. This projected increase reflects changes in the size of the public service workforce, increased longevity and the fact that some schemes, particularly the NHS scheme, are not yet mature. The projected spending increase would be higher but for the proposed reforms to these schemes, particularly the increase in normal public service pension age from 60 years to 65 years to be introduced for new entrants from 2006.
- Other spending 5.18** Spending on education, state pensions, public service pensions, and health and long-term care amounted to roughly 48 per cent of total government spending in 2003-04. This share is projected to rise to around 55 per cent by 2053-54. In terms of GDP, the total of education, state pension, public service pensions, and health and long-term care spending is projected to rise from 19½ per cent in 2003-04 to around 24 per cent by 2053-54. Other spending (which, for example, includes all social security items not listed explicitly under state pensions) is projected to fall by around 1½ per cent of GDP beyond the medium term.

<sup>7</sup> State pension spending is defined as the sum of the basic state pension, State Second Pension, Minimum Income Guarantee and Pension Credit, Winter Fuel Payments, Over 75 TV licences, and Christmas Bonus.

<sup>8</sup> See [www.dwp.gov.uk/asd/asd4/expenditure.asp](http://www.dwp.gov.uk/asd/asd4/expenditure.asp). Note that the projections presented by the Department for Work and Pensions are based on slightly different macroeconomic and demographic assumptions and are therefore not directly comparable to the figures presented here.

<sup>9</sup> Without the change in the morbidity assumption (see Chapter 4), health spending would have risen to 10.3 per cent of GDP by 2053-54 in the projections.

<sup>10</sup> *Budget 2002: The strength to make long-term decisions: Investing in an enterprising, fairer Britain*, HM Treasury, April 2002.

<sup>11</sup> *Securing our Future Health: Taking a Long-Term View*, Derek Wanless, 2002.

**Spending summary 5.19** The changing demographic structure of the UK's population – and especially the ageing aspect – is projected to have only a limited impact on public spending over the coming decades. Some of the increase is projected to take place over the medium-term horizon however, reflecting the outcomes of the 2002 and 2004 Spending Reviews, in particular the increases for health and education. Beyond the medium term, spending on education is projected to fall slightly as a share of GDP, while state pensions are projected to rise only moderately. The increase in public service pensions, which had previously been counted under Other spending, reflects to a large degree the maturing of the existing schemes. Health and long-term care spending combined are projected to increase the most in absolute terms, rising from 9.2 per cent of GDP in 2009-10 to 11 per cent by 2053-54. Nonetheless, total spending is projected to be only slightly higher, as a share of GDP, in 2053-54 than at the end of the medium term. Table 5.1 summarises the spending projections.

**Table 5.1: Spending projections (per cent of GDP)**

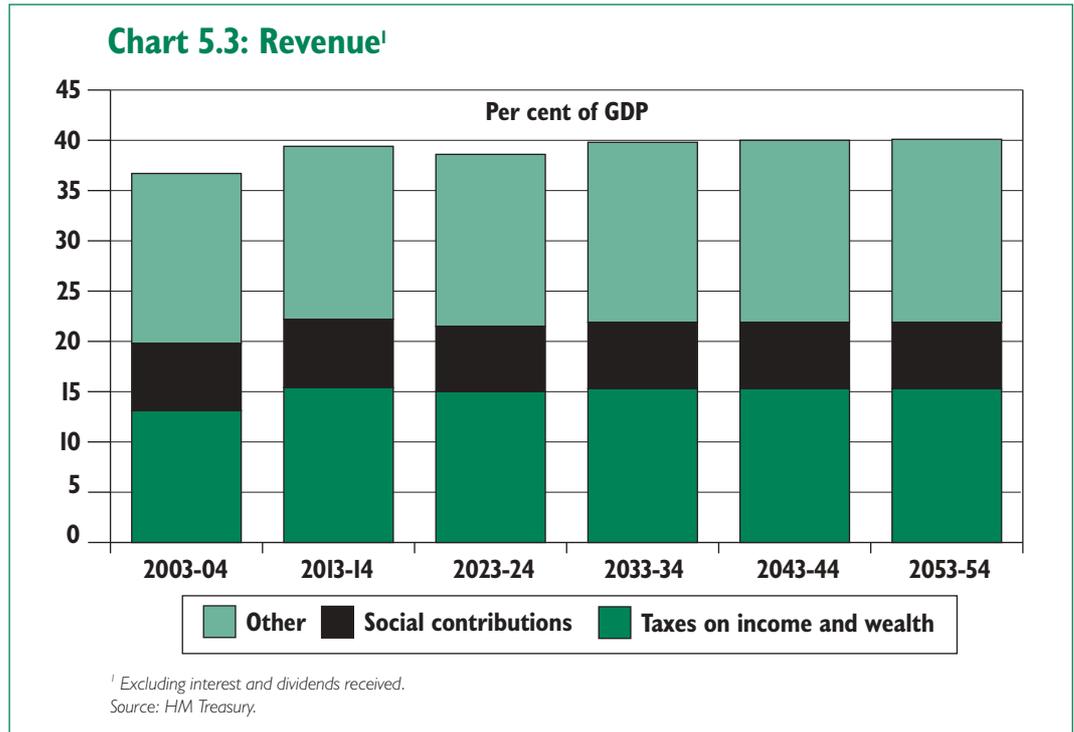
	2003-04	2013-14	2023-24	2033-34	2043-44	2053-54
Education	5.1	5.4	5.1	5.3	5.2	5.2
Pensions <sup>1</sup>	5.0	5.1	5.0	5.5	5.4	5.6
Health <sup>2</sup>	6.9	8.1	8.3	9.0	9.4	9.5
Long-term care <sup>3</sup>	1.0	1.1	1.1	1.3	1.4	1.5
Public service pensions <sup>4</sup>	1.5	1.8	2.1	2.3	2.2	2.2
<b>Total age-related spending</b>	<b>19.5</b>	<b>21.5</b>	<b>21.7</b>	<b>23.4</b>	<b>23.7</b>	<b>24.0</b>
Other spending	21.1	20.3	19.7	19.9	19.4	19.1
<b>Total spending<sup>5</sup></b>	<b>40.6</b>	<b>41.9</b>	<b>41.3</b>	<b>43.3</b>	<b>43.1</b>	<b>43.1</b>

<sup>1</sup> Defined as the sum of the basic state pension, including the State Second Pension, Minimum Income Guarantee and Pension Credit, Winter Fuel Payments, Over 75 TV licences, and Christmas Bonus. <sup>2</sup> Gross NHS spending. <sup>3</sup> Excluding long-term care provided within the NHS which is accounted for under Health. <sup>4</sup> In the 2002 and 2003 reports public service pensions were included under Other spending. <sup>5</sup> Total spending including gross investment but excluding interest and dividends payments.

## Revenue projections

**5.20** Chart 5.3 shows that revenue is projected to rise as a share of GDP between 2003-04 and 2013-14. This reflects the increases forecast over the medium-term horizon. Beyond the medium term, revenue is projected to remain stable as a share of GDP.<sup>12</sup>

<sup>12</sup> The exact figures are 36.7 (2003-04), 39.4 (2013-14), 38.6 (2023-24), 39.8 (2033-34), 40.0 (2043-44) and 40.0 (2053-54) per cent of GDP.



**5.21** These projections do not pick up all the potential developments on the revenue side that might be expected. For example, income tax revenue might rise as a share of GDP as a result of tax-deferred pension contributions (see Box 5.3). More work is necessary to analyse the potential impact of these on the long-term evolution of revenue.<sup>13</sup>

<sup>13</sup> Even with unchanged tax rates, and tax allowances/thresholds indexed for inflation, real fiscal drag will tend to push up revenue due to economic growth. For example, a reasonable long-term assumption is that real earnings will increase in line with productivity growth. The revenue projections in this Report take no account of real fiscal drag beyond the medium-term horizon and should therefore be interpreted as assuming a comprehensive form of 'real indexation'.

**Box 5.3: Tax-deferred pension contributions and future tax revenue**

Much of the analysis of the impact of an ageing population on the public finances has so far focussed on the spending side. However, the revenue side might be affected as well.

One area of research, which has received increasing attention over the last few years, especially in countries with well-established funded pensions provision, is the effect of tax-deferred pension schemes on future tax revenue. Contributions to pension schemes and investment returns from them are generally tax exempt, while the future income stream that a funded pension generates is taxed. A simple projection of the *status quo* would fail to capture the build-up of pension funds and the related tax revenue generated from them in the future.

A Dutch study suggests that total tax revenue could rise by as much as 5 percentage points between 2001 and 2040 in the Netherlands as a result of this development.<sup>a</sup> The researchers conclude that this could help the Netherlands deal with the fiscal consequences of an ageing population.

Research in other countries and by the Organisation for Economic Co-operation and Development (OECD) paint a different picture. For the US, the Congressional Budget Office finds that although a substantial stock of potentially taxable funds has been accumulated, tax revenue from the schemes is projected to rise only slightly in the future, by around 1/2 per cent of GDP.<sup>b</sup> The OECD analysed the likely trend in 17 member states and concluded that the future net budgetary costs of tax-favoured pension schemes, the difference between revenue foregone on contributions and investment returns and revenue received from withdrawals, will probably remain large in most countries, despite the fact that revenue due to an ageing population is set to rise.<sup>c</sup>

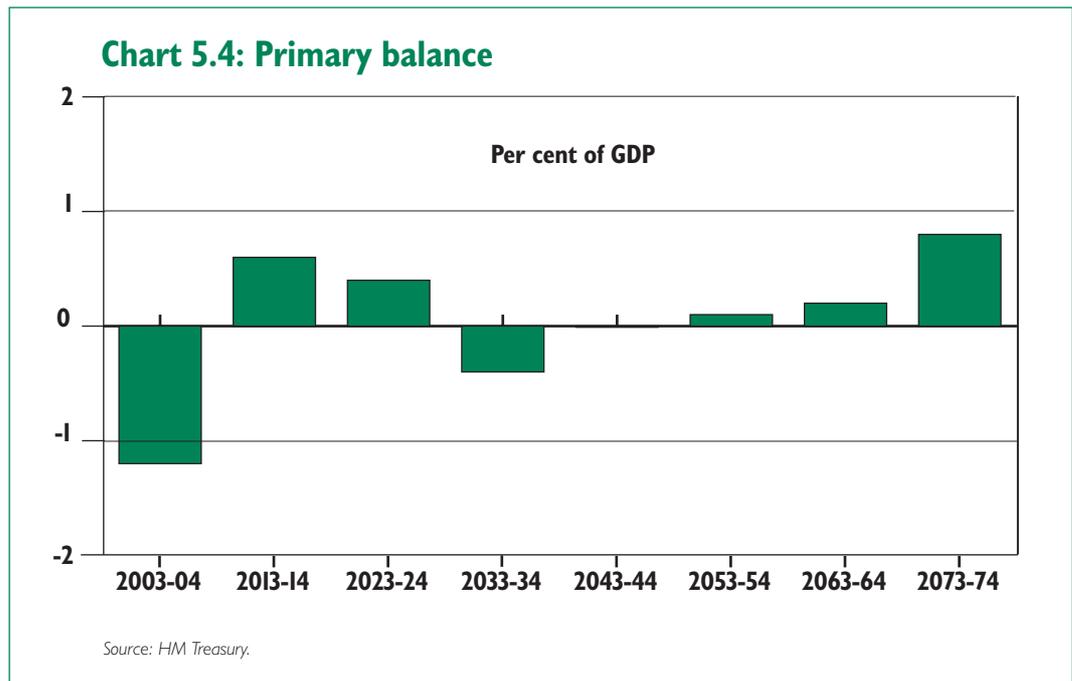
<sup>a</sup> *Ageing in the Netherlands: a manageable problem*, Harry ter Rele et al., 2000.

<sup>b</sup> *Tax-Deferred Retirement Savings in Long-Term Revenue Projections*, Congressional Budget Office, May 2004.

<sup>c</sup> *Long-term budgetary implications of tax-favoured retirement saving plans*, OECD, 2004.

**Primary balance 5.22** As a result of the projected spending and revenue trends, the general government primary balance is projected to be in surplus in 2013-14 before moving into deficit by the late 2020s.<sup>14</sup> Chart 5.4 shows that the projected deficit on the primary balance is most marked, as a share of GDP, around 2035, when spending pressures are projected to be greatest. However, in the very long term the primary balance is projected to return to surplus again as a result of the fact that the ageing process has run its course and due to the continued relative decline of social security spending.

<sup>14</sup>To derive the primary balance, it is necessary to add general government interest and dividends received to the revenue projections shown in Chart 5.3. Interest and dividends received are assumed to remain constant as a share of GDP from the end of the medium-term forecast onwards.



## ANALYSIS OF THE LONG-TERM FISCAL POSITION USING FORWARD-LOOKING INDICATORS

### Updated illustrative long-term fiscal projections

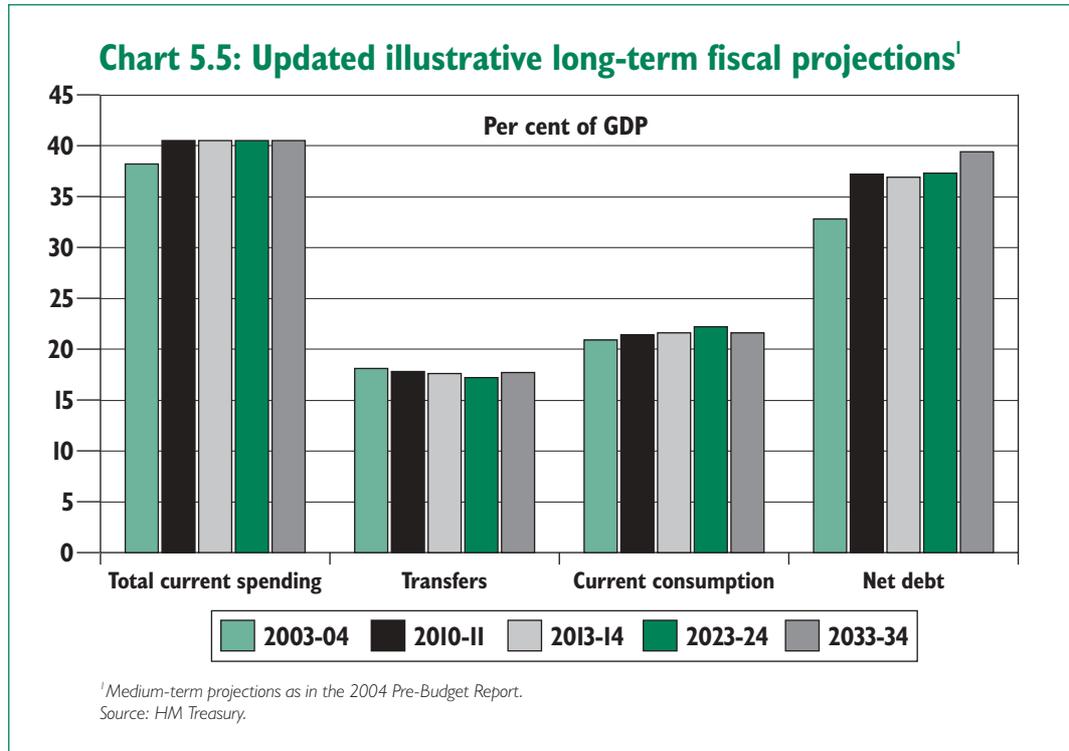
**5.23** Annex A of the 2004 Economic and Fiscal Strategy Report (EFSR), published in Budget 2004,<sup>15</sup> showed that the UK's public finances are broadly sustainable in the long term. Moreover, it showed that: first, current public consumption can grow at around the same annual rate as GDP after the medium term while meeting the Government's golden rule; second, public sector net investment can grow more or less in line with the economy without jeopardising the sustainable investment rule; and third, the net debt to GDP ratio is projected to remain below 40 per cent by the end of the projection period.

**5.24** These conclusions are supported by updated illustrative long-term fiscal projections, which are based on the medium-term forecast as presented in the 2004 Pre-Budget Report and updated population projections.<sup>16</sup>

<sup>15</sup> Budget 2004: *Prudence for a purpose: A Britain of stability and strength*, HM Treasury, March 2004.

<sup>16</sup> The modelling and macroeconomic assumptions remain unchanged from those used for the illustrative long-term fiscal projections presented in Annex A of the 2004 EFSR. For more details, see Budget 2004: *Prudence for a purpose: A Britain of stability and strength*, HM Treasury, March 2004, pages 177 to 179.

**5.25** Chart 5.5 presents the results of the updated projections. The chart shows that transfers as a share of GDP are projected to fall slightly between 2010-11 and 2023-24 before gradually rising again as state pension spending gradually increases. However, this increase is partly offset by relatively lower other transfers such as non-pension social benefits.



**5.26** The chart also shows that current consumption is projected to remain more or less the same as a share of GDP over the coming decades, ensuring that resources are available to meet potential future spending pressures. Finally, the net debt to GDP ratio is projected to remain below 40 per cent until the end of the projection horizon, implying that the sustainable investment rule is met.

**5.27** The projections presented in this section therefore differ only slightly from those presented in Annex A of the 2004 EFSR, indicating that the UK's public finances are broadly sustainable over the long term.

## Intertemporal budget gaps

**5.28** Chapter 3 introduced the concept of the intertemporal budget constraint/gap. Table 5.2 presents estimates of the intertemporal budget gap (that is the increase/reduction in tax revenue as a share of GDP in 2003-04 (and a proportionate increase/reduction thereafter) to meet the intertemporal budget constraint) under a range of discount rate and productivity rate assumptions.<sup>17</sup> It is likely that higher rates of productivity will be associated with higher real interest/discount rates. The results show that whether revenue (or spending) needs to change at all to maintain intertemporal balance depends to some extent on the discount rate assumption. If a low discount rate is used, as could be justified by the low real interest rate on long-term UK government bonds, the condition for intertemporal balance is exceeded in each case regardless of the productivity assumption.

**Table 5.2: Intertemporal budget gaps<sup>1</sup> (per cent of GDP)**

Discount rate (per cent)	2 <sup>1</sup> / <sub>2</sub>	3	3 <sup>1</sup> / <sub>2</sub>
Lower productivity (1 <sup>3</sup> / <sub>4</sub> per cent)	-1/ <sub>4</sub>	1	1 <sup>3</sup> / <sub>4</sub>
Baseline (2 per cent)	-1 <sup>1</sup> / <sub>4</sub>	0	1
Higher productivity (2 <sup>1</sup> / <sub>4</sub> per cent)	-3 <sup>1</sup> / <sub>4</sub>	-1 <sup>1</sup> / <sub>4</sub>	0

<sup>1</sup> Fiscal tightening (or loosening) in 2003-04 and a permanent, proportionate fiscal tightening (or loosening) thereafter needed to ensure intertemporal balance. Rounded to the nearest quarter percentage point.

## Fiscal gaps

**5.29** The fiscal gap concept introduced in Chapter 3 takes a sustainable debt to GDP ratio as a starting point for thinking about long-term fiscal sustainability. The fiscal gap measure represents the change in the primary balance needed to attain a particular debt target at a particular point in time. A negative fiscal gap, for example, implies that fiscal policy could be loosened while still attaining a particular debt level in the future. Taking the 40 per cent net debt to GDP ratio of 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.<sup>18</sup>

**5.30** Tables 5.3 to 5.5 show the fiscal gaps required under a variety of scenarios where the change in the primary balance is assumed to occur from 2010-11 onwards, that is beyond the medium-term horizon for fiscal policy.<sup>19</sup> Table 5.3 shows the baseline projections under the different interest rate assumptions.

<sup>17</sup> 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 the UK, the Government has a wide-ranging agenda to promote higher productivity. In addition, the Government is determined to increase employment opportunities. The Government is also committed to providing a clear and sustainable framework for retirement provision within which individuals can make effective choices about how to save and when to retire. In order to keep under review the regime for private pensions and long-term saving, the Government established the Pensions Commission in 2002, at the time of the 2002 Pension Green Paper. The Pensions Commission published its first report in October 2004, which the Government welcomes. The Government looks forward to the second report on policy recommendations scheduled for autumn 2005. See 2004 *Pre-Budget Report*, HM Treasury, December 2004, *Simplicity, security and choice: Working and saving for retirement*, Department for Work and Pensions, 2002, and *Pensions: Challenges and Choices*, Pensions Commission, 2004, for further details.

<sup>18</sup> The fiscal gaps in this year's Report are based on the public sector rather than the general government sector. This is to increase consistency with the Government's sustainable investment rule, which is defined over the public rather than the general government sector. 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.

<sup>19</sup> If the change in the primary balance were assumed to take place earlier than 2010-11, then the implied increases or reductions in the primary balance would be correspondingly smaller.

**Table 5.3: Fiscal gaps<sup>1</sup> in baseline scenario<sup>2</sup> (per cent of GDP)**

Interest rate (per cent)	2½	3	3½
<b>Target year<sup>3</sup></b>			
2023-24	-¾	-¾	-½
2033-34	-½	-¼	0
2043-44	-¼	0	¼
2053-54	-¼	0	¼

<sup>1</sup> Change to primary balance needed to attain a particular debt level at target year. Rounded to nearest quarter percentage point.

<sup>2</sup> 2 per cent productivity growth.

<sup>3</sup> Net debt target is reached at end of year specified.

**5.31** The results show that the UK public finances are in a solid long-term position. Table 5.3 shows, for example, that the Government could loosen its fiscal stance slightly if it aimed for a net debt to GDP ratio of 40 per cent by 2033-34 in the baseline case. If the horizon were extended to 2043-44 and beyond, the Government could leave its fiscal stance unchanged and still ensure that net debt reaches 40 per cent of GDP in the target year. Table 5.3 also shows that the Government could loosen fiscal policy slightly more (or tighten by slightly less) the lower the assumed interest rate. It should also be emphasised that all the numbers are small, varying between -¾ and ¼ per cent of GDP. This needs to be seen in the context of an average absolute difference between forecast and outturn for public sector net borrowing of little over 1 per cent of GDP over the period 1970-71 to 2003-04.<sup>20</sup>

**5.32** Tables 5.4 and 5.5 illustrate the effect of assuming lower and higher productivity growth respectively than in the baseline scenario. The figures presented in Tables 5.4 and 5.5 suggest that the fiscal gap calculations are robust to changes in the productivity rate assumption, with the required policy action only marginally different from those under the baseline projections.

**Table 5.4: Fiscal gaps<sup>1</sup> in lower productivity scenario<sup>2</sup> (per cent of GDP)**

Interest rate (per cent)	2½	3	3½
<b>Target year<sup>3</sup></b>			
2023-24	¾	-½	-¼
2033-34	0	0	¼
2043-44	¼	¼	½
2053-54	¼	½	½

<sup>1</sup> Change to primary balance needed to attain a particular debt level at target year.

<sup>2</sup> 1¾ per cent productivity growth.

<sup>3</sup> Net debt target is reached at end of years specified.

**Table 5.5: Fiscal gaps<sup>1</sup> in higher productivity scenario<sup>2</sup> (per cent of GDP)**

Interest rate (per cent)	2½	3	3½
<b>Target year<sup>3</sup></b>			
2023-33	-1	-¾	-½
2033-34	-¾	-½	-½
2043-44	-½	-½	-¼
2053-54	-½	-½	-¼

<sup>1</sup> Change to primary balance needed to attain a particular debt level at target year.

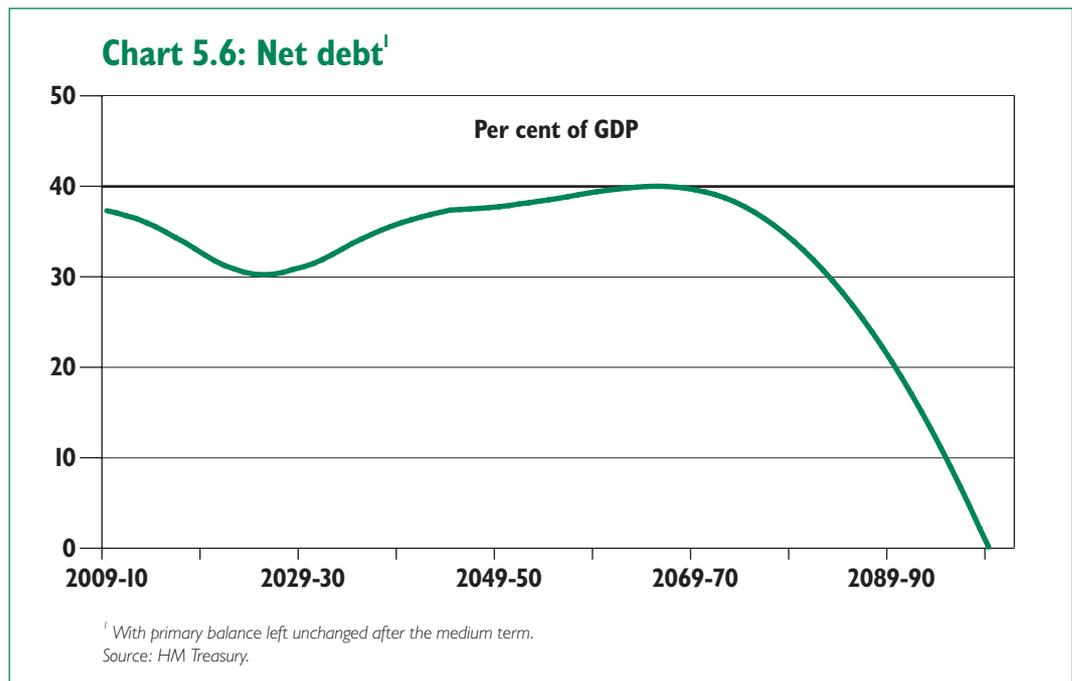
<sup>2</sup> 2¼ per cent productivity growth.

<sup>3</sup> Net debt target is reached at end of years specified.

<sup>20</sup> 2004 End of year fiscal report, HM Treasury, December 2004.

## Alternative fiscal gap indicator

**5.33** Last year's Report introduced an alternative fiscal gap indicator, which calculates the required change in the primary balance after the medium term so that the net debt to GDP ratio never exceeds a certain limit. Chart 5.6 shows the evolution of the net debt to GDP ratio for the baseline scenario (2 per cent productivity growth) and a real interest rate assumption of 3 per cent. As can be seen, if the Government left its fiscal stance unchanged in terms of GDP after the medium term, then the debt to GDP ratio would *never* exceed the 40 per cent limit as specified by the Government's sustainable investment rule. If policy were continued over the very long term, the projection shows that the Government would eventually build up net assets.



**5.34** The fact that the primary balance can be left unchanged while still ensuring that the net debt to GDP ratio *never* exceeds 40 per cent can be compared with the fiscal gap calculations in the baseline scenario (see Table 5.3). For the target years 2043-44 and 2053-54 the fiscal gaps also show that the primary balance can be left unchanged, indicating that the net debt to GDP ratio would evolve in a very similar way.

## Inter-generational balance

**5.35** The inter-generational balance gap (IGG) shows the required immediate (and permanent) revenue increase (or spending reduction or a combination of the two) to establish inter-generational fairness, as interpreted by the generational accounting approach. Based on this year's projections, the IGG is 2½ per cent of GDP for all three discount rate scenarios of 2½, 3 and 3½ per cent.<sup>21</sup> This year's IGGs are therefore similar to those presented in last year's Report, which argued that current policies in the UK have a relatively high degree of inter-generational fairness compared to those in many other countries.

<sup>21</sup> A full discussion of the differences in approaches can be found in Chapter 6 and Annex A of the 2003 *Long-term public finance report: fiscal sustainability with an ageing population*, HM Treasury, December 2003. The IGG presented here is based on an approach that distinguishes between current consumption and investment. This approach was introduced in the 2003 Report and arguably presents a truer picture of the degree of inter-generational fairness of the Government's current policies than the more conventional approach, which treats the two spending categories the same in the generational accounts. Note that the difference in results between the two approaches is small.

**5.36** Chapter 4 introduced an alternative method of projecting future employment and GDP. Box 5.4 presents the spending projections based on the alternative GDP projection.

**Box 5.4: Spending and revenue under alternative employment projections**

Chapter 4 presented an alternative method for projecting future employment based on the cohort effect. Because changes in employment partly determine GDP, using this alternative projection will produce a different GDP projection. More specifically, as mentioned in Chapter 4, the alternative employment projection will lead to a slightly lower GDP projection, as employment does not grow as fast. Given that the level of the spending projections remain unchanged using the alternative employment assumption, spending will therefore be projected to be higher as a share of GDP than under the baseline projection. The following table shows the spending projections based on the alternative employment projections.

**Spending projections (per cent of GDP)**

	2003-04	2013-14	2023-24	2033-34	2043-44	2053-54
Education	5.1	5.4	5.4	5.5	5.4	5.4
Pensions <sup>1</sup>	5.0	5.2	5.2	5.7	5.6	5.8
Health <sup>2</sup>	6.9	8.2	8.7	9.3	9.8	9.9
Long-term care <sup>3</sup>	1.0	1.1	1.2	1.4	1.5	1.5
Public service pensions	1.5	1.8	2.2	2.4	2.3	2.3
<b>Total age-related spending</b>	<b>19.5</b>	<b>21.7</b>	<b>22.7</b>	<b>24.3</b>	<b>24.6</b>	<b>24.9</b>
Other spending	21.1	20.5	20.5	20.6	20.2	19.9
<b>Total spending<sup>4</sup></b>	<b>40.6</b>	<b>42.2</b>	<b>43.2</b>	<b>44.9</b>	<b>44.8</b>	<b>44.8</b>

<sup>1</sup> Defined as the sum of the basic state pension, including the State Second Pension, Minimum Income Guarantee and Pension Credit, Winter Fuel Payment, Over 75 TV licences, and Christmas Bonus.

<sup>2</sup> Gross NHS spending. <sup>3</sup> Excluding long-term care provided within the NHS which is accounted for under Health. <sup>4</sup> Total spending including gross investment but excluding interest and dividends payments.

**However, revenue would also be higher, as a share of GDP, using the alternative GDP projection, reaching 43.1 per cent by 2053-54.<sup>a</sup> The intertemporal budget constraint/gap is unaffected by this alternative employment projection, while the fiscal gaps are only marginally affected.**

<sup>a</sup> The revenue projection in this alternative scenario would be 0.2 percentage points lower by 2053-54 without the modification to the female income tax profile (see Chapter 4, Box 4.1).

## COMPARISON WITH RESULTS OF LAST YEAR'S REPORT

**5.37** The results presented in this year's Report are similar to those shown in the 2003 Report. The main differences can be found in the spending and revenue projections as a share of GDP.

### Spending

- Beyond the medium-term horizon, overall spending is projected to be slightly higher, as a share of GDP, than in last year's Report. This is mainly due larger projected increases in total age-related spending, none of which are related to changes in Government policies. First, state pension spending is projected to be higher mainly as a result of the higher longevity assumption. Second, long-term care spending is no longer assumed to remain constant as a share of GDP. Instead it is projected to increase slightly as a share of GDP. Third, public service pensions are now included in total age-related spending rather than in other spending and are also projected to rise more quickly than previously, partly due to the degree of maturity of different public service pension schemes. These increases are offset slightly by a lower projection of health spending.

### Revenue

- Revenue is also projected to be slightly higher, as a share of GDP, than in last year's Report. This is partly because a larger population size (as is the case in this year's projections) leads to higher absolute revenue and hence, everything else equal, higher revenue as a share of GDP.

### Fiscal indicators remain similar to last year

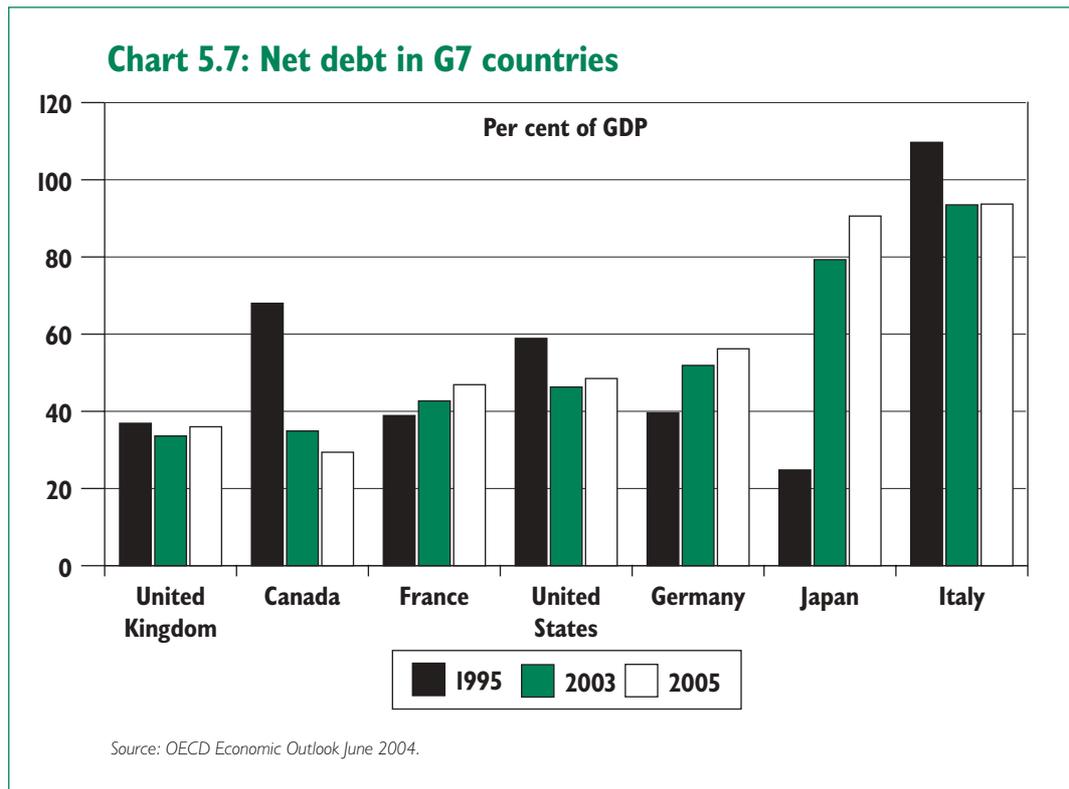
**5.38** The fiscal indicators are very similar to those presented in last year's Report.

- The **intertemporal budget gap** is projected to be marginally smaller than in last year's Report. Assuming that the Government wanted to meet the intertemporal budget constraint and that any adjustment was entirely through a change in the fiscal stance, then fiscal policy would need to remain roughly unchanged (compared with a slight tightening in last year's Report).
- The **fiscal gap** calculations show that the required tightening in the primary balance to meet a pre-determined target level of net debt to GDP in a target year is now marginally smaller (or the possible loosening larger) than in last year's Report.
- The **alternative fiscal gap indicator** shows a similar picture to that presented last year, with the projected public sector primary balance required remaining roughly unchanged as a share of GDP compared with a required tightening of  $\frac{1}{4}$  per cent last year.

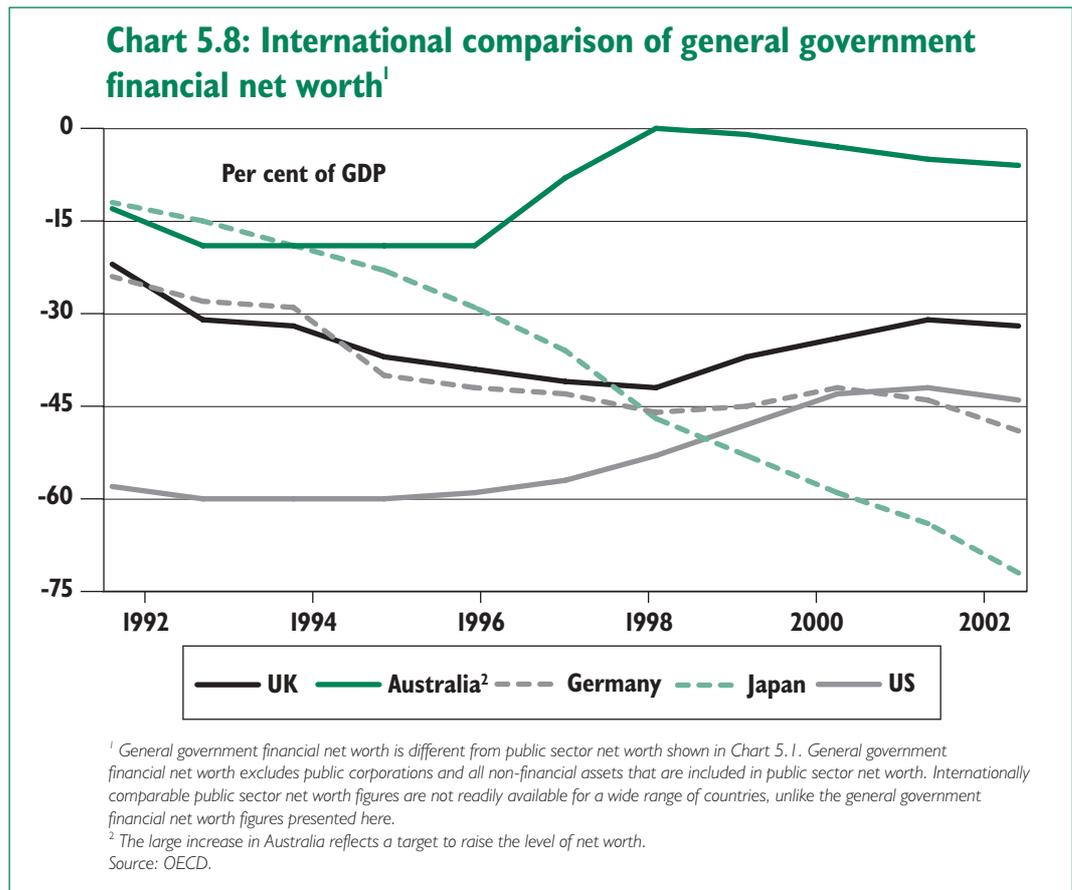
## INTERNATIONAL COMPARISONS

**5.39** International comparisons show that the UK's long-term fiscal position appears relatively strong compared with other developed countries facing challenges from ageing populations, including many EU countries and the United States.

**5.40** The recent global economic slowdown has had a significant impact on public finances throughout the world and some of the G7 economies have experienced rising debt to GDP ratios between 2000 and 2003. Chart 5.7 shows that, with Canada, the UK is the only G7 country that is expected to maintain net debt below 40 per cent of GDP in 2005.



**5.41** The UK's general government financial net worth position also compares favourably with those in other developed countries. Chart 5.8 shows the net worth position as a share of GDP between 1992 and 2002 in the UK, Germany, Japan, Australia and the US. Since the mid 1990s general government financial net worth, as a share of GDP, has been relatively stable in the UK.

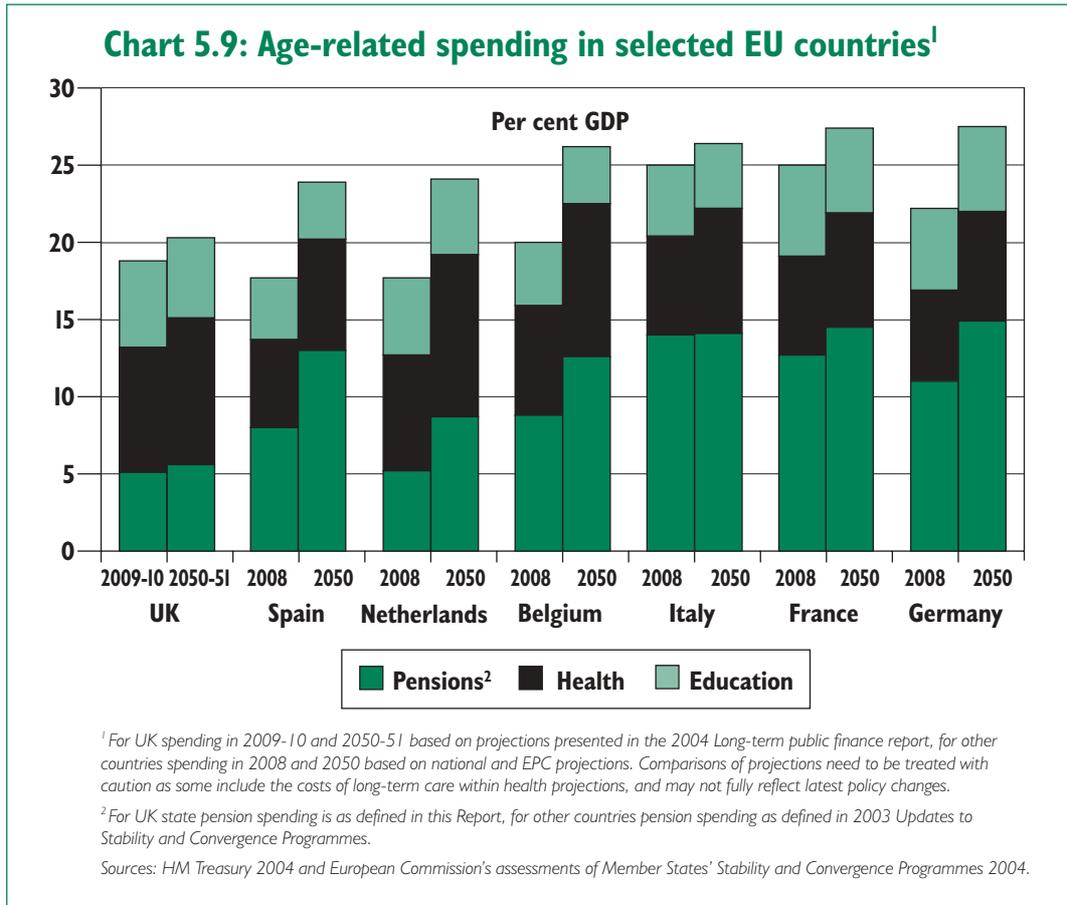


**Fiscal challenges in other countries**

**5.42** Many European countries face significant challenges from ageing populations. In October 2003, the EU's Economic Policy Committee (EPC) published detailed findings on the impact of ageing populations on the public finances.<sup>22</sup> It found that age-related spending, in particular on pensions, will rise substantially in many EU Member States over the coming decades if existing policies remain unchanged. The EPC also found that projected age-related spending increases are not necessarily highest in those countries with the most rapidly ageing populations. Existing policy settings play a potentially even greater role. The 2003 Stability and Convergence Programmes submitted by the EU15 Member States to the European Commission confirm the EPC's findings. Chart 5.9 shows the projected difference in age-related spending over the coming decades in the seven largest EU15 countries.<sup>23</sup> It shows that age-related spending in the UK is projected to rise only moderately over the next five decades even when taking account of the latest population projections presented in this Report. This contrasts with substantial projected increases in some other countries.

<sup>22</sup> *The impact of ageing populations on public finances: overview of analysis carried out at EU level and proposals for a future work programme*, Economic Policy Committee, October 2003.

<sup>23</sup> In terms of purchasing power parity adjusted GDP in 2003. See <http://www.europa.eu.int>.



**5.43** In 2002, the Council of European Finance Ministers mandated the EPC to provide a new set of long-term fiscal projections by mid 2005. One of the key objectives of the exercise will be to incorporate recent policy developments in EU Member States into the projections and to use updated and refined assumptions and modelling techniques. The ten new Member States that joined the EU in May 2004 are also participating in this exercise. The need to develop and enhance the analysis of the long-term fiscal challenges in the EU is one that is strongly supported by the UK.<sup>24</sup>

**5.44** The European Commission published an assessment of the long-term sustainability of the public finances in EU Member States earlier this year.<sup>25</sup> The Commission argues that: "... due to the growing concerns regarding the impact of ageing populations, ensuring the long-term sustainability of public finances is a key objective in the EU". Based on information provided in the Member States' 2003 Stability and Convergence Programmes, the Commission goes on to argue that: "... even assuming that all Member States achieve their medium-term budgetary targets, there is a risk of unsustainable public finances (measured against the 60 per cent gross debt of GDP reference value) emerging in at least one third of the EU15 Member States".

**5.45** According to the Commission's report, six Member States have debt levels that put them in a relatively safe position when both qualitative and quantitative indicators are assessed. The report states that: "Ireland, the UK, Finland, Luxembourg, Denmark and Spain have a relatively low level of debt/GDP ratio. This gives some room to tackle the problem if future imbalances arise".

<sup>24</sup> *The Stability and Growth Pact: A discussion paper*, HM Treasury, March 2004.

<sup>25</sup> See *Public Finances in EMU 2004*, European Commission, 2004, Part I Section 4. The assessment focuses on the 15 countries that were members at the beginning of 2004. Future assessments will include the ten new Member States that joined in May 2004.

**5.46** The Commission points to a number of risks to sustainability over the long term, arising for different reasons in different Member States. They argue that the source of risks for Belgium and Italy is mainly the current high debt to GDP ratio. While France, Portugal and Germany have recently passed a number of pension reforms, the report suggests that budgetary consolidation in the medium term should also be part of their strategy. Pension expenditure in Greece and Spain is expected to increase at a faster rate than in the rest of the EU. For the UK, the European Commission concludes that it appears relatively well-placed to meet the cost of ageing populations.

**5.47** As shown in Chapter 2, the US is ageing slowly by comparison with other developed countries. Nonetheless fiscal imbalances are projected to arise in the US over the coming decades. The US Congressional Budget Office (CBO) regularly publishes long-term analysis covering a wide range of topics, including future social security and defence spending. The CBO projects that spending on social security will increase from 4.4 per cent of GDP in 2003 to 6.3 per cent by 2050, while spending on Medicare and Medicaid (the two principal public health care schemes) is projected (in the ‘middle-cost scenario’) to rise from just under 4 per cent of GDP in 2003 to nearly 11½ per cent by 2050, due to a combination of demographic and non-demographic factors.<sup>26</sup> The CBO concludes that: “... unless taxation reaches levels that are unprecedented in the United States, current spending policies will probably be financially unsustainable over the next 50 years”.<sup>27</sup>

**5.48** The CBO also projects the evolution of the future budget position and debt based on current policies. Based on the ‘middle-cost scenario’ and the assumption that tax revenue will remain unchanged as a share of GDP after 2012, the CBO projects the deficit on the total budget to rise to around 15 per cent of GDP by 2050, with federal debt rising to nearly 200 per cent of GDP over the same time. The CBO also points out though that there is a high degree of uncertainty in the projections and illustrates this with the help of ‘low-cost’ and ‘high-cost’ scenarios. In the former the total budget would remain more or less in balance, leading to the gradual elimination of federal debt by 2050, in the latter, the deficit is projected to rise to 35 per cent of GDP, with federal debt exceeding 200 per cent of GDP by 2035.<sup>28</sup>

**5.49** The CBO refers to a number of other long-term studies, including a paper by Gokhale and Smetters who calculate the US’s fiscal imbalance to assess long-term fiscal sustainability. The fiscal imbalance is the sum of current federal debt and all future discounted federal primary balances.<sup>29</sup> Gokhale and Smetters calculate that the fiscal imbalance is around \$45 trillion, roughly four times today’s US GDP and nearly ten times today’s debt burden,<sup>30</sup> with

<sup>26</sup> *The Outlook for Social Security*, Congressional Budget Office, June 2004 and *The Long-Term Budget Outlook*, Congressional Budget Office, December 2003. The CBO states that there is an 80 per cent probability that social security spending will fall in the range of 4.9 per cent and 7.5 per cent of GDP in 2050.

<sup>27</sup> *The Long-Term Budget Outlook*, Congressional Budget Office, December 2003, executive summary.

<sup>28</sup> *Measures of the U.S. Government’s Fiscal Position Under Current Law*, Congressional Budget Office, August 2004.

<sup>29</sup> *Fiscal and Generational Imbalances: New Budget Measures for New Budget Priorities*, Jagadeesh Gokhale and Kent Smetters, American Enterprise Institute, July 2003. The fiscal imbalance is closely related to the intertemporal budget constraint/gap (IBC) introduced in Chapter 3. The IBC also calculates the sum of current debt and all future discounted primary balances but expresses the fiscal imbalance in terms of the immediate and permanent change in revenue and/or spending necessary to close the imbalance.

<sup>30</sup> Based on the average yield on 30-year US bonds in recent years, Gokhale and Smetters use a real discount rate of 3.6 per cent to discount future primary balances. As such they do not use a “risk-adjusted” discount rate. This is in line with the real discount rate/interest rate assumptions used in this Report. See Chapter 4.

the majority of the fiscal imbalance arising from public health care spending. To restore fiscal balance, the authors calculate that income taxes would have to rise by around two-thirds or social security and Medicare benefits would have to be cut by 45 per cent.<sup>31</sup>

**5.50** Since the publication of last year's *Long-term public finance report*, Auerbach *et al.* have updated their analysis of the long-term sustainability of the US public finances using the fiscal gap approach.<sup>32</sup> This approach is similar to the fiscal gaps described above, with the debt target set at the current level of debt. An update was needed as new projections for Medicaid and Medicare spending were available, which demonstrates the importance of conducting regular updates of long-term fiscal sustainability. As in their previous analysis they present two scenarios, a 'CBO baseline' and what they consider a more realistic scenario, which among other things allows for recent tax cuts to continue beyond their official 'sunsets'. Based on these assumptions they estimate the fiscal gap has grown to 7.2 per cent of GDP, or \$36.3 trillion, for a time horizon up to 2080. This compares to their equivalent estimate last year of 4.9 per cent of GDP, which suggests a significant worsening of the US long-term fiscal position.

**5.51** Because of its rapidly ageing population, Japan is a particularly important country to study in the context of long-term fiscal sustainability. Despite the ageing process, the Organisation for Economic Co-operation and Development (OECD) projects that state pension spending will rise only moderately from 7.9 per cent of GDP in 2000 to 8.5 per cent by 2050.<sup>33</sup> Nonetheless, overall age-related spending is projected to rise substantially over the coming decades. For example, the Ministry of Health, Labour and Welfare, which manages social security spending, including health and pensions, estimates that the funds necessary to finance the current social security system will need to rise from 16 per cent of GDP in 2002 to nearly 25 per cent by 2025.<sup>34</sup>

**5.52** The Australian Treasury published its first intergenerational report in May 2002.<sup>35</sup> The report presents bottom-up projections up to 2041-42 for central government revenue and spending. The Australian Treasury projects that central government health spending will double from around 4 per cent of GDP today to 8 per cent by 2041-42 (with non-demographic factors the main cost drivers), while pension spending will rise moderately from 2.9 per cent of GDP to 4.6 per cent of GDP. Overall, the deficit on the primary balance could reach around 5 per cent of GDP by 2041-42. The report states that: "... if policies are not adjusted, the current generation of taxpayers is likely to impose a higher tax burden on the next generation. The required adjustment in taxes and spending is about 5 per cent of GDP by 2041-42 ... Governments will need to exercise sound policy management to minimise the tax burden transferred to the next generation ...".<sup>36</sup>

<sup>31</sup> Based on a similar framework to that used by Gokhale and Smetters, the International Monetary Fund calculates an even larger fiscal imbalance equivalent to nearly five times today's GDP. See *The Real Fiscal Problem – An International Accounting Approach*, Roberto Cardarelli, in *United States: 2004 Article IV Consultation – Staff Report; Staff Supplement; and Public Information Notice on the Executive Board Discussion*, International Monetary Fund, July 2004.

<sup>32</sup> *Sources of the Long-Term Fiscal Gap*, Alan J. Auerbach, William G. Gale and Peter R. Orszag, Tax Notes, May 2004.

<sup>33</sup> The OECD projections exclude the latest reforms, which aim to dampen future expenditure growth on pensions, for example by reducing generosity. Japanese law requires that reforms must be implemented if an actuarial revaluation of the state pension scheme, which takes place every five years, shows that it is on an unsustainable path. See also *Public Pension Reform in Japan*, International Monetary Fund, in *Japan: 2004 Article IV Consultation – Staff Report; Staff Supplement; and Public Information Notice on the Executive Board Discussion*, International Monetary Fund, August 2004.

<sup>34</sup> Assessing the long-term fiscal position of Japan, International Monetary Fund, 2003, in: *Japan: Selected Issues*.

<sup>35</sup> *Intergenerational Report 2002-03*, Department of the Treasury of Australia, May 2002.

<sup>36</sup> *Intergenerational Report 2002-03*, Department of the Treasury of Australia, May 2002, page 1.

## CONCLUSIONS

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**5.61** The Report updates the illustrative long-term fiscal projections presented in Annex A of the EFSR and confirms the findings in Budget 2004. Given the assumed profile for tax revenue and the projected profile for transfers, current consumption can grow at around the same annual rate than GDP after the medium term while meeting the Government's golden rule. In addition, public sector net investment can grow close to the economy's growth rate over the projection period without jeopardising the sustainable investment rule. Given the modelling assumptions, the net debt to GDP is projected to remain below 40 per cent by the end of the projection period.

**5.62** The Report also provides updated bottom-up projections of spending and revenue (and their respective components). The bottom-up projections, which are based on updated medium-term fiscal projections and the latest population projections, differ only slightly from those presented in last year's Report. Total spending is projected to be slightly higher, as a share of GDP, than in last year's Report. This is mainly due to larger projected increases in age-related spending; none of which are related to changes in Government policies. On the revenue side, this year's projections also show a larger increase over the long term than last year's projections.

**5.63** As last year, this year's Report also assesses the long-term sustainability of the public finances using a range of fiscal sustainability indicators, including the intertemporal budget gap/constraint and fiscal gaps. The updated results confirm the findings of last year's Report that the UK fiscal position is sustainable in the long term on the basis of current policies and that the UK is in a strong position relative to many other developed countries to face the challenges of an ageing society.



# A

# DIFFERENCES BETWEEN WHOLE OF GOVERNMENT ACCOUNTS AND NATIONAL ACCOUNTS

## INTRODUCTION

**A.1** Fiscal information is currently produced using national accounts measures. Although the coverage of Whole of Government Accounts has been designed to match the coverage of the public sector in national accounts, other differences exist between the national accounts framework and the Generally Accepted Accounting Practice (GAAP) framework, under which Whole of Government Accounts will be prepared. This annex considers the differences between these two frameworks and concludes that the major ones are due to some expenditure items being recognised at different times under the two approaches.

### Progress towards Whole of Government Accounts

**A.2** The Government announced in 2003 that it will publish Whole of Government Accounts for the 2006-07 financial year onwards, once the methodological issues that have been raised by the development work have been addressed through the dry-run processes.<sup>1</sup> Whole of Government Accounts will use best practice accounting methods to produce a single set of commercial style financial statements for the whole public sector – central government, local government and public corporations. Publishing Whole of Government Accounts will represent an important complement to the existing national accounts. Box A1 summarises progress to date towards publishing Whole of Government Accounts.

#### **Box A1: Progress towards publishing Whole of Government Accounts**

**A necessary interim step towards producing full Whole of Government Accounts are Central Government Accounts, comprising a consolidation of all central government departments, non-departmental public bodies and central government funds.**

**Dry run processes for Central Government Accounts are now complete and processes are in place to collect and produce the data for the first 'live' year: 2003-04. Between the first and second dry runs substantial data quality improvements were made; in particular identifying and eliminating significant intra-government transaction streams and reconciling the flows between the central funds. However, work is continuing on improving the quality of data within the accounts, for example by developing full accruals-based recognition of tax revenue and improving the quality of data on public service pension schemes.**

**Work is also underway on developing the systems and processes needed to produce Whole of Government Accounts. Significant practical and accounting policy issues arise in the consolidation of around 1300 different sets of financial statements prepared under a range of accounting policy regimes such as the Local Government Statement of Recommended Practice, NHS Trusts Manual for Accounts and the Companies Act. Dry run processes will begin for the 2004-05 financial year with some limited piloting having been carried out for the 2003-04 financial year.**

**A.3** Whole of Government Accounts will be prepared under Generally Accepted Accounting Practice (GAAP).<sup>2</sup> This framework differs from the European System of Accounts (ESA) framework used by the Office for National Statistics for preparing national accounts. The differences take two forms – items that are recognised earlier in Whole of Government Accounts and items that are recognised earlier in national accounts.

<sup>1</sup> See 2003 *Pre-Budget Report: The strength to take the long-term decisions for Britain: Seizing the opportunities of the global recovery*, HM Treasury, December 2004, page 18.

<sup>2</sup> Strictly, Whole of Government Accounts is produced under GAAP as adapted for the context, which leads to similar but not identical results.

## EARLIER RECOGNITION IN WHOLE OF GOVERNMENT ACCOUNTS

**A.4** There are two types of expenditures that are recognised earlier in Whole of Government Accounts: provisions and some depreciation/capital consumption. Public service pensions are, in terms of the effect they have on the accounts, a type of provision and so the same discussion suffices for both.

**Provisions A.5** As discussed in Chapter 3, Whole of Government Accounts will summarise information on creditors, provisions, contingent liabilities and remote contingent liabilities currently produced in individual accounts across government. Creditors, provisions, contingent liabilities and remote contingent liabilities have one common characteristic: they all represent present obligations on government to pay a third party as a result of a past event. However, they differ in terms of the level of certainty that surrounds them: only creditors represent a definite obligation to pay a known amount to a known third party. As a result of the lack of complete certainty that surrounds provisions and contingent liabilities, national accounts only include creditors as a liability when calculating net worth. Whole of Government Accounts, following the rules of GAAP, will additionally include provisions as a liability on its balance sheet. It will also detail contingent liabilities and remote contingent liabilities in the notes to the accounts.<sup>3,4</sup>

**A.6** As a result, for a specific financial year, provisions represent a difference between national accounts and Whole of Government Accounts. This reflects the different times at which the resulting expenditure is recognised in the different accounts. As the uncertainties surrounding a provision are resolved over time, it will either be reclassified as a creditor, or result in a cash flow, and appear in both national accounts and Whole of Government Accounts.

**Depreciation and capital consumption A.7** Depreciation (Whole of Government Accounts) and capital consumption (national accounts) are synonymous terms used to describe the estimate made for the amount of expenditure charged to represent the use of fixed assets each year. In simplified terms, when a fixed asset, such as a building or motor vehicle, is purchased it is not treated as current expenditure in the year of purchase and instead its value is added to the level of capital stock. An amount is then treated as current expenditure in each year of its estimated life.<sup>5</sup>

**A.8** National accounts and Whole of Government Accounts use different methods to calculate the level of depreciation. National accounts currently use a top-down approach to determining the capital stock. The net level of capital expenditure (additions less disposals) is added to the capital stock each year and depreciation is estimated using the Perpetual Inventory Method. In contrast, the methodology used for Whole of Government Accounts is a bottom-up approach. Most assets will have a separate entry on a fixed asset register which will generally hold information on an asset-by-asset basis. This allows for depreciation and other factors to be estimated on an asset-by-asset basis.<sup>6</sup>

<sup>3</sup> See Chapter 3, Box 3.2 for a more detailed discussion of how to distinguish between a creditor, provision, contingent liability and remote contingent liability.

<sup>4</sup> As an illustration, the Government's provisions and contingent liabilities for nuclear energy can be seen in the Department for Trade and Industry's (DTI) resource accounts. These show that at 31 March 2003 the Government had made provisions for nuclear energy totalling £9.6 billion to reflect the expected cost of decommissioning plants currently in operation. This is included in the indicative net liabilities figures shown in Chapter 5, Chart 5.1. The DTI's resource accounts also show the Government's contingent liabilities related to nuclear energy – some of which are quantified and some of which are not. Due to their uncertainty, these do not count towards the indicative net liabilities total in Chart 5.1. The DTI's resource accounts provide considerable detail on the make up of these liabilities and the uncertainties that surround them, including estimates as to when the provisions will be used.

<sup>5</sup> Other factors such as revaluation and estimated sale proceeds also need to be taken into account when determining the level of current expenditure to be charged each year.

<sup>6</sup> In the future the way that national accounts and Whole of Government Accounts estimate depreciation may be aligned as a result of the Atkinson Review. This recommends a study into whether to use the GAAP methodology in the compilation of national accounts c.f. *Interim report: Measurement of Government Output and Productivity for the National Accounts*, Atkinson Review, 2004, page 61.

**A.9** One important result of the different methodologies is that GAAP forces management to take account of factors that change the value or lifespan of an individual asset – such as physical damage or obsolescence. The adjustments made to reflect such adverse factors, known as impairments, are in effect accelerated depreciation meaning that Whole of Government Accounts recognises some depreciation earlier than national accounts. This also has knock-on-effects for the respective levels of capital stock.

## EARLIER RECOGNITION IN NATIONAL ACCOUNTS

### Single use military equipment

**A.10** Specialist, or single use, military equipment such as tanks and fighter aircraft are treated differently in national accounts and Whole of Government Accounts. In national accounts such expenditure is treated as current expenditure in the year that items are delivered or developmental work is undertaken. In contrast, Whole of Government Accounts treats the expenditure as capital expenditure in the year it is spent, meaning that it is added to the capital stock in the balance sheet and depreciation is charged. Both developmental work, for example on a new tank design, and delivery of an actual physical item, such as an individual tank, are treated in this way. The destruction of an asset or a decision not to proceed with bringing an item into service, results in an impairment being charged. These differences combine to mean that national accounts will recognise expenditure on such military equipment earlier than Whole of Government Accounts.

**A.11** This annex has shown that GAAP-based accounts, such as WGA, recognise some items earlier than national accounts, while national accounts also recognises some items earlier than GAAP-based accounts. This means that GAAP-based accounts and national accounts can be used as a complement to each other. Box A2 provides a summary of the way national accounts and GAAP-based accounts have been used in other countries.

### Box A2: International experience of GAAP based accounts

Internationally, GAAP-based accounts have been used in various ways to supplement and support country-specific fiscal frameworks.<sup>a</sup>

The fiscal framework in **New Zealand** is based entirely on New Zealand GAAP. Objectives are set for the operating balance (surplus of income over expenditure) and an adjusted operating balance known as operating balance excluding revaluations and accounting policy changes (OBERAC). This is supplemented using gross debt, net debt and net worth (effectively the same as net liabilities) indicators and objectives; all measured on a GAAP basis.

In **Canada** a GAAP-based framework was introduced in 2001-02. The key fiscal indicator is budgetary balance on an accruals basis, which is supplemented by a cash indicator. Canada also has a target of keeping the debt (calculated on a GAAP basis) to GDP ratio on a downward trend. Canada also makes use of the national accounts framework to draw international comparisons.

In **Australia**, fiscal policy is set using the Australian version of the national accounts framework but GAAP is used for the budgeting and reporting frameworks. The Australian fiscal framework has a primary objective to maintain budget balance over the course of the economic cycle. This is supplemented by targets to maintain budget surpluses in the future, keep the overall tax burden stable as a percentage of GDP and raise the level of net worth.

<sup>a</sup> *The Economy of New Zealand*, New Zealand Treasury at <http://www.treasury.govt.nz/nzefo/2004/economy.asp>, *Budget 2004 Budget Plan*, Department of Finance, Canada at <http://www.fin.gc.ca/budget04/bp/bpa4e.htm> and *Budget Strategy and Outlook 2004-05*, Commonwealth of Australia, 2004 at <http://www.budget.gov.au/2004-05/bp1/html/bst1.htm>.



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## LIST OF ABBREVIATIONS

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CBO	Congressional Budget Office
DTI	Department of Trade and Industry
DWP	Department for Work and Pensions
EFSR	Economic and Fiscal Strategy Report
EPC	Economic Policy Committee
EU	European Union
FRS	Financial Reporting Standard
GAAP	Generally Accepted Accounting Practice
GAD	Government Actuary's Department
GDP	Gross Domestic Product
HDI	Human Development Index
IBC	Intertemporal budget constraint
IBG	Intertemporal budget gap
IGG	Inter-generational balance gap
IMF	International Monetary Fund
MIT	Massachusetts Institute of Technology
NBER	National Bureau of Economic Research
NHS	National Health Service
NIESR	National Institute of Economic and Social Research
OBERAC	Operational balance excluding revaluations and accounting policy changes
OECD	Organisation for Economic Co-operation and Development
ONS	Office for National Statistics
PSSRU	Personal Social Services Research Unit
WGA	Whole of Government Accounts

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