

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

December 2005



HM TREASURY



HM TREASURY

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

December 2005

© Crown copyright 2005

Published with the permission of HM Treasury on behalf of the Controller of Her Majesty's Stationery Office.

The text in this document (excluding the Royal Coat of Arms and departmental logos) may be reproduced free of charge in any format or medium providing that it is reproduced accurately and not used in a misleading context. The material must be acknowledged as Crown copyright and the title of the document specified.

Any enquiries relating to the copyright in this document should be sent to:

The Licensing Division
HMSO
St Clements House
2-16 Colegate
Norwich
NR3 1BQ

Fax: 01603 723000

E-mail: licensing@cabinet-office.x.gsi.gov.uk

HM Treasury contacts

This document can be accessed from the Treasury Internet site at:

www.hm-treasury.gov.uk

For further information on the Treasury and its work, contact:

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

Tel: 020 7270 4558

Fax: 020 7270 4861

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

ISBN: 1-84532-123-5

CONTENTS

	Page	
Chapter 1	Overview	1
Chapter 2	Long-term socio-economic trends	5
Chapter 3	Approaches to assessing long-term fiscal sustainability	21
Chapter 4	Assumptions	31
Chapter 5	Results	41
Annex A	Whole of Government Accounts and National Accounts	67
Annex B	Projecting employment trends	71
Bibliography		77
List of charts		83
List of tables		85
List of boxes		87
List of abbreviations		89

OVERVIEW

INTRODUCTION

I.1 In 2002 the Government published its first *Long-term public finance report*¹ with the intention of providing a comprehensive analysis of long-term socio-economic and demographic developments, and their likely impact on the public finances. Since then the Long-term public finance report has become an annual publication.² The Long-term public finance report complements the illustrative long-term fiscal projections presented in the Economic and Fiscal Strategy Report (EFSR),³ 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 publications presented with each Budget. This approach has been received favourably, for example by the Organisation for Economic Development and Cooperation (OECD).⁴

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 are 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 economic trends, and the fiscal implications of current policy for future generations. A better understanding of these trends also assists the Government in making strategic policy decisions, including those that will shape the outcome of the 2007 Comprehensive Spending Review.⁵ In addition, more information on long-term fiscal trends greatly improves fiscal transparency and credibility. Furthermore, 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.

Long-term challenges **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.⁶ The ageing trend is driven mainly 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.

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

² 2003 *Long-term public finance report: fiscal sustainability with an ageing population*, HM Treasury, December 2003 and 2004 *Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, December 2004.

³ Annex A of the Economic and Fiscal Strategy Report, in *Budget 2005: Investing for our future: Fairness and opportunity for Britain's hard-working families*, HM Treasury, March 2005.

⁴ See *Sustainable Budget Policy: Concepts and Approaches*, OECD, May 2005, page 11. The author of the report argues: "In my view, the best course would be to report on the long-term prospect in a separate document, but to summarize key findings in a supporting schedule that is included in the budget. This is the tact taken by the United Kingdom".

⁵ In July 2005 the Government announced that the 2007 Comprehensive Spending Review will also look at domestic and international trends, which might unfold over the longer term. See *Written statement to Parliament on the Spending Review*, HM Treasury, July 2005.

⁶ Chapter 2 of this Report presents evidence suggesting that developing regions are also projected to experience ageing populations.

1.4 These trends are likely to 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 trends⁷ 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 fiscally 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 firms and individuals.

Sustainable public finances

1.5 The 2005 *Long-term public finance report* follows the general structure developed in the previous reports. On the basis of an updated assessment, which takes account of the Government Actuary's Department's (GAD) latest population projections and the latest medium-term forecast as published in the 2005 Pre-Budget Report,⁸ the 2005 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 remains 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

1.6 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. According to the OECD: "The United Kingdom is a leader in the quality of its monetary and fiscal policy frameworks among OECD countries and the principles and features of its frameworks have been scrutinised by other countries with a view to implementation in a different institutional context".⁹

1.7 The fiscal framework is guided by the *Code for Fiscal Stability*,¹⁰ 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 important for achieving the Government's objective of building a stronger, more enterprising economy and a fairer society, extending economic opportunity and supporting those most in need to ensure that rising national prosperity is shared by all.

⁷ See Chapter 2 for the longer-term trends that have been identified by the Government as important for the 2007 Comprehensive Spending Review.

⁸ 2005 *Pre-Budget Report*, HM Treasury, December 2005.

⁹ *OECD 2005 Economic Survey of the UK*, OECD, October 2005, page 18.

¹⁰ *Code for Fiscal Stability*, HM Treasury, March 1998.

Fiscal rules **I.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.

I.11 The golden rule specifies that current spending should be financed by current taxes over the economic cycle, thus ensuring generational fairness and fiscal sustainability. In addition, the sustainable investment rule ensures debt sustainability and also supports generational fairness by limiting the scope for the current generation to leave excessive debt burdens to future generations.

PURPOSE AND STRUCTURE OF THIS REPORT

I.12 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 extends and complements 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 demographic change and other long-term trends on the public finances.

Structure

Long-term challenges **I.13** 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. Chapter 2 presents the latest population projections for the UK, published by GAD in October 2005. 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.

Comprehensive assessment of sustainability **I.14** This year's Report uses the same wide range of approaches to assessing long-term fiscal sustainability as used in the 2004 Report. These are discussed in Chapter 3 and are: net debt, the intertemporal budget constraint/gap, fiscal gaps, an alternative fiscal indicator based on the fiscal gap concept and an indicative estimate of GAAP-based¹¹ net liabilities, which can be derived from the GAAP-based balance sheet that the Government is developing as part of the Whole of Government Accounts (WGA) programme. The 2003 Report

¹¹ Generally Accepted Accounting Practice.

introduced the concept of the GAAP-based balance sheet and how it complements the other measures of long-term fiscal sustainability, while the 2004 Report presented an indicative estimate of net liabilities.¹² As in 2004, the indicative estimate presented in this Report is based on national accounts rather than full GAAP-based Whole of Government Accounts, which are still being developed.¹³

Modelling assumptions

I.15 Chapter 4 discusses the assumptions used in this Report. Projecting future GDP growth, for example, requires assumptions about future labour-market trends and productivity growth. Regarding the former, this year's Report uses employment trends generated using the so-called 'cohort' method, which was developed in the 2004 Report.¹⁴ Regarding the latter, as in previous years, the Report presents results based on three different productivity growth rate assumptions to provide some sensitivity analysis. Chapter 4 also outlines the modelling methodology for the health and long-term care projections, which was developed in last year's Report and remains unchanged.¹⁵ The recent issuance of long-term bonds is also discussed.

Updated projections and assessment of sustainability

I.16 Using the latest medium-term public finance projections, as published in the 2005 Pre-Budget Report, Chapter 5 presents updated long-term fiscal projections and compares them with those published in last year's *Long-term public finance report*. Age-related spending is projected to rise by more than presented in the 2004 Report, partly because the latest population projections show a more pronounced ageing process than the previously used projections. This clearly demonstrates the need to update regularly the long-term fiscal projections. On the basis of current policies and a range of reasonable assumptions, the public finances 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 trends in the Government's net liabilities. Updated international comparisons 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.

¹² See 2003 *Long-term public finance report: fiscal sustainability with an ageing population*, HM Treasury, December 2003, pages 16 to 23, and 2004 *Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, December 2004, pages 22 to 26.

¹³ See *Delivering the benefits of accruals accounting for the whole public sector*, HM Treasury, December 2005.

¹⁴ See *ibid* 2004, pages 33 to 37.

¹⁵ See *ibid*, pages 17 to 19.

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 previous 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 earlier Long-term public finance reports.¹

2.2 Population ageing is not the only socio-economic trend that is likely to occur over the coming decades. Previous Long-term public finance reports have looked at other potential trends, including:

- the divergence in the size of working-age populations in different developed countries and what this might mean for trend growth in different regions of the world;² and
- demand for health and long-term care services, which will depend to a certain degree on the evolution of morbidity. In combination with future supply drivers such as technological and medical advance, these will influence future health spending.³

2.3 In addition to demographic change, the Government has identified a number of other potential longer-term trends that should be taken into account in the 2007 Comprehensive Spending Review.⁴ These trends are:

- the intensification of cross-border economic competition as the balance of international economic activity shifts toward rapidly growing emerging markets;⁵
- an acceleration in the pace of innovation and technological diffusion and a continued increase in the knowledge-intensity of goods and services;
- continued global uncertainty with ongoing threats of international terrorism and global conflict; and
- increasing pressures on natural resources and global climate from rapid economic and population growth in the developing world, and sustained demand for fossil fuels in advanced economies.

¹ See 2003 *Long-term public finance report: fiscal sustainability with an ageing population*, HM Treasury, December 2003, page 5, and 2004 *Long-term public finance report: an analysis of fiscal sustainability*, December 2004, pages 7 to 15.

² Whereas the working-age population is projected to increase over the coming decades in the United States, it is projected to decline in Japan, Germany, Italy and other countries. See 2003 *Long-term public finance report: fiscal sustainability with an ageing population*, HM Treasury, December 2003, pages 11 and 12.

³ 2004 *Long-term public finance report: an analysis of fiscal sustainability*, December 2004, pages 17 to 19.

⁴ See *Written statement to Parliament on the Spending Review*, HM Treasury, July 2005.

⁵ See also *Long-term global economic challenges and opportunities for the UK*, HM Treasury, December 2004.

2.4 Given the time horizons involved, there is inevitably a very high degree of uncertainty involved in predicting trends. History tells us that change can often be rapid and abrupt rather than gradual. Few people in the mid 1980s, for example, would have imagined that the Soviet Union would disintegrate by the late 1980s and that central and eastern European countries would join the European Union in 2004. In addition to the discussion of population ageing, which is an underlying trend and therefore relatively certain, this Chapter also provides some suggestions about how to deal with more uncertain trends. It suggests that scenario building could be a helpful tool for decision makers to understand how different future outcomes might affect the future policy environment.

THE CHANGING STRUCTURE OF THE UK POPULATION

2004-based population projections **2.5** One of the most important future developments is the changing structure of the UK's population. In the UK, GAD produces the official population projections. GAD published its latest principal population projections, the 2004-based projections, in October.⁶ These projections are based on the latest population estimates produced by the Office for National Statistics (ONS)⁷ and replace the 2003-based interim projections, which were used for the analysis in last year's *Long-term public finance report*.

Variant population projections **2.6** 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 has 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. As part of its revisions, GAD also updated its variant population projections. Table 2.1 summarises GAD's main assumptions for the latest principal and high variant population projections.⁸

Table 2.1: Assumptions for principal and high variant population projections

	Principal	High Fertility	High Longevity	High Migration
Fertility rate ¹	1.74	1.94	1.74	1.74
Life expectancy at birth (years) in 2031				
Males	81.4	81.4	83.5	81.4
Females	85.0	85.0	86.5	85.0
Long-term annual net migration ²	145,000	145,000	145,000	205,000

¹ Long-term average number of children per woman.

² From 2007-2008 onwards.

Source: Government Actuary's Department, 2004-based population projections.

Total population projected to increase **2.7** According to the latest principal population projections, the UK's population will increase from 59.8 million in 2004 to around 69.5 million by 2054. 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 due to the assumption that life expectancy will improve at a constant rate year-on-year, and to assumed long-term net migration of around 145,000 people per year.⁹ These assumptions are different from those used in GAD's 2003-based interim projections (used for last year's *Long-term public finance report*), with the effect that the UK population is no longer projected to stabilise after 2035, but instead continues to trend upwards.¹⁰ The total population size is

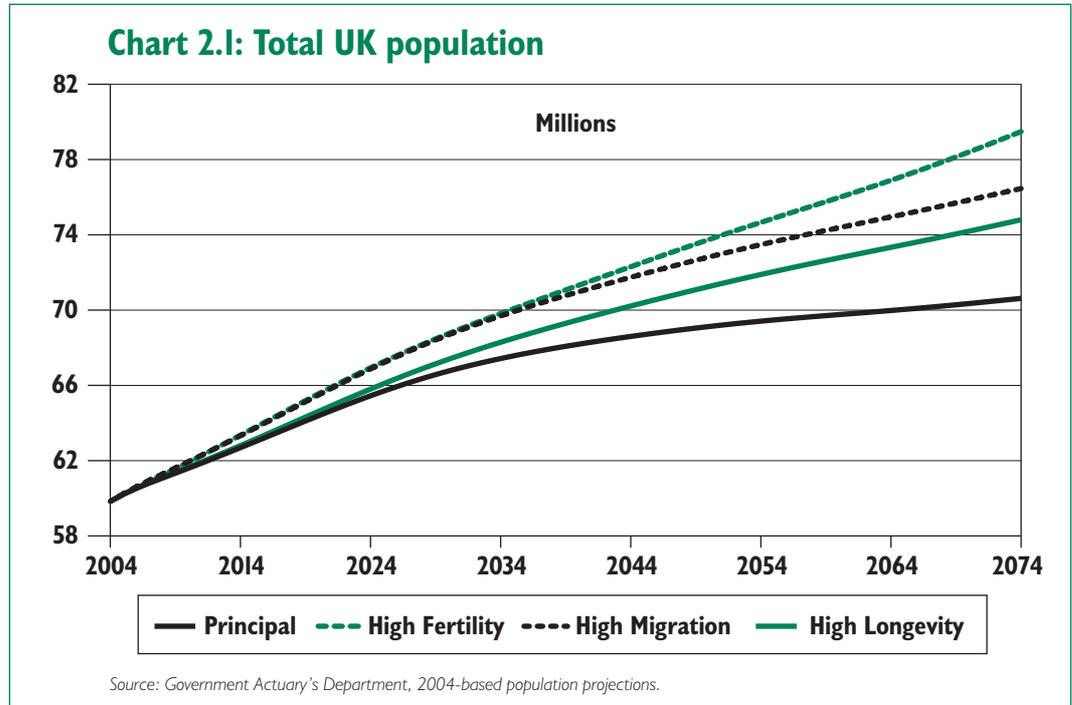
⁶ <http://www.gad.gov.uk/Population/index.asp>.

⁷ <http://www.statistics.gov.uk/pdfdir/popest0805.pdf>.

⁸ GAD also produces low and other variants. These are not shown in Table 2.1.

⁹ According to the Office for National Statistics, net migration (including other changes) stood at 177,200 in the year to mid 2004.

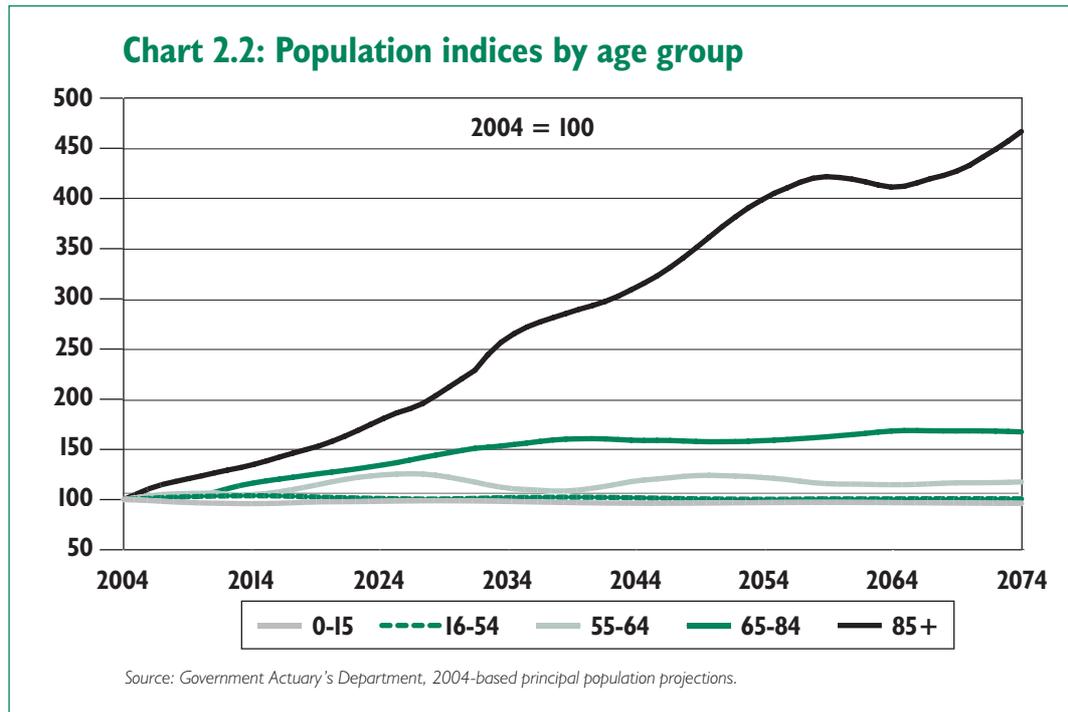
projected to increase by more in GAD's high population variants, and by the most in the high fertility variant, reaching nearly 80 million by 2074. The high longevity assumption makes the smallest difference. Chart 2.1 shows the projected evolution of the total population size in the different high variants.



An ageing population 2.8

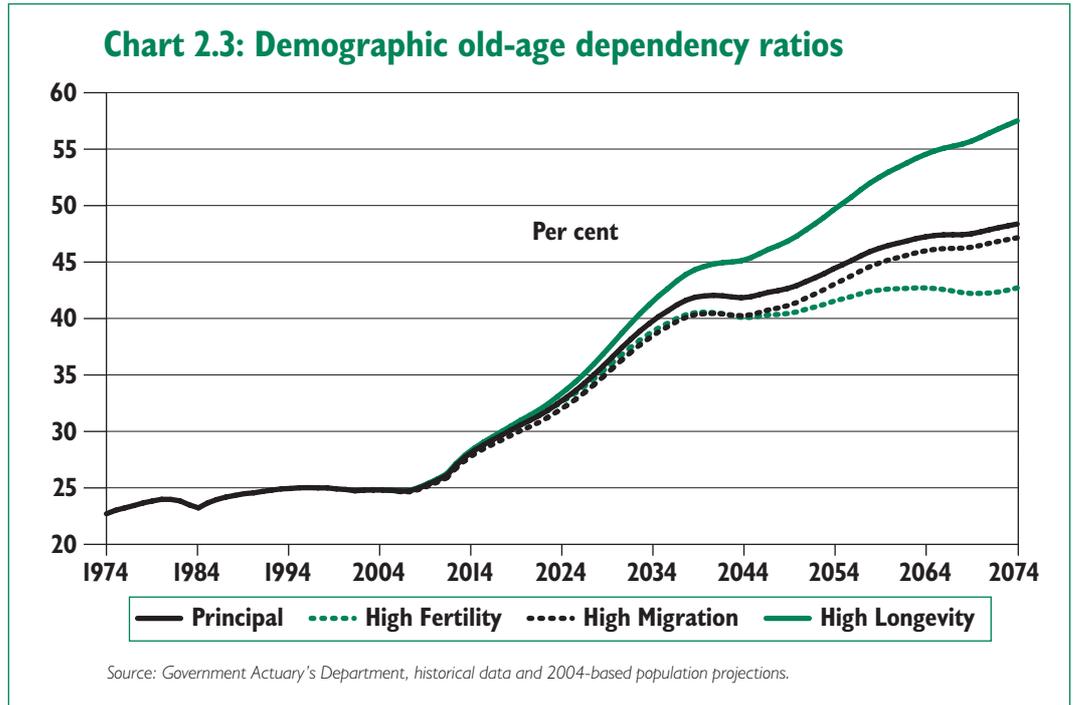
In addition to the projected rise in the number of people living in the UK, GAD's projections also show a marked change in the composition of the population over the coming decades, with the share of older people in the total population rising gradually. As shown in Chart 2.1 above, the total population is projected to rise by a little over 15 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 the number of children are projected to remain relatively stable over the period, while the 55 to 64 year olds show an increase of nearly 20 per cent by 2074. This contrasts with large projected increases for the older age-groups: the 65 to 84 year olds will have grown by more than half, and the 85+ group will have more than quadrupled by the end of the period.

¹⁰ See 2004 *Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, December 2004, page 8, for more on GAD's 2003-based interim population projections.



2.9 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 1970s, reaching around 25 per cent in the mid 1990s. The population ageing process is expected to accelerate significantly after 2010, with the ratio projected to rise to 42 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 2054, due to the higher number of people aged 65 years and over. The 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.¹¹

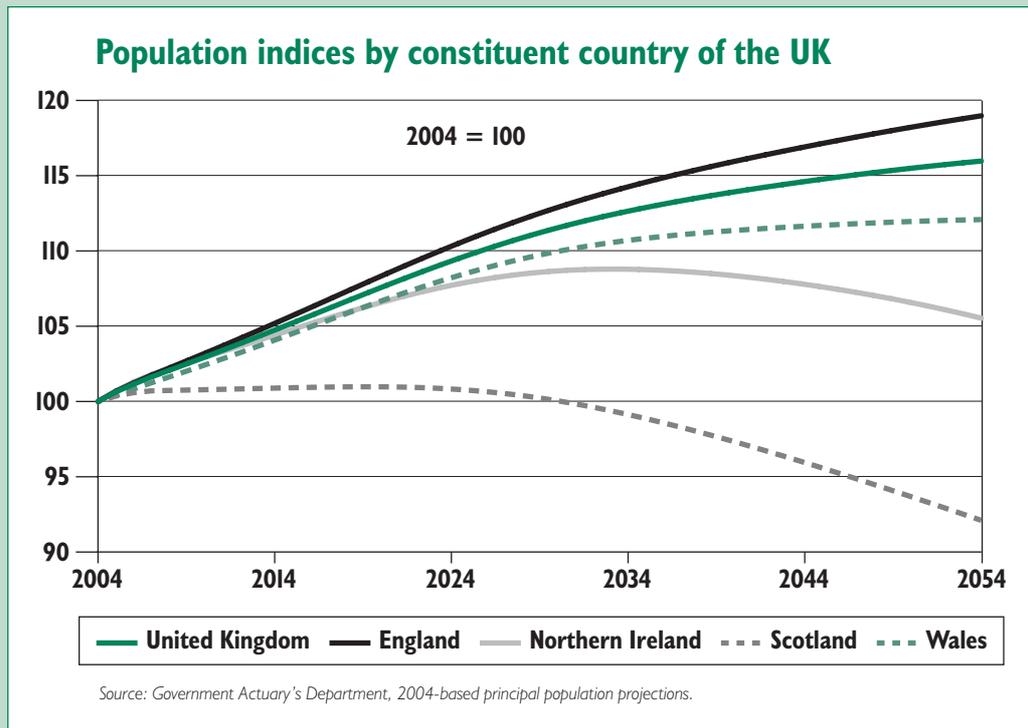
¹¹ GAD has generated these demographic old-age dependency ratios using deterministic population projections. Another approach is to use stochastic population projections, as for example done by the National Institute for Economic and Social Research (NIESR). In stochastic population projections, the key vital parameters (fertility and morbidity rates, and migration flows) are shocked at random. The NIESR found that, based on its assumptions regarding the random processes influencing the key parameters, the demographic old-age dependency ratio could be anything between 15 and 70 per cent by 2052. See *2004 Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, December 2004, page 11, and *Fiscal Implications of Demographic Uncertainty for the United Kingdom*, James Sefton and Martin Weale, January 2005.



2.10 In addition to the population projections for the UK as a whole, GAD also produces projections for each of the UK's constituent countries, giving an insight into the possible development of the composition of the UK population. See Box 2.1 for more details on these projections.

Box 2.1: Decomposition of population projections by constituent country

The high proportion of the UK population living in England means that population trends at the UK level are broadly determined by the population trends in England. The chart shown below illustrates that this is also the case for *projected* population trends. Between 2004 and 2054, the population of England is projected to grow by 19 per cent, with Wales projected to experience an increase in its population of 12 per cent over this period. The population of Northern Ireland is projected to rise up to 2032, and decline after 2033, with an overall increase of just over 5 per cent over the entire 2004-2054 period. Scotland, however, is projected to observe a falling population over this period, both in absolute terms (by just over 8 per cent) and as a proportion of the total UK population.



The projected trends reflect different demographic patterns. For example, the projected decline of the population in Scotland can be partly explained by relatively low assumptions regarding life expectancy and fertility,^a outweighing positive long-term net migration. The population increase projected for Wales is supported by positive long-term net migration, while the projected increase for England is influenced by both large positive long-term net migration and relatively high life expectancy assumptions. Northern Ireland, by contrast, is assumed to experience a net migration outflow over the long term, which partly offsets a relatively high assumed fertility rate.

^a The assumed fertility rate for Scotland is the lowest for all the UK constituent countries, which is largely consistent with recent trends. See <http://www.gad.gov.uk/Population/index.asp?pic=2004|methodology|comptfr>.

Comparison with previous projections 2.II The latest set of population projections differs significantly from the 2003-based interim population projections, which were used for the 2004 *Long-term public finance report*. Table 2.2 summarises the underlying assumptions used for the 2001-based interim, 2002-based, 2003-based interim and 2004-based baseline populations projections produced by GAD. For comparison, Table 2.2 also shows the assumptions underlying the latest Eurostat and United Nations population projections for the UK.

Table 2.2: Assumptions for population projections

	GAD (principal)				Eurostat (baseline)	UN (medium)
	2001-based ¹	2002-based	2003-based ²	2004-based ³		
Fertility rate ⁴	1.74	1.74	1.74	1.74	1.75 ⁵	1.85 ⁶
Life expectancy (years) ⁷						
Males	79.3	81.0	81.0	81.4	76.4-82.9 ⁸	75.9-81.5 ⁹
Females	83.6	84.9	84.9	85.0	80.9-86.6 ¹⁰	80.6-85.4 ¹¹
Long-term annual net migration ¹²	100,000	100,000	130,000	145,000	98,500-139,500 ¹³	130,000

¹ Used in the 2002 and 2003 Long-term public finance reports.

² Used in the 2004 Long-term public finance report.

³ Used in this year's Report.

⁴ Long-term average number of children per woman.

⁵ From 2019.

⁶ From 2025-2030.

⁷ At birth in 2031 for all GAD projections.

⁸ Life expectancy assumed to increase continually from 76.4 (2004) to 82.9 (2050).

⁹ Life expectancy assumed to increase continually from 75.9 (2000-2005) to 81.5 (2045-2050).

¹⁰ Life expectancy assumed to increase continually from 80.9 (2004) to 86.6 (2050).

¹¹ Life expectancy assumed to increase continually from 80.6 (2000-2005) to 85.4 (2045-2050).

¹² Includes net migration adjustments of -80,000 in 2001-based and -27,000 in 2002-based projections.

¹³ Net migration assumed to fall continually from 139,500 in 2004 until 2045, when it stabilises at 98,500 (to the nearest hundred).

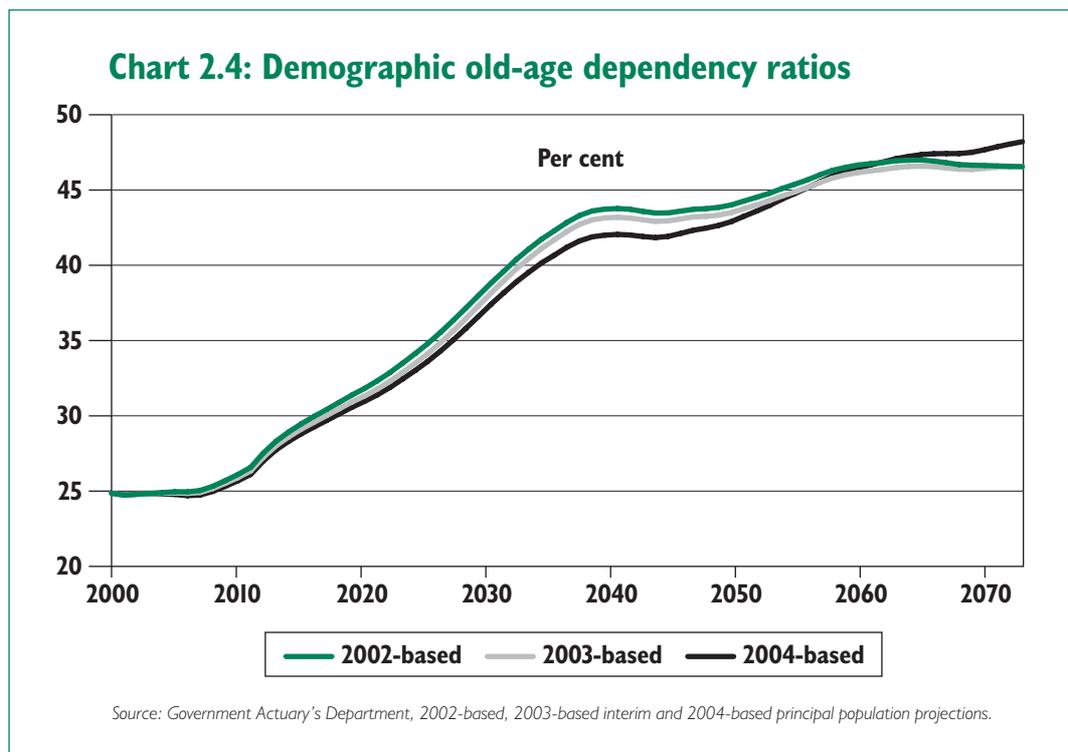
Sources: Government Actuary's Department, 2001-based interim, 2002-based, 2003-based interim and 2004-based principal population projections; Eurostat baseline variant population projections, 2005; United Nations, World Population Prospects: The 2004 Revision.

2.12 Table 2.2 shows that differences between last year's and this year's GAD population projections can be found in the mortality assumption and the net migration assumption. With respect to mortality, rather than assuming a gradual moderation in the increase in life expectancy beyond 2020 (with the assumed increase converging towards zero eventually), GAD now assumes that life expectancy will continue to increase at previously recorded rates (see Box 2.2 below). The difference in the life expectancy assumption between the latest set of projections and previous projections will therefore continue to increase beyond that indicated for 2031 in Table 2.2 above.¹² Everything else equal, the projected share of older people in the population will be larger than in previous projections as a result of this change to the mortality assumption. However, an increase in the assumed level of annual net migration will tend, everything else equal, to reduce the projected share of older people in the population, since it is assumed that the majority of immigrants are of working age. Therefore, the changes GAD have made to this year's mortality and migration assumptions will tend, at least in part, to have offsetting effects on the projected demographic old-age dependency ratio.

2.13 In addition to the changes to the long-term assumptions shown in Table 2.2, GAD has also made significant revisions to their assumptions about the short-term behaviour of fertility and migration. For example, the fertility rate assumption in the 2004-based projections is greater than the fertility rate assumption in the 2003-based interim projections up to 2010-2011. Similarly, the assumed level of net migration in the short term is significantly higher than previously assumed, with average net migration between 2004 and 2006 assumed to be 207,000 per year in the 2004-based projections, in comparison to 130,000 per year in the 2003-based interim projections. Both these changes imply higher long-term population projections than previous projections.

¹² For example, the difference in the male life expectancy assumption between the 2004-based and 2003-based interim projections increases from 0.4 years in 2031 to an annual average of 2.2 years between 2066 and 2071. The equivalent difference in life-expectancy assumption for females increases from 0.1 years in 2031 to an annual average of 1.7 years between 2066 and 2071.

2.14 Chart 2.4 shows GAD's 2002-based, 2003-based interim and 2004-based projections of the evolution of the demographic old-age dependency ratio, in each case based on the principal population projections. Using the 2004-based projections, the demographic old-age dependency ratio is projected to be around 45 per cent by the mid-2050s, very similar to that in previous population projections. Until the early 2050s, however, the ratio is projected to be lower in the 2004-based projections than in the earlier projections. This is because the effect of the change in the net migration assumption more than offsets that of the change in the life expectancy assumption. However, the ratio is projected to continue to rise after the 2050s in the 2004-based projections, whereas in the 2003- and 2002-based projections it begins to stabilise in the 2060s. This is because the effect of the changed mortality assumption begins to dominate, pushing the projected ratio higher. The updated population projections demonstrate the necessity of continuing to assess the sustainability of the public finances on a regular basis.



Box 2.2: The evolution of the mortality assumption

Over time projected mortality rates in the projections produced by the Government Actuary's Department (GAD) have undergone various revisions, driven partly by advances in methodology, new data, developments in the medical world and revised views of future changes in mortality.^a These changes have led to revised estimates of future life expectancies,^b which are calculated using the mortality rates either for a given year, or by allowing for future projected changes in mortality rates as a person ages. Projected mortality rates are used in the population projections for carrying forward, year by year, the projected numbers by age. Consequently, revisions to mortality rate assumptions directly affect the projected numbers in the population by age and sex.

Such revisions have often been prompted by new academic studies or GAD-commissioned research that have challenged the prevailing consensus on mortality.^c The 1985 revision, which amended the assumptions about rates of improvement in mortality for the elderly, followed research into the implications of bronchitis, emphysema and asthma for mortality trends.^d Similarly, new studies into the impact of AIDS upon mortality rates led to significant revisions to projected mortality rates in both the 1987 and 1989 projections.^e

A further such revision to projected mortality rates lies behind the population projections used in this year's Report. In the 2003-based interim projections it was assumed that, after a specified future date (the target year), the rate at which mortality rates improve each year would fall by half every 25 years. This implies that the rate of improvement will eventually fall to zero, after which point mortality rates remain constant. However, life expectancy has continued to rise at relatively constant rates over the last twenty years for both males and females, suggesting that, based on current trends, the previous long-term assumptions have been too pessimistic. As a result, the 2004-based projections assume no decline in the rate of improvement beyond the current target year of 2029, the effect of which is to increase the life expectancy assumption used in this year's population projections relative to previous projections (see Table 2.2).^f

The frequency and significance of the revisions illustrate the uncertainty that surrounds both projected mortality rates and the population projections themselves. In the future, it is likely that assumptions about mortality rates will continue to evolve in the light of additional research, and that the current set of projections will therefore be subject to further revision.

^a For an overview of the history of the assumptions and their reliability, see *Accuracy and uncertainty of the national population projections for the United Kingdom*, Chris Shaw, Population Trends No.77, 1994.

^b Mortality rates are defined as the number of deaths in a given population as a proportion of that population over the course of a year.

^c See *National Population Projections: Review of Methodology for Projecting Mortality*, Government Actuary's Department, 2001, Annex D.

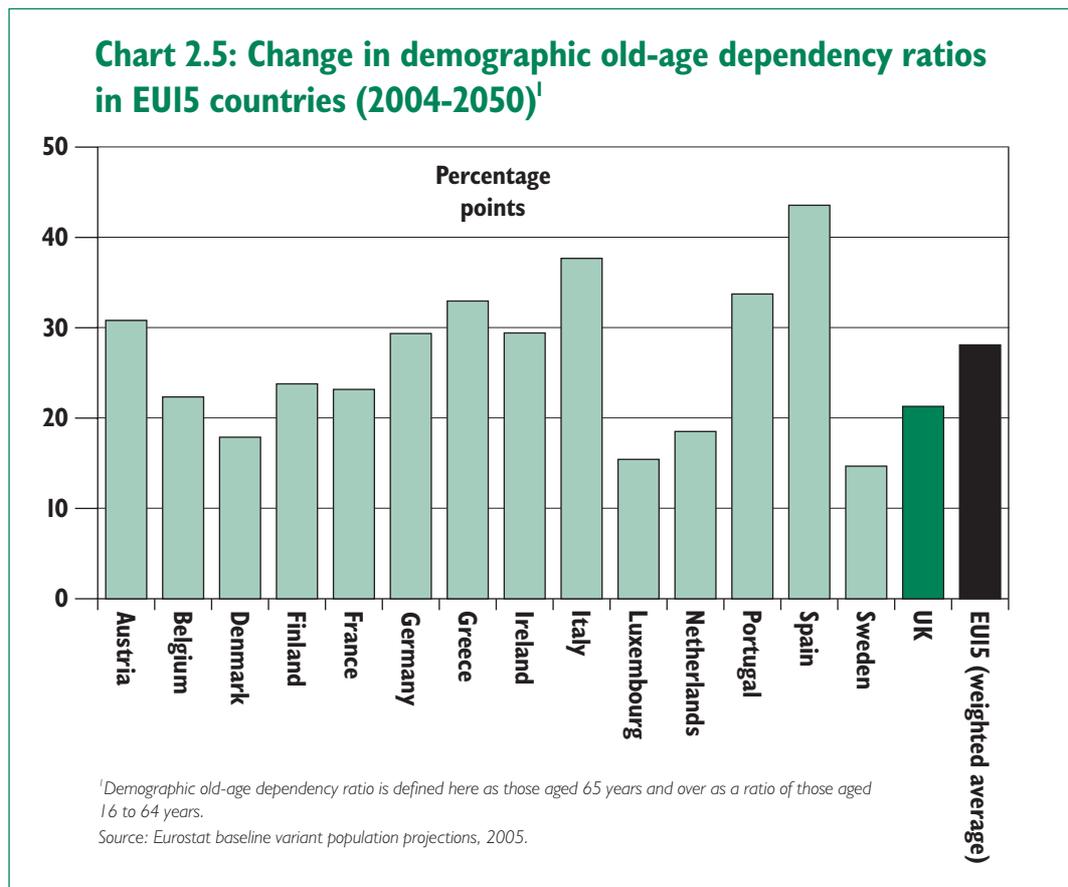
^d See *Projection of mortality rates for the elderly*, Michael Alderson and Fred Ashwood, Population Trends No.42, 1985.

^e See *National Population Projections: Review of Methodology for Projecting Mortality*, Government Actuary's Department, 2001, page 56.

^f This change was endorsed by a panel of demographic experts who were consulted on the assumptions to be used in the new projections.

Population ageing: a global phenomenon

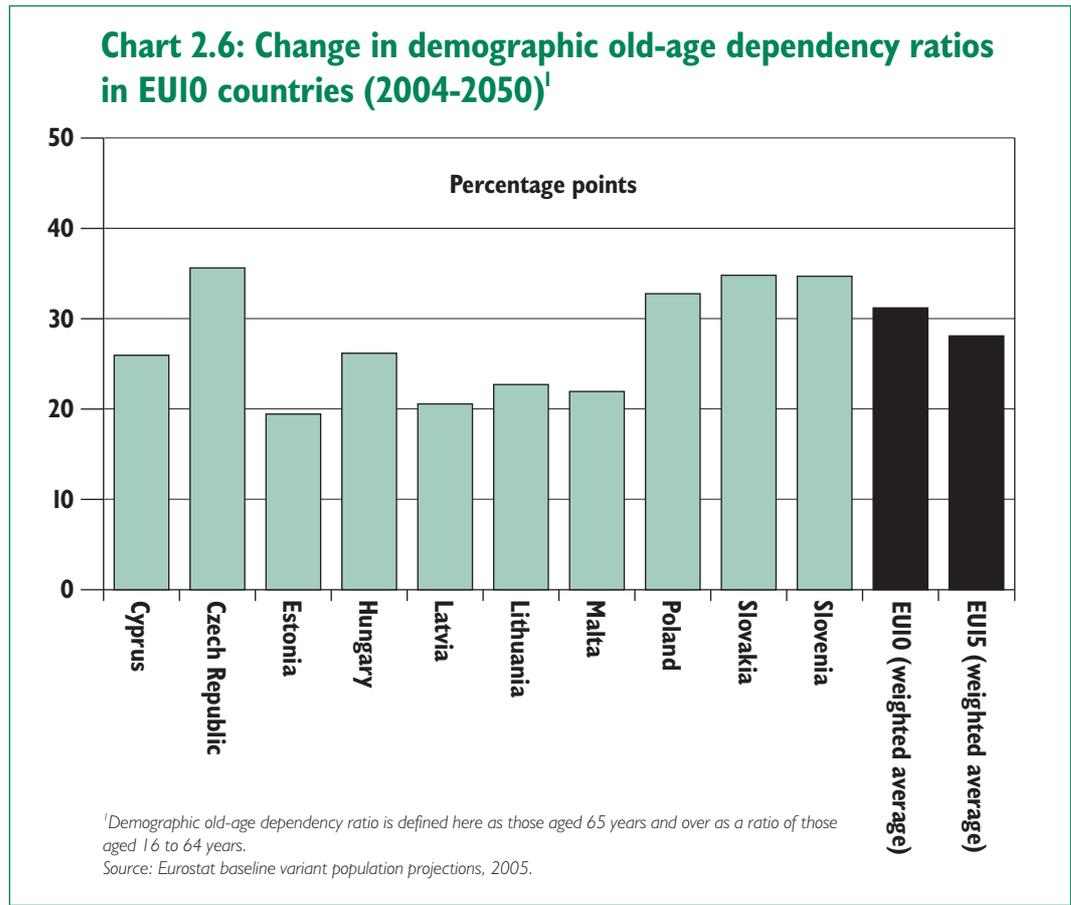
2.15 The UK is not the only country with an ageing population; ageing is a trend seen in most developed countries. According to the latest Eurostat projections,¹³ the population in the EU15 (comprising the countries that were EU Member States before May 2004) will age markedly over the coming decades, with the demographic old-age dependency ratio increasing by nearly 30 percentage points between 2004 and 2050.¹⁴ However, this aggregate trend hides substantial differences between Member States, with the least and most marked increases projected for Sweden and Spain respectively. Chart 2.5 shows the projected increase in the demographic old-age dependency ratio in the EU15, from which it can be seen that the projected increase in the UK is below that projected for other major EU countries and for the EU15 as a whole.



2.16 The EU10 (comprising the Member States that joined the EU in May 2004) are projected to experience a similar change in age profile as projected for the EU15. Chart 2.6 illustrates this, with all new members projected to face an increase in the old-age dependency ratio between 2004 and 2050. Moreover, the EU10 as a whole is projected to experience a rise in the old-age dependency ratio of 31 percentage points, slightly more than the 28 percentage points for the EU15.

¹³ See Eurostat, 2005, at <http://www.europa.eu.int/comm/eurostat/>.

¹⁴ For a more detailed discussion of projected demographic trends in the European Union, see *Demographic Change and the European Union Labour Market*, Katerina Lisiankova and Robert E. Wright, National Institute Economic Review, No. 194, pages 74 to 81, October 2005.

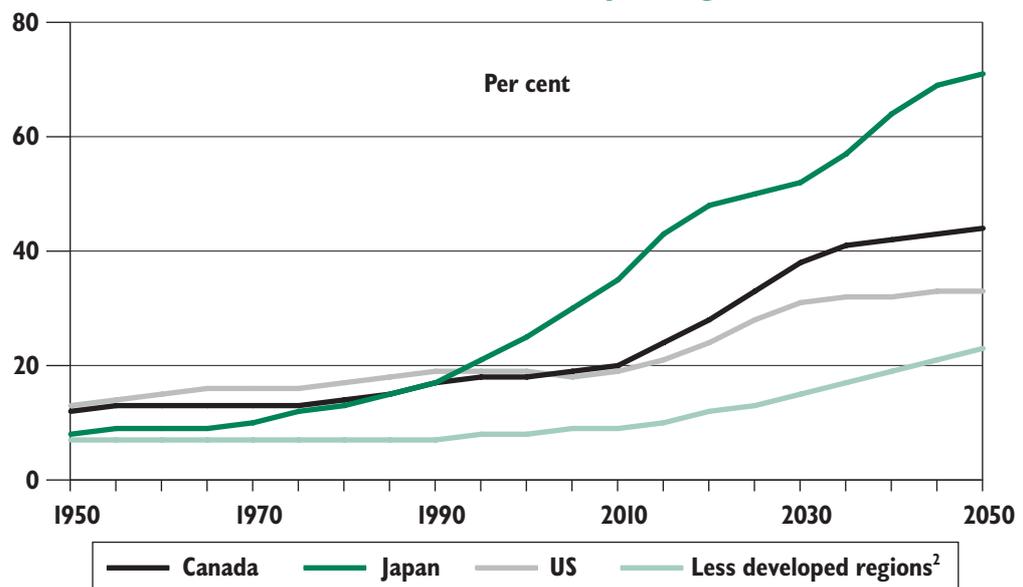


2.17 Similar trends are expected for most other developed countries. The latest United Nations population projections, published in 2005,¹⁵ show that Japan's population is projected to age the most, with the old-age dependency ratio increasing by 41 percentage points between 2005 and 2050, exceeding 70 per cent by 2050. By contrast, the US population is projected to age relatively moderately, with the old-age dependency ratio projected to rise by 20 percentage points between 2005 and 2050, while Canada is projected to observe an increase in its demographic old-age dependency ratio by 32 percentage points over the same period. Chart 2.7 shows the projected increase of the demographic old-age dependency ratio in the non-EU G7 countries. The chart also shows the projected change for less-developed regions, illustrating that population ageing is not a phenomenon limited to developed countries. Many developing and middle-income countries will also experience substantial population ageing over the coming decades, albeit, in many cases, from a lower starting point.¹⁶

¹⁵ See United Nations, 2005 at <http://esa.un.org/unpp/>.

¹⁶ For example, the demographic old-age dependency ratio is projected to rise from 8 per cent in 2005 to 22 per cent in 2050 in India. 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. For an analysis of the ageing challenge in Mexico, see *Building Human Capital in an Aging Mexico: A report of the U.S.-Mexico binational council*, Richard Jackson, July 2005.

Chart 2.7: Demographic old-age dependency ratios in non-EU G7 countries and less-developed regions¹



¹Demographic old-age dependency ratio is defined here as those aged 65 years and over as a ratio of those aged 15 to 64 years. All estimates are based upon the 'medium variant' version of the UN population projections, <http://esa.un.org/unpp/index.asp?panel=4>.
² 'Less-developed regions' are defined by the UN as all regions of Africa, Asia (excluding Japan), Latin America and the Caribbean plus Melanesia, Micronesia and Polynesia.
 Source: United Nations, *World Population Prospects: The 2004 Revision*.

DEMOGRAPHY, CLIMATE CHANGE AND UNCERTAINTY

2.18 Population projections are central to an assessment of long-term fiscal sustainability because they affect projections of future GDP and public spending and revenue trends.¹⁷ They are based on three key demographic assumptions: fertility rate, net migration rate and changes in longevity. Public spending trends are sensitive to demographic assumptions and changing the demographic assumptions could affect the policy conclusions.

2.19 Varying the fertility rate assumption would obviously affect the number of children over the next 20 years or so, which could have implications for education policy; but would have a very limited impact on the size of the working-age population and no impact on the number of older people. Beyond that, the fertility rate assumption begins to affect the working-age population, in turn influencing trend growth. However, it takes more than 60 years to affect the number of people above retirement age. Fertility rates can change very rapidly and depend on a number of factors, not least government policy itself.

2.20 Over a time horizon of about 20 years, the net migration assumption mainly affects the size of the working-age population as most immigrants are of working age in their 20s and 30s (even though some will also bring dependants). The number of older people will only be affected marginally by changes in net migration. However, after this period, the number of older people will also be affected as migrants age. Net migration is very difficult to predict in the short term but it is more stable in the longer term and depends on a wide range of factors, including social and economic circumstances in the UK and other recipient countries.

¹⁷ A recent OECD Working Paper considers the channels through which ageing populations in OECD countries could influence the main economic factors that in turn affect those countries' potential economic growth rate. See *The impact of ageing on demand, factor markets and growth*, Joaquim Oliveira-Martins et al., OECD Economics Working Papers No. 420, March 2005.

2.21 The longevity assumption has a marginal effect on the size of the working-age population but a marked effect on the evolution of older age groups, especially the oldest old. The longevity assumption affects pension spending projections. Together with other factors, such as trends in obesity and morbidity, longevity assumptions should also have a marked effect on projections about future demand for health and long-term care. As discussed in Box 2.2, important revisions have been made to the longevity assumption in the past, with successive population projections using higher and higher longevity assumptions.

Climate change

2.22 As stated in the introduction to this chapter the Government has identified a number of potential long-term trends that will affect the UK's economy over coming decades.¹⁸ One such trend is global climate change, which could have profound effects on societies and economies around the world. The UK fully supports the Kyoto Protocol on climate change. The Government is committed to moving towards a 20 per cent reduction in carbon emissions from 1990 levels by 2010, and to putting the UK on a path to cut emissions by 60 per cent by 2050. Nonetheless, as underlined at the G8 Gleneagles summit in July 2005, climate change is a global challenge requiring urgent action by all nations to slow the increase and then steadily reduce greenhouse gas emissions. Leadership from the developed world will be key to delivering this. Against this background, the Chancellor announced in July 2005 that Sir Nicholas Stern would lead a major review of the economics of climate change, to develop a detailed understanding of the long-term economic challenges and how they can best be met – both within the UK and internationally.

2.23 The full terms of reference for the review were published in October.¹⁹ In brief, the review will examine the evidence on the:

- implications for energy demand and emissions of the prospects for economic growth over the coming decades;
- economic, social and environmental consequences of climate change in both developed and developing countries;
- costs and benefits of actions to reduce the net global balance of greenhouse gas emissions from energy use and other sources; and
- impact and effectiveness of national and international policies and arrangements in reducing net emissions in a cost-effective way and promoting a dynamic, equitable and sustainable global economy.

2.24 Based on this evidence – and in consultation with key domestic and international stakeholders – the review will aim to provide an assessment of the economics of moving to a low-carbon global economy, including for the UK. The review will report to the Prime Minister and Chancellor in 2006.

¹⁸ Peter S. Heller and David Hauner suggest a similar list in the context of potential upside risk to future government spending, which covers, inter alia, potential trends such as natural disasters/climate change, terrorism and pandemics. See *Characterizing the Expenditure Uncertainties of the Industrial Countries in the 21st Century*, Peter S. Heller and David Hauner, April 2005.

¹⁹ See www.sternreview.org.uk.

The long term and uncertainty

2.25 One of the greatest challenges facing governments²⁰ when addressing these longer-term trends is how to deal with the high degree of uncertainty surrounding them. While some trends are pre-determined and should therefore be relatively easy to predict, others are more difficult to quantify. And even those trends that fall into the former group still have a high degree of uncertainty attached to them; the future evolution of longevity is a case in point. The challenge is made bigger by the fact that future trends are often not merely linear extrapolations of past developments. As a result dramatic changes can happen over a very short period of time. Policymakers need to be aware of the nature of change.

2.26 However, given that governments will need to be in the position to fulfil their responsibilities in the long term and that an early policy response might be more cost-effective than a later adjustment (and hence could be beneficial from a long-term public finance perspective²¹), how shall governments prepare for potential long-term trends?

2.27 One approach could be to prepare for all potential future trends. While a government would then be in the position to fulfil its future responsibilities,²² there could also be huge costs to such an approach in the sense that many potential trends will not materialise. For example, a study of UK population projections²³ cites a census from 1891 that projected the combined population stock of Australia and New Zealand in 1981 to be 94 million, five times greater than the actual outcome. Preparing for such a contingency would have been costly and little benefit would have been derived from it at a later stage.

2.28 Another approach could be to prepare for those trends that are either likely to happen and/or would be very expensive to adjust to in the future if they materialised. For all other trends, governments could put in place institutions and structures that allow them to adjust policies quickly if and when new information materialises and pursue a ‘no-regrets’ policy approach, in other words, follow policies which should work under a whole range of potential future outcomes.

The role for scenarios

2.29 One way to shed some light on how future trends might evolve is to construct scenarios. These scenarios could be based on pre-determined (and therefore reasonably predictable) trends and uncertain developments, which are possible (but not necessarily likely) and could have a major impact on future developments. Scenario planning is a well-established discipline and is conducted by governments and businesses alike. By their nature, scenarios are not limited to linear extrapolations of past trends but can also take account of abrupt (assumed) changes.

²⁰ This challenge is not limited to governments. Businesses and individuals also need to plan in an uncertain environment.

²¹ Additionally, earlier and more gradual policy adjustment should also have a less disruptive impact on society and the economy more generally than a more abrupt change.

²² Note though that the role and responsibilities of government might look very different in, say, 50-years’ time than it does now.

²³ See *Accuracy and uncertainty of the national population projections for the United Kingdom*, Chris Shaw, *Population Trends* No.77, 1994, page 24. The study was revealed in a letter to *Royal Statistical Society News*, February 1994.

2.30 For example, in the UK the Government is sponsoring the foresight project,²⁴ which has looked at different issues that affect society and how these might evolve over the next 20 years. Recent studies have covered issues as diverse as brain science and the future of drug use and infrastructure systems, while the latest study will look into obesity. In 2001 the Chancellor asked Derek Wanless to assess the resource needs for the National Health Service over the coming two decades. Derek Wanless's report presented three different health scenarios, which are all possible and whose impact on the public finances varied widely.²⁵ Similarly, large businesses conduct scenario planning to develop a better feel for how their business environment might evolve over the coming decades.

2.31 Scenarios could also be used to provide a richer picture of how the long-term sustainability of the public finances might be affected by different developments. For example, scenarios could be interesting to study potential future health outcomes and how these might affect the economy more widely, e.g. labour-market participation rates and hence trend growth. This is because of the very high degree of uncertainty regarding future health trends. It is possible that medical advances will lead to substantial increases in life expectancy and improvements in healthy life expectancies over the coming decades. These medical advances might or might not be expensive from a public-finance perspective.²⁶ As a result of longer healthy life expectancy, older workers might want to/are able to stay in the labour market for longer than is currently the case. This would raise GDP and, everything else equal, tax revenue. However, medical advances could turn out to be smaller than assumed in the above scenario and their positive impact could be more than offset by other possible trends, such as an increase in obesity.

²⁴ See <http://www.foresight.gov.uk>.

²⁵ *Securing Our Future Health: Taking a Long-Term View*, Derek Wanless, 2002. The three scenarios included "solid progress", "slow uptake" and "fully engaged", with projected health spending as a share of GDP in 2022-2023 varying from 10.6 per cent in the "fully engaged" scenario to 12½ per cent in the "slow uptake" scenario.

²⁶ New technologies open up new diseases for treatment, which could be costly, but at the same time they could also make current treatments cheaper. For example, so-called keyhole surgery falls into the second category. Also, preventative medicine could be cheaper than corrective intervention.

INTRODUCTION

3.1 This chapter sets out the 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: the national accounts measure of debt, GAAP-based¹ balance sheets and indicators based on comprehensive projections. This chapter also discusses 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 sustainable investment rule.

3.3 In this chapter three different approaches that could be used to assess long-term sustainability are discussed.² These approaches are:

- the national accounts measure of public sector (net) debt;
- GAAP-based balance sheets, which will be prepared as part of Whole of Government Accounts (WGA); and
- fiscal 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.

¹ Generally Accepted Accounting Practice.

² For more details of these approaches, see the 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. 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, such as those shown in Chapter 5 of this Report, will generally take account of existing liabilities (for example debt) but also include information about future spending and revenue streams. As such they can provide an answer to the question whether government will be able to meet its obligations if and when they arise in the future. The main limitation is that projecting into the future is inevitably subject to a high degree of uncertainty, making sensitivity analysis and careful interpretation of the results important.

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

3.5 The Government has announced 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 are resolved through dry-run processes. WGA will be prepared under UK Generally Accepted Accounting Practice (UK GAAP) and will be a single set of commercial-style financial statements for the whole public sector. WGA will include new information on areas such as provisions and contingent liabilities, and will provide new ways of looking at existing information.³

³ See *Delivering the benefits of accruals accounting for the whole public sector*, HM Treasury, December 2005, for more details.

3.6 Annex A discusses the major differences between GAAP and the System of National Accounts (SNA). The main differences relate to when costs are recognised. Although some differences result in earlier recognition of costs in national accounts, the net impact of these differences is likely to be earlier overall cost recognition in GAAP-based accounts compared with national accounts.

Assets 3.7 Both GAAP-based accounts and national accounts include measures of the Government's assets, although there are some recognition differences between the two. These are largely related to the treatment of single use military equipment (SUME).⁴ Under SNA, purchases of SUME are treated as consumption or current expenditure. However, GAAP treats purchases of SUME as a capital asset, so that these are added to the capital stock and depreciation is charged. Consideration is being given internationally to changing the national accounts framework to capitalise SUME.

3.8 Under GAAP, estimates of the capital stock and other assets are built from the "bottom-up", from individual bodies' records of their assets (and liabilities). The process of consolidating these data to prepare WGA is supporting the Office for National Statistics (ONS) in its ongoing efforts to improve the national accounts in relation to capital assets. The ONS has already begun using departmental data consolidated by HM Treasury to inform estimates of the capital stock for the central government sector.

Liabilities 3.9 The Government has many different types of liabilities. National accounts 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. This type of liability is generally referred to as a creditor. Government debt is one example of such a liability.

3.10 GAAP-based accounts also include information on liabilities that have some degree of uncertainty surrounding them, including provisions (these are transfers which are probable, but where there is uncertainty over the amount and/or timing of the transfer) and contingent liabilities (these are possible transfers, where there may be uncertainty over whether the past event actually took place). For example, the Government's GAAP-based balance sheet will include a provision for the cost of nuclear decommissioning; it will also disclose contingent liabilities such as guarantees for private sector borrowing, as a note to the accounts, although these will not count towards the balance sheet totals. Box 3.2 and Annex A provide more details on liabilities.

⁴ 'Single use military equipment' comprises those assets that have an exclusively military purpose (such as warships) as opposed to assets with other possible uses (such as trucks).

Box 3.2: Liabilities in Whole of Government Accounts

Whole of Government Accounts (WGA) will include information on four types of liabilities: creditors, provisions, contingent liabilities and remote contingent liabilities. 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 exists, e.g. a supplier will have delivered goods (past event) and the buyer has an obligation to pay (present obligation). However, in some cases it is less clear whether a liability exists or not. The timing of payment may be uncertain (for example, decommissioning costs associated with nuclear power generation), or the event itself may be uncertain (such as guarantees on private sector borrowing). Whether it is a creditor, provision or contingent liability depends on the degree of certainty on whether there is a present obligation, and the timing and amount that will have to be paid.

Concept	Level of certainty	Example
Creditor	Certain transfer	Government debt
Provision	Certain or probable transfer, but uncertainty over timing	Nuclear decommissioning liability
Contingent liability	Possible transfer, uncertainty over existence of past event	Guarantees on private sector borrowing
Remote contingent liability	Possible transfer, but unlikely to occur	Notes and coins in circulation

In WGA, both creditors and provisions are included on the balance sheet. The inclusion of provisions in the balance sheet results in earlier cost recognition than in national accounts. Contingent liabilities are disclosed as a note to the accounts, but do not count towards the balance sheet totals.

Public service pensions 3.11 Another difference between national accounts and WGA is the treatment of public service pensions. National accounts include current transactions in relation to public service pension schemes such as cash flows in from current employees (employee contributions) and cash flows out to current pensioners (total pension payments). By contrast, WGA will recognise the value of pension entitlements as a liability at the time when they are earned (which may be 40 years or more before payments commence), with any assets held by the individual schemes netted off against this.

3.12 Clearly there is a significant degree of uncertainty 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 liabilities are in effect very large provisions.

3.13 This new information on assets and liabilities is one way in which the Government expects to benefit from the WGA programme. In addition, the Government expects to benefit from greater comparability of financial information across the public sector, additional impetus to improvements in the quality of individual bodies' accounts and financial management systems, and improved accountability with greater external scrutiny through the external audit process. Once complete, Whole of Government Accounts will represent one of the most complex financial consolidations in the world.

INDICATORS BASED ON COMPREHENSIVE PROJECTIONS

Top-down approach

Illustrative long-term fiscal projections

3.14 Within the Economic and Fiscal Strategy Report (EFSR), the *Code for Fiscal Stability*⁵ 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.

3.15 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 Government's 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. One feature 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

3.16 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.⁶

3.17 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. Chapter 5 provides the results of this year's comprehensive bottom-up projections. A comprehensive set of bottom-up spending and revenue projections can also 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. 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 policymakers to potential changes in spending and revenue over the long term, and provides useful insights into the long-term sustainability of the public finances.

⁵ *Code for Fiscal Stability*, HM Treasury, March 1998.

⁶ 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.

3.18 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.

Fiscal sustainability indicators

Intertemporal budget constraint/gap 3.19 To formalise the assessment of sustainability, a government's obligations over time can be represented in the intertemporal budget constraint (IBC).⁷ The IBC states that the present discounted value (PDV) of all future revenue (that is, over an infinite time horizon) should be equal to the PDV of all future spending (excluding interest payments) and today's outstanding debt burden. Put differently, the current level of debt must be equal to the PDV of all future primary balances.

3.20 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. Meeting the intertemporal budget constraint does not mean that debt should ever be 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.

3.21 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 would also work, as would a combination of the two.

3.22 More generally, even if the intertemporal budget gap points to an imbalance, it does not necessarily imply that only 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.

3.23 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. However, the intertemporal budget constraint approach also has a number of weaknesses. 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 debt 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.

⁷For 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.

3.24 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 based on a present discounted value of future flows and outstanding liabilities, 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 3.25 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.⁸ 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.

3.26 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.

3.27 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”.⁹ 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 spending and/or revenue develop in a non-linear way, which is possible over longer time periods, for example due to the retirement of the baby-boom generation.

⁸ 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.

⁹ *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.

3.28 Box 3.3 discusses three indicators used by the European Commission to assess long-term fiscal sustainability in the EU Member States, which are very similar to the measures of the intertemporal budget constraint and the fiscal gap measures discussed above.

Box 3.3: The European Commission’s sustainability indicators

The European Commission regularly publishes assessments of the long-term sustainability of the public finances of Member States.^a As part of the 2004 assessment three quantitative indicators were used: two long-term sustainability indicators (called S1 and S2) and an indicator with a more medium-term focus, known as the *required primary balance* or RPB.

The S1 indicator is the difference between the constant tax to GDP ratio required to reach a gross debt ratio of 60 per cent of GDP in 2050 and the current tax ratio. The analogy with the fiscal gap measure discussed in this chapter is clear. The S2 indicator is the intertemporal budget gap (IBG). It indicates the change in the tax to GDP ratio that would be needed to equate the present discounted value of future primary balances (that is, revenue less non-interest-related expenditure) to the current level of debt.

The RPB is based on the intertemporal budget gap (S2). It calculates the average minimum required cyclically-adjusted primary balance to be maintained over the first five years of the projections after the programme period, if the IBG is to be met.^b This indicator therefore gives an indication of the degree of adjustment in fiscal policy needed over the medium term to meet the IBG. A significant gap between the S2 indicator and the RPB suggests substantial changes in the profile of expenditure over the medium term (due, for example, to the pattern of age-related expenditures).

These indicators are very similar in nature to the intertemporal and fiscal gaps presented in this Report. However, there are some important differences; for example S1 is based on a target gross debt to GDP ratio of 60 per cent compared with the 40 per cent net debt to GDP target used in this Report. In addition, spending and revenue are only projected up to 2050, and then held constant as a share of GDP, whereas in this Report the projection horizon is 100 years. This affects the calculations of the intertemporal budget gap.

^a *Public Finances in EMU – 2005, European Commission, 2005.*

^b The ‘programme period’ is the period covered by the stability (convergence) programme submitted by the Member State.

Alternative fiscal gap indicator 3.29 It is possible to imagine other indicators of long-term fiscal sustainability. The 2003 *Long-term public finance 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 IBC 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.

Generational accounting 3.30 Generational accounting provides a different approach to thinking about long-term fiscal issues.¹⁰ 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,¹¹ then current policies are considered to be generationally fair.

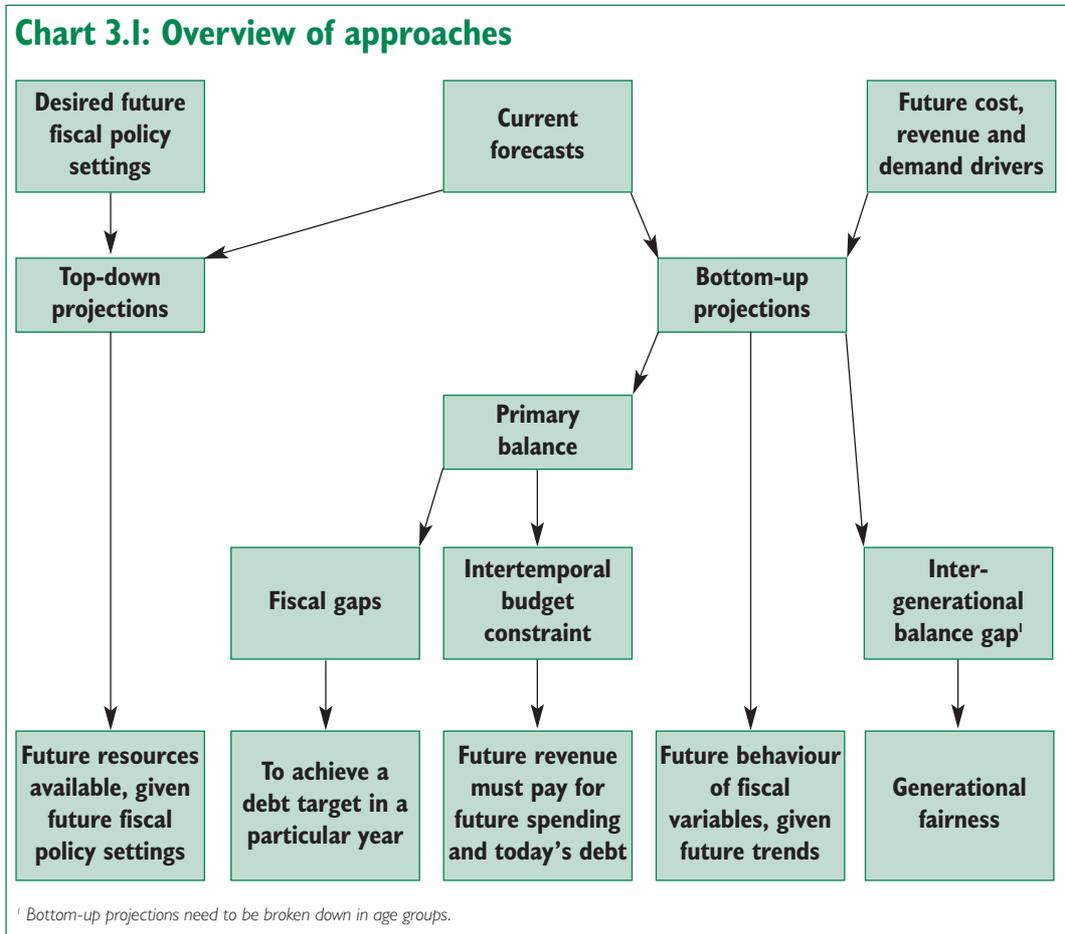
3.31 The generational accounts' inter-generational balance gap (IGG) indicates by how much current taxes have to rise (or fall), or spending has to fall (or rise), so that a current newborn and a future newborn are equally well off.¹² One drawback is arguably that the inter-generational balance indicator 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. Chapter 5 provides this year's IGG.

¹⁰ 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.

¹¹ 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.

¹² 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.

Overview of approaches 3.32 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 comprehensive bottom-up projections.



4

ASSUMPTIONS

DEMOGRAPHY

Updated population projections 4.1 The population projections used in this Report are based on the Government Actuary's Department (GAD) 2004-based principal population projections, which were published in October. This year's Report therefore incorporates the latest population projections available. The main results and differences from previous population 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.¹ For example, the gradual rise in the female participation rate 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 rates and hence future GDP levels.

4.3 In previous reports a basic assumption was made that the overall employment rate remains unchanged beyond the end of the medium term.² This meant that changes in employment levels were entirely due to changes in the working-age population. Although simple and transparent this method did not account for either the effect of an ageing population on participation rates, or the current trend of increasing female labour market participation.

4.4 The 2004 *Long-term public finance report* introduced an alternative approach to projecting gender- and age-specific employment rates and total employment levels beyond the medium term.³ This year's Report uses this alternative approach, the so-called 'cohort' method, for the employment projections. Studies by the Organisation for Economic Co-operation and Development (OECD)⁴ and on-going analysis into the long-term sustainability of the public finances in EU Member States conducted by the EU's Economic Policy Committee (EPC)⁵ also utilise this approach.

¹ To be entitled to the full basic state pension, individuals must have reached state retirement 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 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.

² See 2004 *Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, December 2004, page 33.

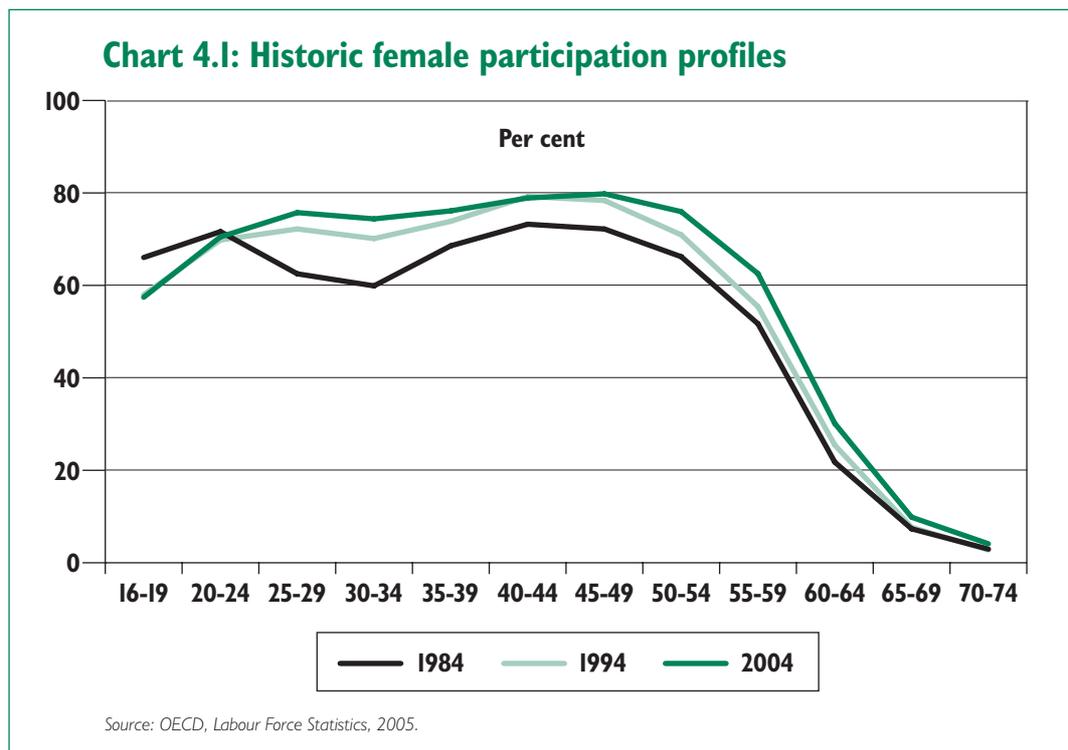
³ *Ibid*, pages 33 to 36.

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

⁵ *The 2005 projections of age-related expenditure (2004-2050) for the EU-25 Member States: underlying assumptions and projection methodologies*, European Union Economic Policy Committee, November 2005 (available at http://europa.eu.int/comm/economy_finance/publications/european_economy/2005/eespecialreport0405_en.htm).

Projecting employment levels

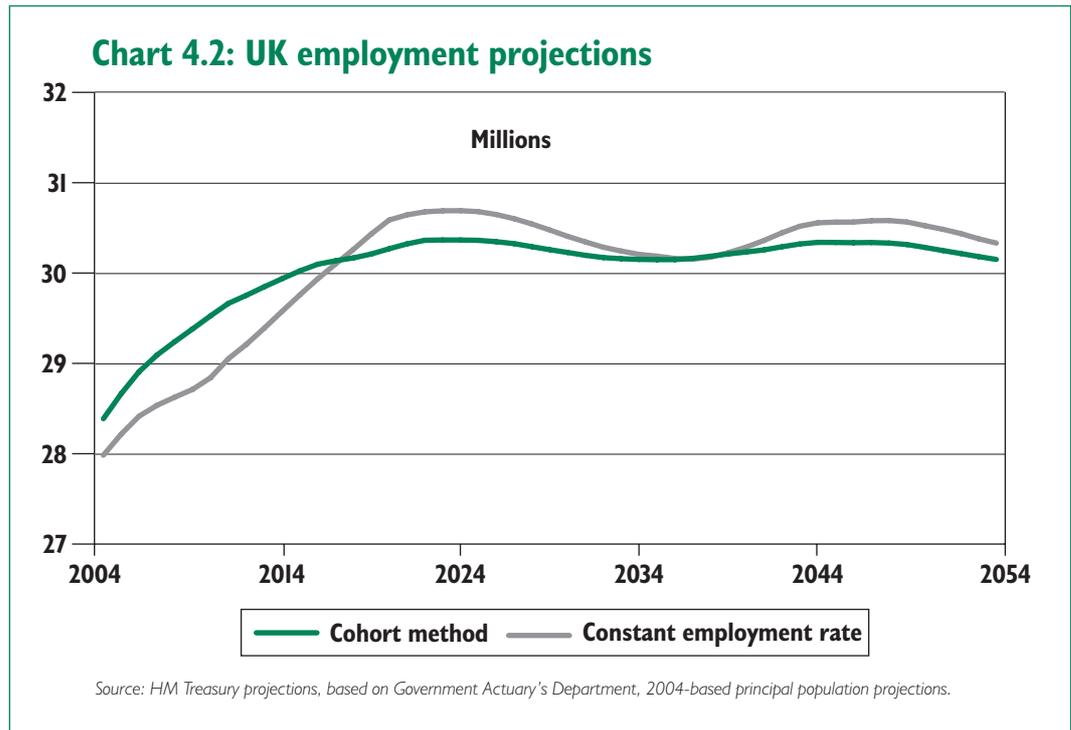
4.5 The cohort method of projecting employment trends captures the negative impact of an ageing workforce on overall participation (due to older workers generally having lower participation rates than younger workers) and the effect of current young cohorts gradually replacing current older cohorts. This is important, as 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. In the case of females, Chart 4.1 below shows that females today are much more likely to participate in the labour market at most ages than females of the same age were, say, 10 or 20 years ago.⁶ This ‘cohort effect’ is likely to have important implications for future participation rates. Annex B of this Report explains in more detail how the cohort effect is modelled and what underlying assumptions are made.



4.6 Chart 4.2 shows projected UK employment over the next 50 years, based on the cohort method and the alternative assumption that the total employment rate will remain constant beyond the medium term (that is, the assumption used in previous reports). According to the projections, UK employment will continue to rise until the mid 2020s, then fall slightly over the following decade before more or less stabilising at just over 30 million; around 2 million higher than now. The chart shows that the evolution of employment levels is similar under both modelling approaches, as was the case last year.⁷ This is because the cohort model picks up two opposing effects (rising female participation and falling participation due to an ageing workforce), which more or less cancel each other out in terms of overall employment.

⁶ The fall in female labour market participation rates of those in the 16 to 19 year age group between 1984 and 2004 can largely be attributed to the substantial rise in female participation in post-16 education over the period. For example, the proportion of females aged between 16 years and 19 years in the UK enrolled in all forms of full-time education increased from 32.3 per cent in 1985 to 58.7 per cent in 2003 (figures based on education enrolment data provided by *OECD Education Online Database*, OECD at <http://www1.oecd.org/scripts/cde/members/linkpage.html> and population estimates provided by *Population and Social Conditions Database*, Eurostat at <http://epp.eurostat.ec.eu.int/>).

⁷ Note that the cohort model projects employment levels based on the 16 to 69 year age group, in other words the employment projections also include individuals who are above the state retirement age. This is done because a substantial number of people above the state retirement age are in employment and therefore contribute to GDP.



PRODUCTIVITY AND GROSS DOMESTIC PRODUCT (GDP)

Productivity growth 4.7 The productivity growth assumption (output per person) used in the baseline projections 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.

4.8 In addition to the baseline assumption, 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 (EFSR) stresses that the lower productivity growth assumption is cautious.⁸

GDP growth 4.9 Given assumptions regarding productivity and projections of employment growth, it is possible to derive projected GDP growth beyond the end of the medium-term forecast period. Table 4.1 shows the average real GDP growth rates in the coming decades for the baseline projections.⁹

Table 4.1: Real GDP growth and its components in the baseline scenario (per cent)¹

Year	2014-15 to 2023-24	2024-25 to 2033-34	2034-35 to 2043-44	2044-45 to 2053-54
Productivity	2	2	2	2
Employment	0	0	0	0
Real GDP	2	2	2	2

¹Productivity growth is $1\frac{3}{4}$ per cent and $2\frac{1}{4}$ per cent in the lower and higher productivity scenarios respectively.

Source: HM Treasury.

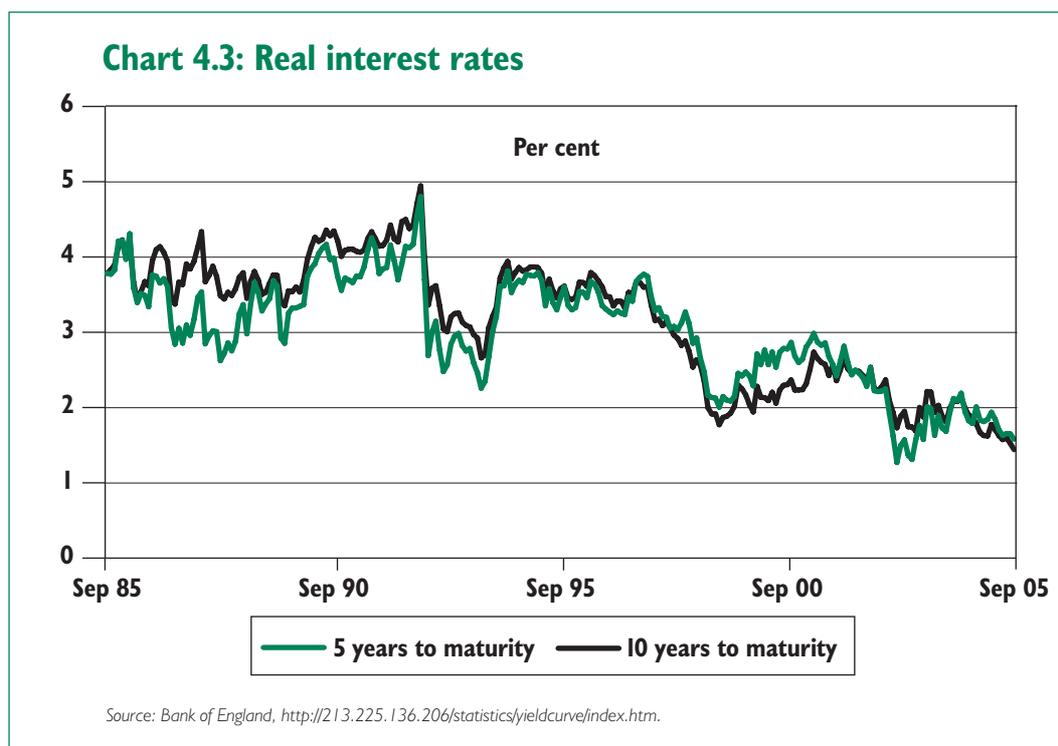
⁸Economic and Fiscal Strategy Report in *Budget 2005: Investing for our future: Fairness and opportunity for Britain's hard-working families*, HM Treasury, March 2005.

⁹Real GDP growth is projected to be slightly lower between 2014-15 and 2023-24 and slightly higher between 2024-25 and 2033-34 than in last year's Report. As can be seen from Chart 4.2, this reflects the employment projections using the cohort method and a constant employment rate approach. As the former is calculated over the age group 16 to 69 year olds, it is not affected by the increase in the female state pension age between 2010 and 2020, whereas the latter is.

DISCOUNT/DEBT INTEREST RATE

4.10 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.

4.11 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 1985, and have remained between 1 per cent and 4 per cent since 1998, averaging less than 2½ per cent since 2000. To provide some sensitivity analysis, the Report presents results based on discount rate assumptions of 2½ per cent, 3 per cent and 3½ per cent.



4.12 The discount/debt interest rate assumptions are higher than real interest rates for UK government bonds with five- and ten-year maturities have been since the end of the 1990s. However, they are in line with the recommendations of the 2003 Green Book.¹⁰ The Green Book is a best practice guide for all central Government departments and executive agencies on the process of project appraisal and evaluation. The 2003 Green Book recommends a discount rate of 3½ per cent but also states that there are a number of circumstances (for example, when the impacts occur over the long term as in these calculations of long-term fiscal sustainability), in which a lower discount rate may be appropriate. In addition, the discount rate assumptions are also similar to those used in recent academic studies.¹¹ Box 4.1 provides information on ultra-long bonds, a topic which has received increased interest recently.

¹⁰ *The Green Book: appraisal and evaluation in central government*, HM Treasury, 2003.

¹¹ 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.

Box 4.1: Ultra-long gilt issuance by the UK Debt Management Office

The Chancellor of the Exchequer announced at Budget 2005 that, for the first time in a generation, the Government would issue bonds with maturities of up to 50 years, locking in low borrowing costs for the Exchequer while also meeting investor needs for longer-dated assets. In particular, an exercise led by the Debt Management Office (DMO) in 2004 suggested that the pension and insurance industries were seeking longer-dated secure assets to match their future liabilities. The DMO took the view that it could successfully satisfy some of that demand through the issuance of ‘ultra-long’ gilts^a and that it would likely be able to capture a premium in doing so. On the basis of issuance to-date, that has proved to be the case.

In May 2005, the DMO launched, by auction, a new 4¹/₄ per cent conventional ultra-long gilt maturing in 2055. The initial tranche of £2¹/₂ billion was well received by gilt-market participants. Subsequently, the DMO successfully re-opened the gilt in July 2005 and announced a further re-opening towards the end of the year.

In September 2005, the DMO launched, via a syndicate^b of banks, a 1¹/₄ per cent index-linked gilt, also maturing in 2055. HM Treasury and the DMO concluded that a syndicated offering would be the best way, in this particular case, to ensure a fair and transparent price discovery process that would benefit both the Exchequer and investors. This is the longest-dated sovereign index-linked bond in the world and the DMO has successfully opened a new sector of the index-linked gilt market via this issue. The syndicated offer attracted orders in excess of £2 billion, allowing the issue size to be increased to £1¹/₄ billion from the originally anticipated £1 billion. The DMO successfully re-opened this gilt by auction in October 2005 and achieved the lowest real interest rate of any long-dated gilt auction since its foundation in 1998 (1.13 per cent).

Experience of overseas sovereigns also suggests a growing trend for issuance of ultra-long bonds. The Agence France Trésor opened their 4 per cent Obligation Assimilable du Trésor (OAT) in February 2005 and has since re-opened it. In September 2004, the European Investment Bank issued, by syndication, a 50-year sterling denominated bond with a coupon of 4⁵/₈ per cent that matures in 2054.

^a A gilt is a UK Government security issued by HM Treasury.

^b Syndication is a process whereby a group of banks is appointed to manage the sale of a bond on behalf of the issuer. A syndicated gilt offering would involve the appointment of a group of underwriters (drawn from the gilt-edged market makers (GEMMs)) formed for the purpose of jointly managing the initial offering of a new gilt. One or more of the underwriters would act as lead manager(s) of the ‘syndicate’ and would build a ‘book’ of orders for the gilt.

SPENDING AND REVENUE

Current policies are assumed 4.13 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. The assumption of current policy 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.¹²

¹² *The impact of ageing populations on public finances: overview of analysis carried out at EU level and proposals for a future work programme*, European Union Economic Policy Committee, October 2003.

4.14 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 2010-11, 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.

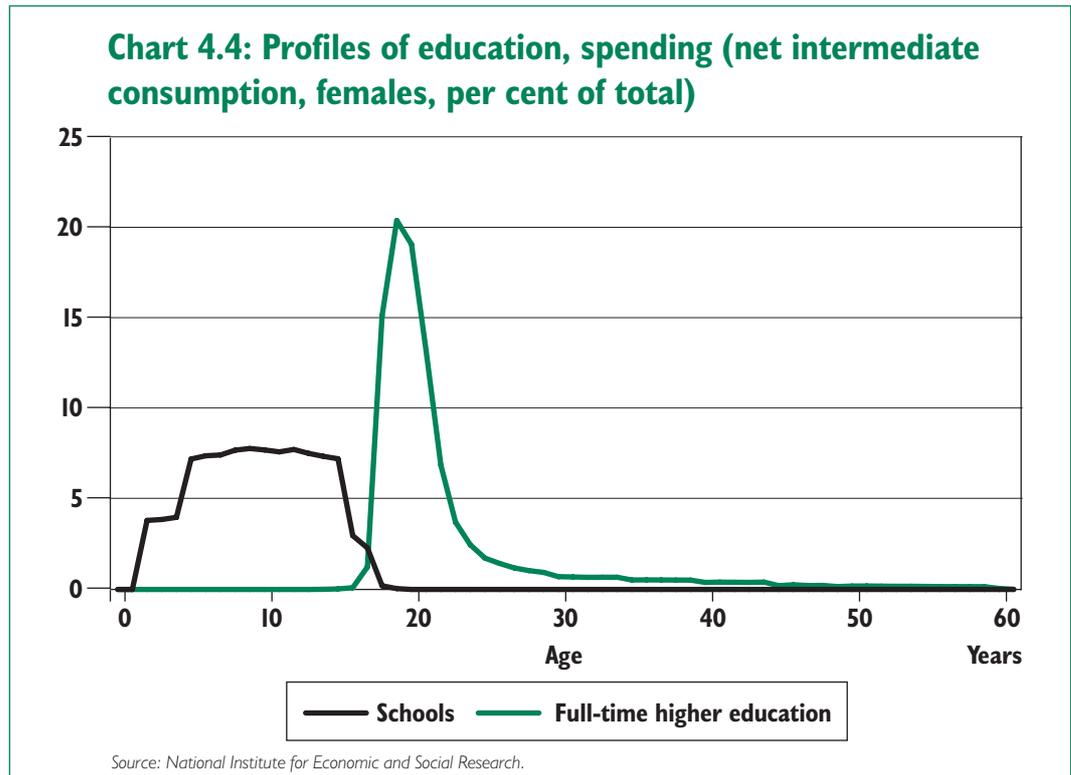
Spending and revenue items have specific age profiles

4.15 The spending and revenue projections are based on the same separate spending and revenue profiles for males and females as used in the 2004 *Long-term public finance report*. The majority of 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.¹³ For a few spending and revenue items, modified profiles are used, which were introduced in the 2004 Report (see below).

4.16 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 (and revenue from) 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, in this case the education spending profile for females.¹⁴ As expected, most of the spending on schools occurs on those between the ages of 5 and 16, with females in each cohort within this age band receiving around 8 per cent of total spending on schools (on females). Spending on higher education is concentrated on a higher age group than spending on schools and is allocated over fewer years. This reflects the fact that higher education degrees generally take between 3 and 4 years. It can be seen from Chart 4.4 that females aged 20 receive around a fifth of total higher education spending (on females). The age cohorts of 30 years and over receive only small shares of higher education spending as few women of those ages are in full-time higher education.

¹³ 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.

¹⁴ More examples can be found in the 2002, 2003 and 2004 Long-term public finance reports.



Per capita allocations and contributions

4.17 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.

4.18 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 latest 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 the population projections to generate spending and revenue projections. The projections can be used to calculate the indicators discussed in Chapter 3.

Exceptions

4.19 As in previous years, there are a number of exceptions where the approach discussed above is used in a modified way or not used at all. In particular, the 2004 Report introduced a number of modifications to the underlying health and long-term care profiles. Specifically, last year's Report introduced the assumption that the proportion of life spent in ill health is constant. This implies that as life expectancy increases, both the number of years spent in bad and in good health will rise by the same proportion. This assumption, which is implemented again in this year's Report, is relatively cautious regarding the evolution of future morbidity trends. The 2004 *Long-term public finance report* provides more detail on future health trends and potential modelling assumptions.¹⁵

¹⁵ See 2004 *Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, December 2004, pages 17 to 19 and 40 to 41. In addition, a recent New Zealand Treasury study on the effect of changing age structure on health expenditures (not covered in the 2004 *Long-term public finance report*) found that improvements in health status could offset more than one third of the extra health spending pressures created by population ageing. See *Population ageing and government health expenditure*, John Bryant, Audrey Sonerson, Martin Tobias, Jit Cheung and Mhairi McHugh, New Zealand Treasury Policy Perspectives Paper 05/01, March 2005.

4.20 As in previous years, for a number of spending items it is beneficial to rely on external projections. This is particularly the case for social security spending, which is projected by the Department for Work and Pensions (DWP) 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.

4.21 The Government has made clear that decisions relating to the indexing of the Pension Credit will be made on a Budget and Spending Review timetable in the context of resources and priorities. As such, the projections set out here describe just one possible scenario of how the Pension Credit might evolve, but should not be taken as the Government's policy. The particular scenario used for the purposes of the projections is where the parameters of the Pension Credit are uprated in such a way as to lead to an upper estimate of the possible cost of the Pension Credit in the long term, in order to be prudent and cautious. Box 4.2 provides further details.

4.22 Furthermore, public service pensions are also projected by GAD, using a model which takes into account factors such as the degree of maturity of different public service pension schemes and changes in employment. The underlying modelling assumptions are the same as in last year's Report.¹⁶

4.23 For this year's Report the income tax projections have been refined so as to be fully consistent with the employment projections (see above). This has been achieved by projecting income tax revenue raised from those aged 16 years to 69 years on the basis of the age-specific employment projections, as generated by the cohort employment model. For income tax raised from those 70 years and over, it is assumed that it grows in line with the projected changes in the number of people in this age group.¹⁷

¹⁶ See 2004 *Long-term public finance report: an analysis of long-term fiscal sustainability*, HM Treasury, December 2004, page 43.

¹⁷ The projections require a breakdown of total income tax revenue by gender and age groups for the first year of the projection period. These data are based on *Income Tax and Personal Incomes National Statistics Tables*.

See http://www.hmrc.gov.uk/stats/income_tax/index.htm.

Box 4.2: Long-term expenditure on state pensions

In keeping with previous Long-term public finance reports, this Report sets out projections for long-term expenditure on state pensions on the basis that the Guarantee Credit within the Pension Credit is indexed in line with earnings. This should not be taken as the Government's policy but as just one possible scenario which leads to an upper estimate of the possible long-term cost of Pension Credit, in order to be prudent and cautious.

It has never been the intention that this scenario should be interpreted as defined Government policy beyond the current commitments. As all previous Long-term public finance reports state, the scenarios used in the long-term projections: "... should not be interpreted as meaning that policy will not change over time but is used so that the long-term projections do not prejudice future Government policy".^a

This was recognised by the independent Pensions Commission in its recent report.^b When discussing the assumptions that it uses in its projections of state pension spending, the Pensions Commission Report states: "[These assumptions] are not however defined government policy for the long-term since for example the government has only made firm commitments to the Pension Credit indexation regime until 2007-08".^c

The Government has made clear that decisions relating to the future indexing of the Pension Credit will be made on a Budget and Spending Review timetable in the context of resources and priorities. To date the Government has committed to index the Guarantee Credit within the Pension Credit by earnings only until the end of the current Spending Review period (2007-08). This commitment forms the basis of the Government's medium-term expenditure plans.^d If the Government were to decide to index the Guarantee Credit by earnings beyond this period, such a decision would need to be accounted for in the table of Budget policy decisions in the Financial Statement and Budget Report.

The Pensions Commission has set out the additional costs of indexing the Guarantee Credit by earnings in real terms, over and above the Government's medium-term expenditure plans. These costs are reproduced in the table below.

Pension Credit indexation: additional costs of earnings indexation relative to indexation by Rossi (real terms 2005-06 prices)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
£ billion	1.4	2.5	3.3	3.3	3.2	4.3	4.7	5.2	5.2	5.9	6.4

Source: Pensions Commission. See <http://www.dwp.gov.uk/publications/dwp/2005/pensionscommreport/media/costs.pdf>.

The Pensions Commission has also estimated that the total cost of its package would be £7.6 billion in 2020 in real terms, relative to expenditure assuming earnings indexation of the Guarantee Credit. As shown in the above table the cost of indexing the Guarantee Credit by earnings reaches £6.4 billion by 2020. For public finance purposes this £6.4 billion would be an addition to the medium-term expenditure forecast. As the Pensions Commission has stated "against this level the cost of the package is £14 billion"^e in 2020, expressed in real terms.

^a For example, see 2003 Long-term public finance report: fiscal sustainability with an ageing population, HM Treasury, December 2003, page 40.

^b A New Pension Settlement for the Twenty-First Century: The Second Report of the Pensions Commission, Pensions Commission, November 2005.

^c *Ibid*, page 13.

^d See Annex B of the 2005 Pre-Budget Report, HM Treasury, December 2005, which sets out the assumptions used to project public sector spending for the years 2008-09 to 2010-11.

^e *Sanity in the numbers*, Pensions Commission, December 2005.

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.¹ 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.² 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 2005 Pre-Budget Report,³ are continued into the future. The nature of these assumptions does not mean that the Government has made a commitment to continue current policy. Similarly, it 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 keeping within the fiscal rules as discussed in Chapter 1. Importantly, the Government aims 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, 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 term.

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 for 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 2005 Pre-Budget Report provides updated

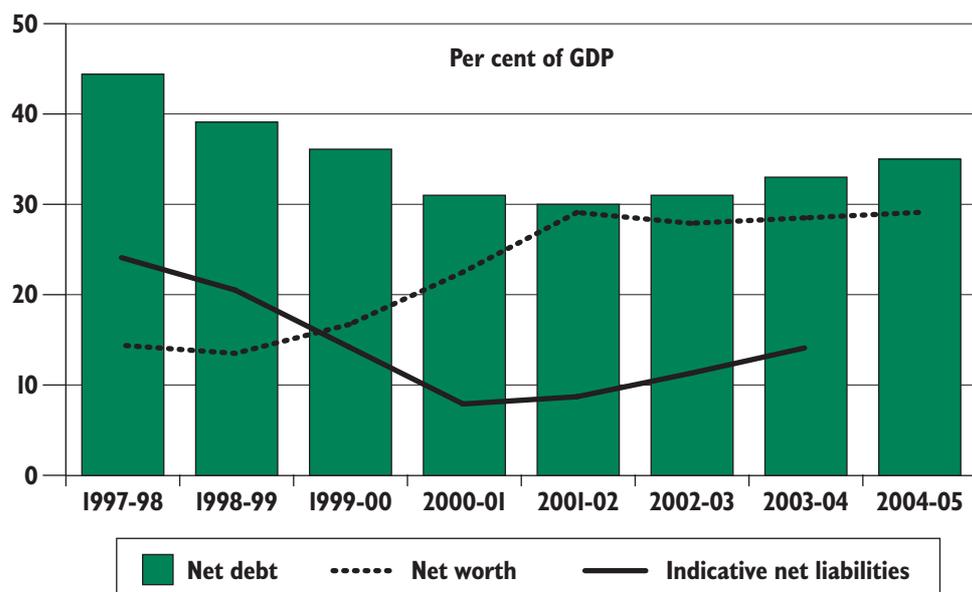
¹ Generally Accepted Accounting Practice.

² The assumptions used in this Report are stated in Chapter 4.

³ 2005 *Pre-Budget Report*, HM Treasury, December 2005.

projections of net debt as a share of GDP up to 2010-11.^{4,5} The chart also shows the public sector's net worth position, which is also taken from the national accounts. Between 1998-99 and 2004-05 net worth more than doubled as a share of GDP.⁶ Unlike net debt, however, net worth is not at present used as a key indicator of the public finances because of difficulties involved in accurately measuring many government assets and liabilities.

Chart 5.1: Public sector net debt, net worth and indicative net liabilities¹



¹ Data for indicative net liabilities are not yet available for 2004-05. The exact figures for the indicative net liabilities are 27.8, 23.5, 16.9, 9.5, 10.3, 10.9 and 12.6 per cent of GDP, respectively. Source: HM Treasury.

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.

⁴ 2005 Pre-Budget Report, HM Treasury, December 2005.

⁵ The ONS has announced that from mid-2006 they should be able to include an element of debt associated with on-balance-sheet Private Finance Initiative schemes (PFI) in figures for public sector net debt. These data have not been included up to now due to data quality issues.

⁶ Note that ONS has revised its estimates of net worth up significantly over the past year, largely reflecting revisions to the value of roads. This also affects the estimates for indicative net liabilities.

5.7 Chart 5.1 shows that net liabilities, as a share of GDP, have been lower than net debt since 1997-98.⁷ This indicates 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 the reduction in debt has not been at the expense of government assets or an increase in provisions.

ANALYSIS OF FUTURE SPENDING AND REVENUE

5.8 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 and the principal population projections based on the Government Actuary's Department (GAD) 2004-based principal population projections.

Spending projections

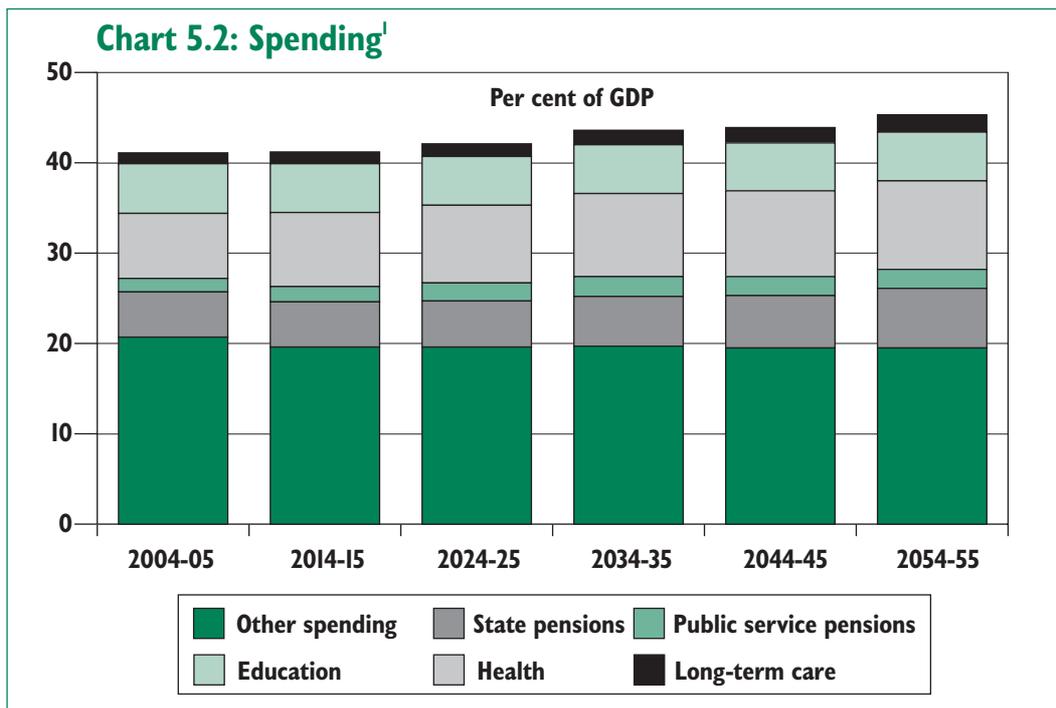
Spending projections and uncertainty

5.9 Caution must be exercised when interpreting the long-term spending projections because of the uncertainty surrounding the underlying assumptions. The results are based on projections (which depend on assumptions) and do not represent forecasts. Some trends are predictable, while others are not. For example, as discussed in Chapter 2, while there is general agreement that the population is ageing there is little consensus on the exact nature of longevity, fertility, and migration trends in the future. In addition, depending on their main non-demographic determinants, different levels of uncertainty attach to different spending items.

5.10 In addition, the projections also depend crucially on assumptions about future policy settings. For example, the Government has made it clear that decisions related to the indexing of the Pension Credit will be made on a Budget and Spending Review timetable in the context of resources and priorities. As such, the projections set out here describe just one possible scenario of how the Pension Credit might evolve, but should not be taken as the Government's policy. The particular scenario used for the purposes of the projections is where the parameters of the Pension Credit are uprated in such a way as to lead to an upper estimate of the possible cost of the Pension Credit in the long term, in order to be prudent and cautious. Box 4.2 provides further details.

5.11 Chart 5.2 shows the evolution of spending and some of the key spending items as a share of GDP over the next five decades.

⁷ The 2004 Report showed that this was also the case in 1996-97, the earliest available year for indicative figures. See 2004 *Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, December 2004, page 46.



Education 5.12 Education spending is projected to remain relatively stable over the coming decades, fluctuating around 5½ per cent of GDP. 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.

State pensions 5.13 State pension spending⁸ is projected to increase from 5 per cent of GDP in 2004-05 to around 6½ per cent by 2054-55. These projections are based on the scenario that the parameters of the Pension Credit are uprated in such a way as to lead to an upper estimate of the possible cost of the Pension Credit in the long term, in order to be prudent and cautious; as described in paragraph 5.10. The profile of spending for the years between 2014-15 and 2024-25 is affected by the increase in the state pension age for women. See Chapter 4 for more details on the modelling assumptions.

Health 5.14 The health projections are based on the assumption that future increases in life expectancy can be enjoyed partly in good health. Chapter 4 provides more background. Health spending is projected to increase from 7.2 per cent in 2004-05 to nearly 10 per cent of GDP by 2054-55 as the population ages. Of this an increase of around 1 percentage point by 2007-08 reflects the substantial increase in NHS spending announced in Budget 2002⁹ in response to the Wanless Review.¹⁰ As in previous years, though, non-demographic factors that might affect health spending beyond the medium term are not modelled.

Long-term care 5.15 The long-term care projections are based on the same morbidity assumption as the health projections. Based on this assumption, long-term care is projected to rise from 1.2 per cent of GDP now to nearly 2 per cent by 2054-55.

⁸ State pension spending is defined as the sum of the basic state pension, State Second Pension, Pension Credit, Winter Fuel Payments, Over 75 TV licences, and Christmas Bonus. Some external estimates include other components, such as Housing Benefit, in the definition of state pension spending. However, these components have been included under “other spending” in official projections since 2002, when the Long-term public finance report was first published.

⁹ Budget 2002: *Economic and fiscal strategy report: The strength to make long-term decisions: Investing in an enterprising, fairer Britain*, HM Treasury, April 2002.

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

Public service pensions 5.16 Expenditure on public service pension benefits is projected to increase from around 1½ per cent of GDP now to around 2 per cent by 2054-55. This projected increase reflects changes in the size of the public service workforce, improved longevity and the fact that some schemes, and in particular the NHS scheme, are not yet mature.

Other spending 5.17 Spending on education, state pensions, public service pensions, and health and long-term care amounted to roughly half of total government spending in 2004-05. This share is projected to rise to around 57 per cent by 2054-55. In terms of GDP, the total of education, state pension, public service pensions, and health and long-term care spending is projected to reach around 26 per cent by 2054-55. By contrast, other spending is projected to remain more or less stable as a share of GDP beyond the medium term. This is because projected increases in ‘other’ consumption and capital spending (i.e. those unrelated to education, health and long-term care) more or less offset projected relative falls in other spending items such as non-pension social transfers which are, based on current policies, mainly increased in line with prices.¹¹

Spending summary 5.18 The changing demographic structure of the UK’s population – and especially the ageing aspect – is projected to lead to an increase in public spending over the coming decades. A significant proportion of this increase is projected to take place over the medium-term horizon, reflecting the outcomes of the 2002 and 2004 Spending Reviews, and 5-year settlement on health.¹² Beyond the medium term, spending on education is projected to remain more or less stable as a share of GDP, while state pension spending are projected to rise by around 1½ percentage points. The increase in public service pension spending reflects to a large degree the maturing of the existing schemes. Health and long-term care spending are projected to increase the most in absolute terms, rising from a combined 8.4 per cent of GDP in 2004-05 to around 11¾ per cent by 2054-55. Table 5.1 summarises the spending projections.

Table 5.1: Spending projections (per cent of GDP)

	2004-2005	2014-2015	2024-2025	2034-2035	2044-2045	2054-2055
Education	5.5	5.4	5.4	5.4	5.3	5.4
State pensions ¹	5.0	5.0	5.1	5.5	5.8	6.6
Health ²	7.2	8.2	8.6	9.2	9.5	9.8
Long-term care ³	1.2	1.3	1.4	1.6	1.7	1.9
Public-service pensions	1.5	1.7	2.0	2.2	2.1	2.1
Total age-related spending	20.4	21.6	22.5	23.9	24.4	25.8
Other spending	20.7	19.6	19.6	19.7	19.5	19.5
Total spending⁴	41.1	41.2	42.1	43.6	43.9	45.3

¹ Defined as the sum of the Retirement pension, including the State Second Pension, Pension Credit, Over 75 TV licences, and Christmas Bonus.

² Gross NHS spending.

³ Excluding long-term care provided within the NHS which is accounted for under Health.

⁴ Total spending including gross investment but excluding interest and dividends payments.

5.19 As noted above, there is considerable uncertainty surrounding the assumptions underlying the long-term spending projections. Box 5.1 discusses this in more detail.

¹¹ The projected increase in ‘other’ consumption and capital spending, as a share of GDP, reflects the substantial projected increase in the total UK population.

¹² See *Budget 2002: Economic and fiscal strategy report: The strength to make long-term decisions: Investing in an enterprising, fairer Britain*, HM Treasury, April 2002, Chapter 6.

Box 5.1: Spending projections and uncertainty

The **education projections** depend crucially on the fertility rate assumption. As argued in Chapter 2, fertility rates can change very rapidly and depend on a range of factors. In addition to this demographic driver, future education spending will also depend on non-demographic factors such as enrolment rates (for example in higher education). These factors in turn will be affected by society's future preferences. It has often been argued that education is a so-called luxury good, in other words a good which is demanded relatively more the higher the income.^a However, what will be the effect of an ageing population on society's preferences for education spending in the future?

The **pension projections** depend on the underlying demographic assumptions (e.g. longevity) but also on a number of other factors, which are difficult to predict with any certainty. For example, new data from the National Insurance records suggest that more women are building up state pension entitlements on their own than previously thought. How this and other trends will evolve in the future are difficult to predict, so any projection will have to rely on assumptions.^b

The **health and long-term care projections** are probably the least certain of the age-related spending projections presented in this Report in the sense that the widest range of future outcomes could be imagined. This is because future health and long-term care spending will depend on a wide range of factors, most of which are very difficult to predict or not predictable at all. As with future education and pension spending, future health and long-term care spending will depend, at least to a certain degree, on the future population structure. Everything else equal, an ageing population should lead to higher health and long-term care spending (in absolute terms but also as expressed in terms of GDP).

However, it is very difficult to predict whether everything else will indeed remain equal. Will increases in life expectancy be reflected in longer healthier lives or will they merely extend the length of time spent in bad health?^c The future evolution of morbidity (health status) will affect the demand for future health and long-term care products and services. Changing social preferences are also likely to make a difference and should therefore affect public spending. As is the case with education, health is considered to be a so-called luxury good.

There are many other non-demographic factors, which could affect future health and long-term care spending. The Wanless Review^d separated these factors into demand and supply drivers. In addition to demography and health status, the former group comprises health promotion and disease prevention and health seeking behaviour. The latter group comprises technological and medical advances (which should also affect morbidity trends), investment in information and communication technology, and health service workforce productivity. Some commentators have argued that non-demographic drivers are likely to be more important than demographic drivers in determining future health spending.^e

^a More precisely, in the economics literature a good is considered to be a "luxury good" if its income elasticity of demand is greater than one.

^b See also *Quantifying Uncertainty in the Analysis of Long-term Social Security Projections*, Congressional Budget Office, November 2005.

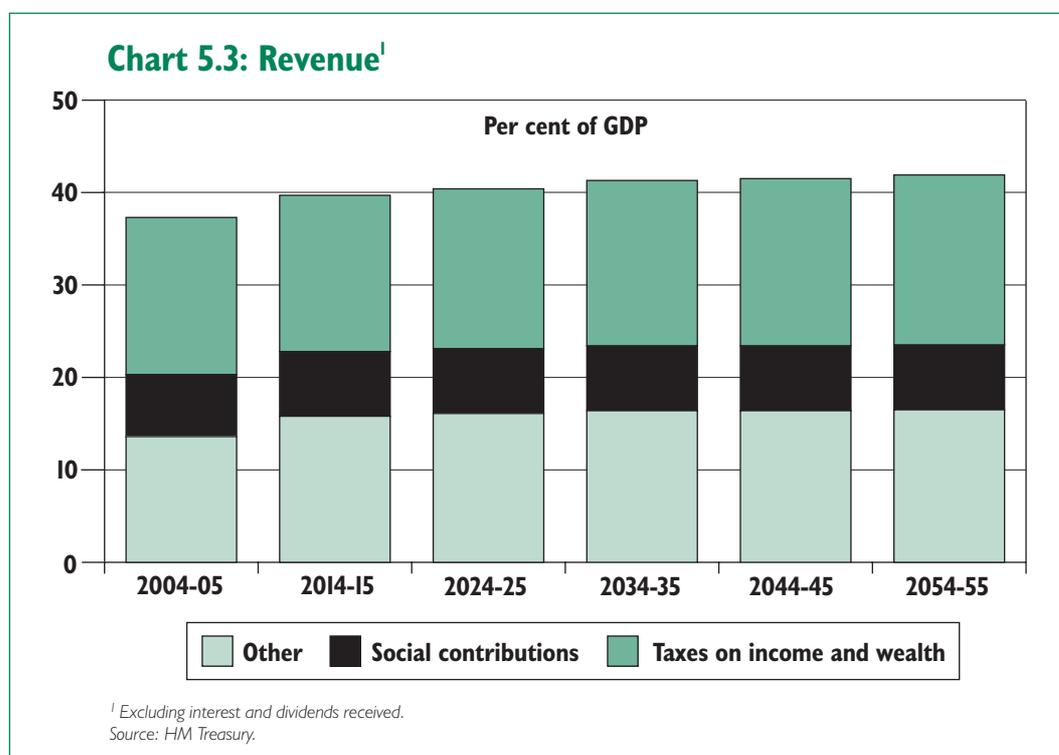
^c See *2004 Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, December 2004, pages 17 to 19 for a detailed discussion.

^d *Securing our Future Health: Taking a Long-Term View*, Derek Wanless, 2002. However, the Wanless Review focused on health trends only.

^e *Economic Implications of an Ageing Australia*, Australian Government Productivity Commission, March 2005.

Revenue projections

5.20 Chart 5.3 shows that revenue is projected to rise as a share of GDP between 2004-05 and 2014-15, reflecting to a large extent the increases forecast over the medium-term horizon.¹³ Beyond the medium term, revenue is projected to rise further, reaching nearly 42 per cent of GDP by 2054-55.¹⁴

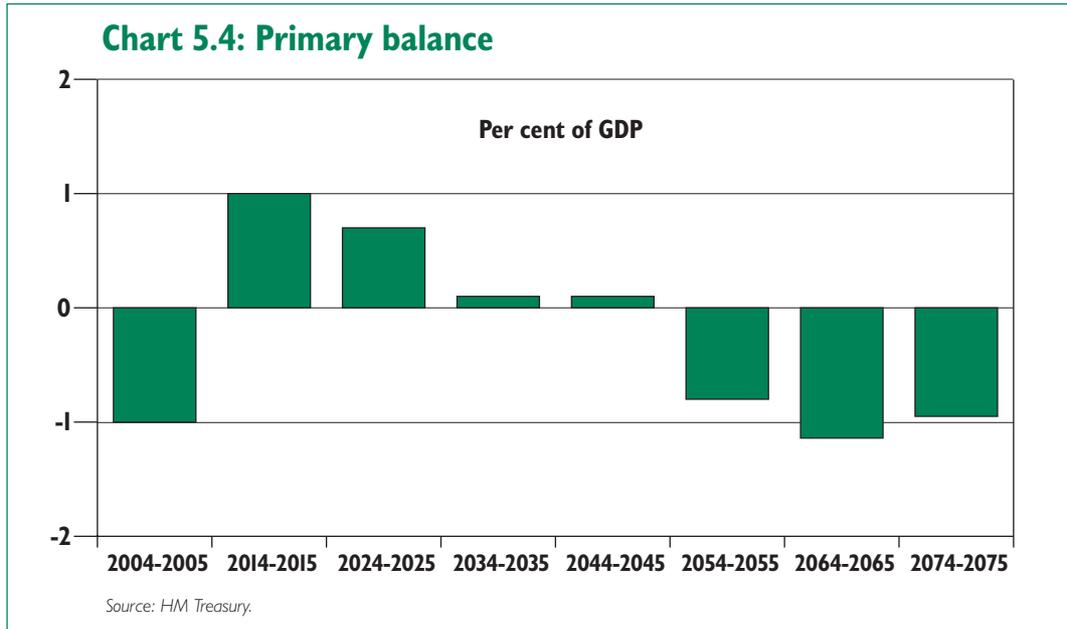


Primary balance 5.21 As a result of the projected spending and revenue trends, the general government primary balance is projected to be in surplus in 2014-15. Chart 5.4 shows that the primary balance is projected to remain in surplus until the mid 2040s, before going into deficit.¹⁵ The gradual deterioration in the primary balance in the very long term mainly reflects continued projected increases in age-related expenditure.

¹³ For further discussion on medium-term public finances projections, see 2005 *Pre-Budget Report*, HM Treasury, December 2005.

¹⁴ The exact figures are 37.3 (2004-05), 39.7 (2014-15), 40.4 (2024-25), 41.3 (2034-35), 41.5 (2044-45) and 41.9 (2054-55) per cent of GDP.

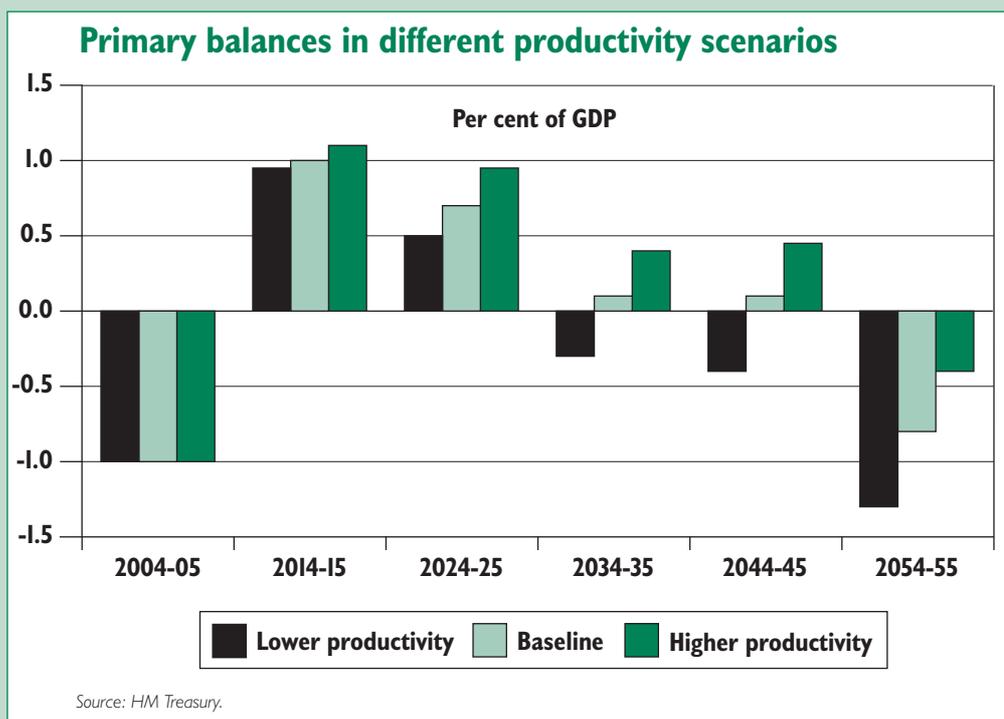
¹⁵ To derive the primary balances in Chart 5.4 and in Box 5.2, it is necessary to add general government interest and dividends received to the spending and revenue projections. This follows the International Monetary Fund's Manual on Fiscal Transparency. See <http://www.imf.org/external/np/fad/trans/manual/gloss.htm>. Interest and dividends received are assumed to remain constant as a share of GDP beyond the medium term.



5.22 The projected evolution of the general government primary balance will depend in part on the underlying productivity growth rate assumption, which affects the extent to which price-indexed social security transfers evolve relative to GDP. Box 5.2 presents the primary balances for the three productivity growth scenarios presented in this Report.

Box 5.2: Primary balances in different scenarios

The projected general government primary balance differs between the three productivity scenarios. This is mainly due to the fact that a number of social security spending items are uprated in line with prices rather than earnings. Different productivity growth assumptions will therefore affect the evolution of these spending items as a share of GDP. The chart below shows the projected evolution of the primary balance in the three scenarios of lower, baseline and higher productivity growth.



The exact figures from the chart above are given in the table below.

General government primary balance (per cent of GDP)

Year	2004-05	2014-15	2024-25	2034-35	2044-45	2054-55
Lower productivity (1¾ per cent)	-1.0	1.0	0.5	-0.3	-0.4	-1.3
Baseline (2 per cent)	-1.0	1.0	0.7	0.1	0.1	-0.8
Higher productivity (2¼ per cent)	-1.0	1.1	1.0	0.4	0.4	-0.4

Source: HM Treasury.

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

Intertemporal budget gaps **5.23** 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 2004-05 (and a proportionate increase/reduction thereafter) to meet the intertemporal budget constraint) under a range of discount rate and productivity growth rate assumptions.¹⁶ 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 achieve intertemporal balance depends to some extent on the discount rate assumption. (See Chapter 4 for more information on the discount rate assumption.) If a lower 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 growth rate assumption.

Table 5.2: Intertemporal budget gaps¹ (per cent of GDP)

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

¹ Fiscal tightening (or loosening) in 2004-05 and a permanent, proportionate fiscal tightening (or loosening) thereafter needed to ensure intertemporal balance. Rounded to the nearest quarter percentage point.

Fiscal gaps **5.24** 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 level from the sustainable investment rule as the target, it is therefore possible to use the fiscal gap concept to estimate the primary balance that is consistent with the Government's sustainable investment rule over different time horizons.¹⁷

5.25 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 2011-12 onwards, that is, beyond the medium-term horizon for fiscal policy.¹⁸ Table 5.3 shows the baseline projections under the different interest rate assumptions.

¹⁶ 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.

¹⁷ The fiscal gap and alternative fiscal gap calculations in this 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. Note that for the fiscal gap and the alternative fiscal gap calculations, the primary balance is defined as net borrowing excluding net debt interest payments. This is consistent with the UK's definition of primary balance which, by excluding interest receipts, yields larger deficits and/or smaller surpluses than the IMF's definition (see footnote 15). See *Analysing UK Fiscal Policy*, HM Treasury, November 1999, page 35. Excluding interest receipts is also consistent with calculating the fiscal gaps on a net debt basis.

¹⁸ If the change in the primary balance were assumed to take place earlier than 2011-12, then the implied increases or reductions in the primary balance would be correspondingly smaller.

Table 5.3: Fiscal gaps¹ in baseline productivity scenario² (per cent of GDP)

Interest rate (per cent)	2 ¹ / ₂	3	3 ¹ / ₂
Target year			
2024-25	- ¹ / ₂	- ¹ / ₄	0
2034-35	0	0	¹ / ₄
2044-45	0	¹ / ₄	¹ / ₂
2054-55	¹ / ₄	¹ / ₂	¹ / ₂

¹ Change to primary balance needed to attain net debt of 40 per cent of GDP at end of target year. Rounded to the nearest quarter percentage point.

² 2 per cent productivity growth.

5.26 The results show that the UK public finances are in a solid long-term position. Table 5.3 shows, for example, that (except in the high interest rate scenario) the Government is projected to achieve a net debt to GDP ratio of 40 per cent by 2034-35 in the baseline case without a change in the fiscal stance. 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 -¹/₂ and ¹/₂ 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 2004-05.¹⁹

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

Table 5.4: Fiscal gaps¹ in lower productivity scenario² (per cent of GDP)

Interest rate (per cent)	2 ¹ / ₂	3	3 ¹ / ₂
Target year			
2024-25	- ¹ / ₄	0	¹ / ₄
2034-35	¹ / ₄	¹ / ₄	¹ / ₂
2044-45	¹ / ₂	¹ / ₂	³ / ₄
2054-55	³ / ₄	³ / ₄	1

¹ Change to primary balance needed to attain net debt of 40 per cent of GDP at end of target year. Rounded to the nearest quarter percentage point.

² ¹/₄ per cent productivity growth.

Table 5.5: Fiscal gaps¹ in higher productivity scenario² (per cent of GDP)

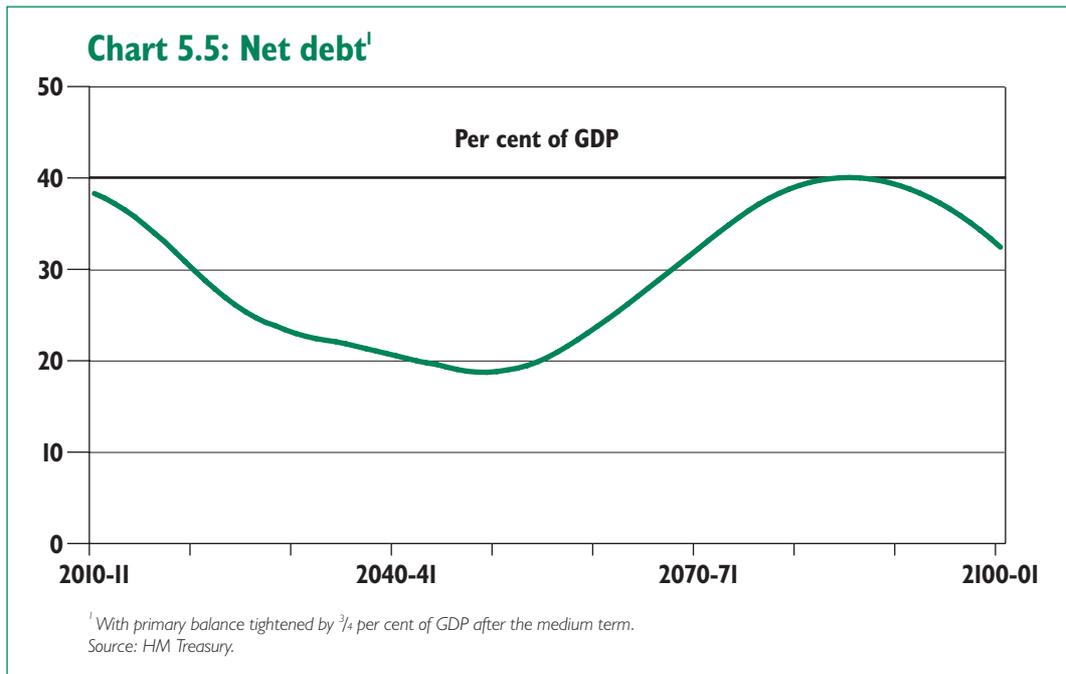
Interest rate (per cent)	2 ¹ / ₂	3	3 ¹ / ₂
Target year			
2024-25	- ³ / ₄	- ¹ / ₂	- ¹ / ₄
2034-35	- ¹ / ₂	- ¹ / ₄	0
2044-45	- ¹ / ₄	0	0
2054-55	0	0	¹ / ₄

¹ Change to primary balance needed to attain net debt of 40 per cent of GDP at end of target year. Rounded to the nearest quarter percentage point.

² ²/₄ per cent productivity growth.

¹⁹ 2005 *End of year fiscal report*, HM Treasury, December 2005.

Alternative fiscal gap indicator 5.28 The 2003 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 5.5 shows the evolution of the 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 tightened its fiscal stance slightly after the medium term, then the net debt to GDP ratio would *never* exceed the 40 per cent limit as specified by the Government’s sustainable investment rule.



Inter-generational balance 5.29 Chapter 3 introduced the concept of generational accounting. Box 5.3 presents this year’s updated results of the inter-generational balance.

Box 5.3: Inter-generational balance

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 around $2\frac{1}{2}$ per cent of GDP in the baseline scenario for all three discount rates of $2\frac{1}{2}$, 3 and $3\frac{1}{2}$ per cent. This year’s IGGs are therefore similar to those presented in previous reports, which have argued that current policies in the UK have a relatively high degree of inter-generational fairness compared with those in many other countries.^a

^a The IGG presented here is based on an approach that distinguishes between current consumption and investment rather than the more conventional approach, which treats the two spending categories the same in the generational accounts. 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. Note that the difference in results between the two approaches is small.

COMPARISON WITH PREVIOUS RESULTS

Spending and revenue 5.30 The results presented in this year's Report show differences but also similarities with the results shown in the 2004 Report.

Spending

- Beyond the medium-term horizon, overall spending is projected to increase by more, as a share of GDP, than in last year's Report. This is mainly due to 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. This is principally due to the long-term impacts of lower levels of contracting out of the State Second Pension at present, which increase long-term spending, the inclusion of new data from National Insurance records which suggest that more women are building up state pension entitlement on their own than had previously been thought, and refined modelling assumptions, using the Department for Work and Pensions' new dynamic microsimulation tool, Pensim 2.²⁰ Second, health and long-term care spending are projected to increase by slightly more than in last year's Report, with the increased upward pressure created by the latest population projections. This is particularly the case for the long-term care projections, which are especially sensitive to changes in the number of the oldest old (85 years and over).

Revenue

- Revenue is projected to continue to rise as a share of GDP through to the end of the projection period, in contrast with last year's projections, where revenue as a share of GDP stabilised beyond the mid 2030s. This is mainly due to refinements to the income tax projections to make the modelling consistent with the cohort employment model methodology.

Fiscal indicators 5.31 The fiscal indicators are very similar to those presented in last year's Report.

- The **intertemporal budget gap** is projected to be very similar to the 2004 estimates. Assuming that the Government wanted to meet the intertemporal budget constraint and assuming that any adjustment was entirely through a change in the fiscal stance, then fiscal policy could remain roughly unchanged.
- the **fiscal gap** calculations show that the required loosening in the primary balance to stabilise net debt at 40 per cent of GDP in a specific target year is now marginally smaller (or the possible tightening greater) than in last year's Report.

²⁰ Note that the new population projections are not a major driver of the change in projected state pension spending from last year's Report.

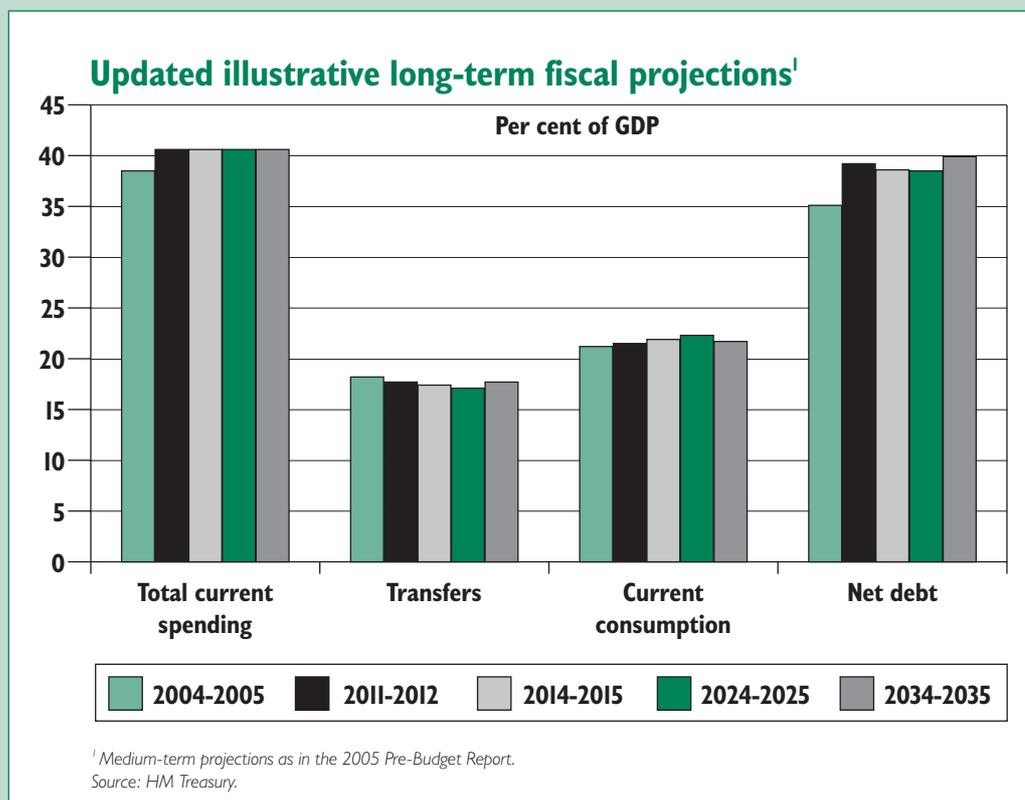
- the **alternative fiscal gap indicator** shows a slightly different picture to that presented in 2004, with the public sector primary balance requiring a small tightening of $\frac{3}{4}$ per cent of GDP. This reflects the projected evolution of the primary balance, especially in later decades. As noted earlier, there are large uncertainties surrounding these projections. The degree of uncertainty inevitably increases the longer the projection horizon.
- the **illustrative long-term fiscal projections**, updating those presented in Annex A of the 2005 Economic and Fiscal Strategy Report (EFSR),²¹ show that the UK's public finances are sustainable in the long term, confirming the previous projections. Box 5.4 provides details of the updated illustrative long-term fiscal projections, which are based on the medium-term forecast as presented in the 2005 Pre-Budget Report, and updated population and social security projections.²²

²¹ *Budget 2005: Investing for our future: Fairness and opportunity for Britain's hard-working families*, HM Treasury, March 2005.

²² The modelling and macroeconomic assumptions remain nearly unchanged from those used for the illustrative long-term fiscal projections presented in Annex A of the 2005 EFSR. For more details see *Budget 2005: Investing for our future: Fairness and opportunity for Britain's hard-working families*, HM Treasury, March 2005, pages 175 to 183. The only difference is that employment growth is projected using the cohort approach introduced in Chapter 4.

Box 5.4: Updated illustrative long-term fiscal projections

The chart below presents the results of the updated projections, following the approach used in Annex A of the Economic and Fiscal Strategy Report (EFSR). The chart shows that transfers, as a share of GDP, are projected to fall slightly between 2011-12 and 2024-25 before 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.



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.

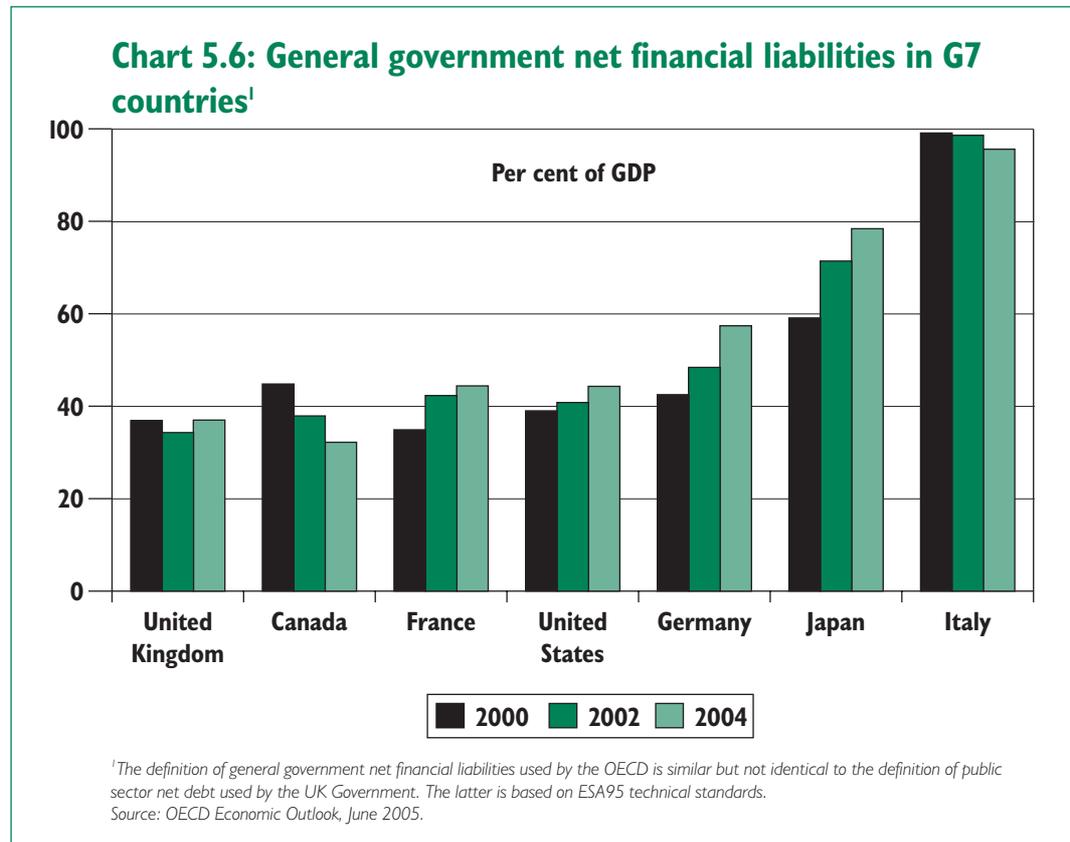
The illustrative long-term fiscal projections presented here therefore differ only slightly from those presented in Annex A of the 2005 EFSR, indicating that the UK’s public finances are broadly sustainable over the long term.

INTERNATIONAL COMPARISONS

5.32 International comparisons suggest that the UK’s long-term fiscal position is relatively strong compared with other developed countries facing challenges from ageing populations, including many EU countries and the United States. As the OECD notes: “Unlike the situation in many OECD countries, future fiscal costs are not projected to rise significantly as the population ages”.²³

²³ OECD Economic Survey of the United Kingdom 2005, OECD, October 2005, page 11.

5.33 Chart 5.6 shows that the UK's general government net financial liabilities, as a share of GDP, are among the lowest in the G7 countries. In addition, they have remained as a share of GDP, more or less stable between 2000 and 2004; this contrasts with marked increases in some of the G7 countries.

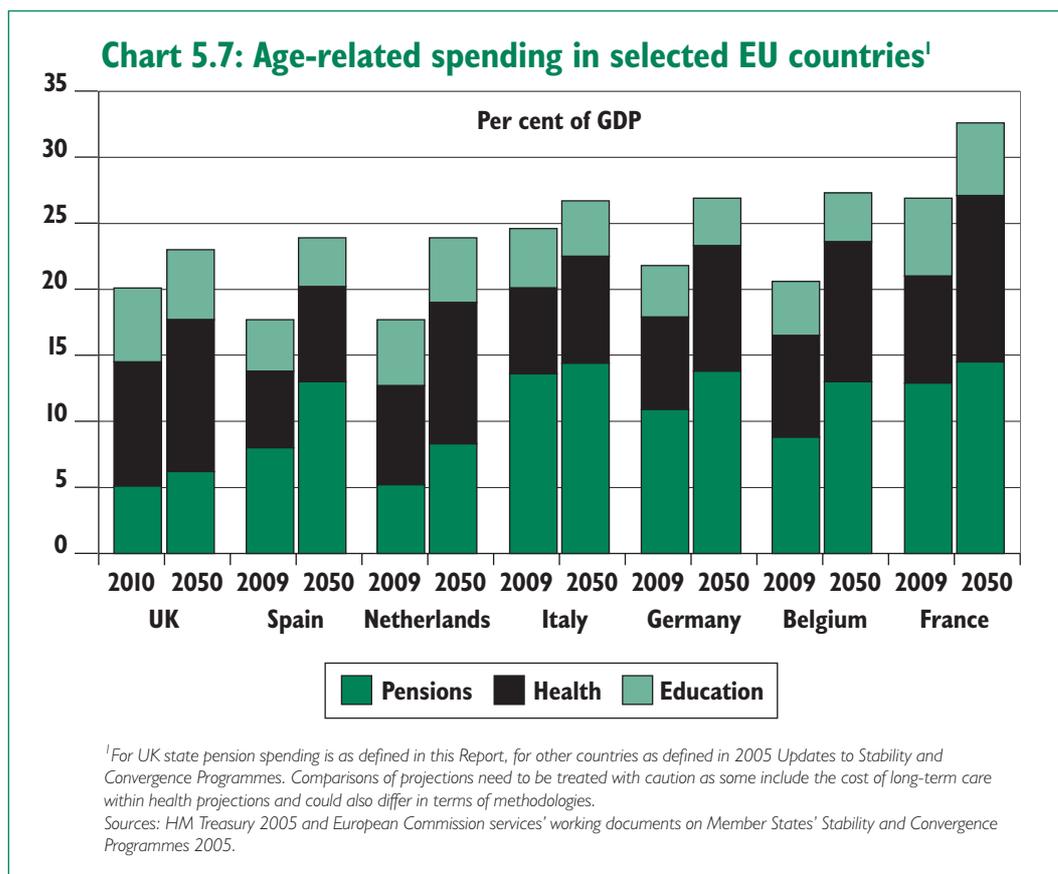


Fiscal challenges in EU Member States

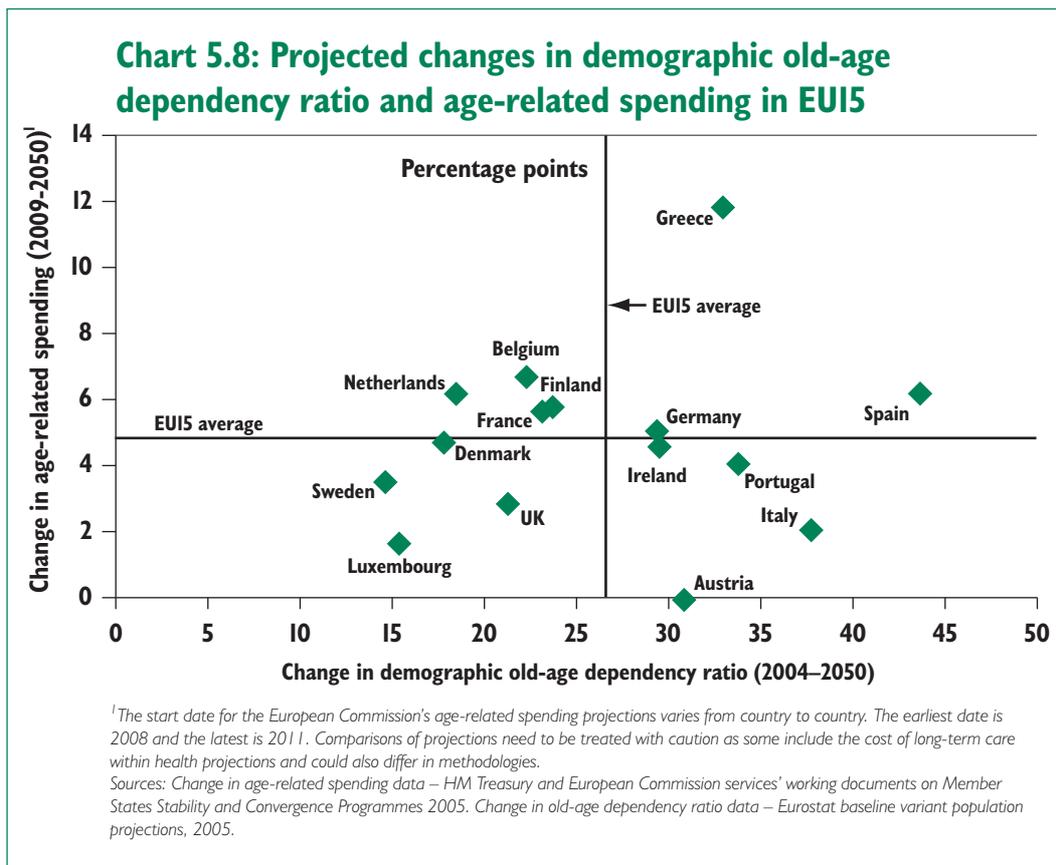
5.34 Many European countries face significant challenges from ageing populations. In October 2003, the EU's Economic Policy Committee (EPC) published detailed findings on the impact of ageing populations on the public finances.²⁴ It found that age-related spending, in particular on pensions, will rise substantially in many EU Member States over the coming decades if existing policies remain unchanged. The 2005 Updates to Stability and Convergence Programmes submitted by EU Member States to the European Commission confirm the EPC's findings. Chart 5.7 shows the projected difference in age-related spending over the coming decades in the seven largest EU countries.²⁵ 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.

²⁴ *The impact of ageing populations on public finances: overview of analysis carried out at EU level and proposals for a future work programme*, European Union Economic Policy Committee, October 2003.

²⁵ In terms of purchasing power parity adjusted GDP in 2004.



5.35 The EPC also noted in its 2003 report that age-related spending increases are not necessarily expected to be highest in those countries with the most rapidly ageing populations. Chart 5.8 reinforces this point. It shows that a clear positive relationship does not exist between projected increases in the demographic old-age dependency ratio and projected increases in age-related spending for the EU15 Member States. Existing institutional structures and policy settings are likely to play a much greater role than the magnitude of ageing in determining how much age-related spending will increase in the EU15.



5.36 The Council of European Finance Ministers (ECOFIN) has mandated the EPC to provide a new set of long-term fiscal projections. One of the key objectives of this exercise will be to incorporate recent policy developments in EU Member States in the projections. In addition, the EPC's report will use updated and refined assumptions and modelling techniques (including updated demographic assumptions) and will cover the ten new Member States that joined the EU in May 2004. Box 5.5 explains the key differences between the assumptions used in generating the projections presented in this Report and the EPC's commonly-agreed assumptions and methodologies.

Box 5.5: Long-term budgetary projections by the Economic Policy Committee

The long-term projections presented in this Report are based on assumptions that differ in a number of ways from the commonly-agreed assumptions that will be used by the European Union's Economic Policy Committee (EPC) for its 2006 exercise. The key differences in the underlying assumptions used in the two sets of projections are as follows:

Population: As previously mentioned, the results presented in this Report use population projections produced by the Government Actuary's Department (GAD). By contrast, the EPC's long-term budgetary projections use Eurostat population projections. GAD projects that the UK population will reach 69.2 million by 2050, whereas Eurostat projects that the UK population will be 64.3 million in 2050. Moreover, while the GAD projections envisage a steadily rising UK population to 2050 and beyond, under the Eurostat projections the population peaks at 64.7 million in 2040 and then begins to fall. Table 2.2 of this Report shows the assumptions underlying the latest GAD and Eurostat population projections for the UK.^a

Dependency ratio: The two sets of projections also use different projected age structures for the UK population, as reflected in the demographic old-age dependency ratio. In both cases, the demographic old-age dependency ratio is projected to be on an upward trend during the period to 2050. However, under the Eurostat projections the ratio will reach 46 per cent by 2050, whereas GAD projects a lower ratio of 43 per cent by that year.

Employment levels: As discussed in Chapter 4, the results presented in this Report use a cohort employment model to project employment levels in the economy. Using this model, employment is projected to be around 30.3 million in 2050, having peaked in 2024 at around 30.4 million and then remained fairly stable. The EPC employment projections are based on a similar cohort model but, mainly due to differences in the underlying population projections, yield a different profile. In the EPC projections, employment peaks in 2017 at 30.7 million and falls thereafter, reaching 28.9 million in 2050.

Productivity growth rates: For the baseline projections presented in this Report, labour productivity growth is assumed to be 2 per cent per year throughout the projection period. By contrast, under the EPC assumptions productivity growth in the UK is assumed to increase over the next ten years, from 1.9 per cent per year in 2005 to 2½ per cent in 2012 and 2013. The productivity growth rate is then assumed to fall back to 1.7 per cent per year by 2029, before stabilising.

In addition to differences in underlying assumptions, the EPC's budgetary projections also use different modelling and projection methodologies for health, long-term care and education expenditures.^b For the pension projections, by contrast, the same methodologies are used for both sets of projections (though using different underlying assumptions, as explained above). The budgetary projections will be published in early 2006.

^a The EPC budgetary projections are, in fact, based on a variant of the Eurostat baseline population projections. For the UK, the differences between the two are negligible.

^b See *The 2005 projections of age-related expenditure (2004-2050) for the EU-25 Member States: underlying assumptions and projection methodologies*, European Union Economic Policy Committee, November 2005 (available at http://europa.eu.int/comm/economy_finance/publications/european_economy/2005/eespecialreport0405_en.htm) for a full explanation of the assumptions and methodologies agreed by the EPC.

5.37 The ten new Member States that joined the EU in May 2004 also submitted Convergence Programmes. However, comprehensive projections of all three components of age-related spending – pensions, health care and education – are available for only three of these Member States: the Czech Republic, Slovakia and Latvia.²⁶

5.38 The European Commission's assessments show that, as is the case with a number of the EU15 Member States, some of the new Member States face risks to the long-term sustainability of their public finances due to projected increases in age-related spending. Among the countries for which comprehensive projections are available, the problem is particularly acute in the Czech Republic, where total age-related spending is projected to increase from nearly 19 per cent of GDP in 2008 to around 28 per cent in 2050. The bulk of this increase is attributable to a rise in pensions spending, from around 8½ per cent in 2008 to just above 15 per cent in 2050. Future increases in age-related spending appear to pose less of a threat to long-term fiscal sustainability in Slovakia and Latvia. In Slovakia, age-related spending is expected to increase from around 16 per cent in 2008 to 18 per cent in 2050. The European Commission projects that age-related spending in Latvia will rise from nearly 15 per cent of GDP in 2008 to 15½ per cent in 2050.

5.39 The European Commission published an assessment of the long-term sustainability of the public finances in EU Member States earlier this year.²⁷ The Commission argues that: "...projected demographic changes, with the old-age dependency ratio doubling over the coming decades in the EU, has led to growing concerns regarding the long-term sustainability of public finances".²⁸ The report notes that: "The increased focus on long-term sustainability in the EU has resulted in reforms in several countries, leading to some further improvement to cope with the budgetary impact of ageing populations".²⁹ However, the European Commission goes on to argue that: "...even assuming that all Member States achieve their medium-term budgetary targets (baseline scenario), and assuming a full impact of legislated structural measures incorporated in the long-term projections, there is a risk of unsustainable public finances (measured against the 60 per cent of GDP reference value in 2050) emerging in about half of the EU Member States".³⁰

5.40 According to the European Commission's report, 14 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, Sweden, Spain and all of the new Member States except Cyprus, Hungary and Malta have a relatively low level of debt to GDP ratio. This gives some room to tackle the problem if future imbalances arise".³¹

5.41 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, Germany, Hungary, Poland and Slovakia have recently passed a number of pension reforms, the report suggests that budgetary consolidation in the medium term should also be part of their

²⁶ For the other new Member States, the European Commission's projections for age-related spending cover only a subset of the spending components, and hence do not provide a full picture of long-term fiscal sustainability in these countries. For example, the European Commission's assessment of the Convergence Programme for Poland does not include education projections, and only pensions projections are available for Hungary.

²⁷ See *Public Finances in EMU - 2005*, European Commission, 2005, Part I Section 4. For the first time the assessment includes the ten new Member States that joined in May 2004.

²⁸ *Ibid*, page 50.

²⁹ *Ibid*, page 20.

³⁰ *Ibid*, page 55.

³¹ *Ibid*, page 56.

strategy. Pension expenditure in Greece, Spain, Slovenia, the Czech Republic, Cyprus and Malta is expected to increase at a faster rate than in most other Member States. Although the report suggests some uncertainties over the medium term for the Netherlands, the UK, Latvia and Lithuania, the European Commission concludes that these countries appear relatively well placed to meet the cost of ageing populations.

Germany 5.42 Individual EU Member States have also carried out a considerable amount of work on long-term fiscal sustainability. For example, in June 2005 the German Federal Ministry of Finance published a report on the sustainability of the public finances.³² According to the report, aggregate public spending on government old-age provision, health and education will initially fall from nearly 25½ per cent of GDP in 2003 to around 23½ per cent of GDP in 2012. Thereafter it will rise to nearly 28 per cent of GDP by 2050. The report concludes that recent reforms in the field of statutory pensions and health insurance have improved the long-term fiscal position but that there is a need for the Government to take further action: “Reform measures such as putting up the statutory pensionable age, additional action to curb spending in the health-care sector and to bring down other public-sector expenditure still further would help considerably to improve the long-term development of public finances.”³³

5.43 Chapter 2 noted that ageing is a trend seen in most developed countries, including those outside the EU. However, as Chart 5.8 demonstrates, those EU15 Member States with more pronounced ageing processes do not necessarily face greater challenges in achieving long-term fiscal sustainability. The importance of institutional structures and policy settings in influencing increases in age-related spending is also shown by the experiences of developed countries outside the EU.

US 5.44 For example, 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 spending. The CBO projects that spending on social security will increase from 4.4 per cent of GDP in 2003 to 6.4 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.³⁴ In the CBO’s view: “...there is little doubt that over the long term, the federal budget faces growing pressures that are likely to absorb an increasing share of the US economy”.³⁵

5.45 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.³⁶

³² *Bericht zur Tragfähigkeit der öffentlichen Finanzen*, Bundesministerium der Finanzen, 2005.

³³ *Ibid*, summary, page 4.

³⁴ *Updated Projections for Social Security*, Congressional Budget Office, March 2005 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 5.1 per cent and 8.2 per cent of GDP in 2050.

³⁵ *The Economic costs of long-term federal obligations: CBO testimony before the Committee on the Budget, United States Senate*, Congressional Budget Office, February 2005.

³⁶ *Measures of the U.S. Government’s Fiscal Position Under Current Law*, Congressional Budget Office, August 2004.

5.46 The CBO refers to a number of other long-term studies, including 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.³⁷ 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, with 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.³⁸

5.47 The Social Security Trustees also publish an annual assessment of the finances of the US social security system.³⁹ Of particular interest, the Trustees publish a measure of the system's 'closed group funded obligations'. As the report explains: "This value represents the shortfall of lifetime contributions for all past and current participants relative to the lifetime costs associated with their generations. For a fully-advance-funded program this value would equal zero".⁴⁰ As such, closed group funded obligations is a useful measure for considering the generational fairness of the social security system. In 2005, the Trustees project a \$12 trillion gap between the present value of the benefits to current and past generations, and their contributions. The Trustees also project that future participants will pay, in present value, \$0.9 trillion more in contributions than they will receive in benefits, leaving an \$11.1 trillion shortfall in the long-run finances of the social security system. While these figures are not large as a percentage of GDP, the Trustees' calculations highlight that there are inter-generational imbalances in the US social security system.

Japan 5.48 As noted in Chapter 2, ageing is projected to be particularly rapid in Japan, with the demographic old-age dependency ratio expected to exceed 70 per cent by 2050. 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 2050.⁴¹ 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 2025.⁴²

³⁷ *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.

³⁸ Other studies have also analysed the long-term fiscal position of the US. For example, 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. Auerbach *et al.* have analysed the long-term sustainability of the US public finances using the fiscal gap approach. This approach is similar to the fiscal gaps described above, with the debt target set at the current level of debt. Based on a scenario which, among other things, allows for recent tax cuts to continue beyond their official 'sunssets' they estimate that the fiscal gap has grown to 7.2 per cent of GDP, or \$36.3 trillion, for a time horizon up to 2080. See *Sources of the Long-Term Fiscal Gap*, Alan J. Auerbach, William G. Gale and Peter R. Orszag, Tax Notes, May 2004.

³⁹ *2005 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds*, US Social Security Administration, 2005.

⁴⁰ *Ibid*, page 60.

⁴¹ 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.

⁴² Assessing the long-term fiscal position of Japan, in: *Japan: Selected Issues*, International Monetary Fund, September 2003.

Canada 5.49 Canada is also projected to experience a rapid increase in its old-age dependency ratio over the coming decades (see Chapter 2). Nonetheless, the IMF's 2004 Staff Report on Canada states that: "...the federal fiscal position is sustainable provided that budgetary policies remain prudent".⁴³ In particular, the report notes that pension reform has ensured that the Canada Pension Plan, a portion of the public pension system, is actuarially sound. However, the IMF also notes that public health care spending is likely to rise by nearly 7 per cent of GDP by 2050. The IMF concludes that: "...fiscal sustainability would be jeopardized unless significant debt reduction is achieved ahead of the retirement of the baby boom generation and health care spending is contained".⁴⁴

Australia 5.50 In March 2005 the Australian Government Productivity Commission published a report on the economic implications of ageing in Australia.⁴⁵ According to the report, between 2003-04 and 2044-45: "...spending is projected to rise by about 6½ percentage points of GDP, of which most is health and aged care".⁴⁶ The report projects that during this period there will be an increase in fiscal pressure (the extent to which government spending outpaces revenue growth) of 5.7 percentage points of GDP. This is slightly higher than was found earlier by the Australian Treasury's first intergenerational report (published in May 2002).⁴⁷ In the 2002 intergenerational report, the Australian Treasury concluded that: "...if policies are not adjusted, the current generation of taxpayers is likely to impose a higher tax burden on the next generation. ... Governments will need to exercise sound policy management to minimise the tax burden transferred to the next generation...".⁴⁸ The Australian Charter of Budget Honesty requires that an intergenerational report be published at least once every five years, which implies that the next intergenerational report must be published by May 2007.⁴⁹

New Zealand 5.51 Another country that has announced that it will produce an assessment of its long-term fiscal position is New Zealand. The New Zealand Treasury is required to publish its first statement on the long-term fiscal position by the end of June 2006.⁵⁰ The statement will assess New Zealand's fiscal position over a period of at least 40 years from the publication date. New Zealand has been at the forefront of long-term fiscal analysis for many years, with the New Zealand Treasury regularly publishing detailed studies into related topics. For example, this year the New Zealand Treasury published a paper considering the effect on government health expenditure of changes in the demographic and health profile of the New Zealand population.⁵¹ In 2004 it produced a paper on whether New Zealanders are saving adequately for retirement.⁵²

5.52 As stated in Chapter 2, the problem of ageing is not limited to developed countries. A number of less-developed countries will also face fiscal challenges as a result of the ageing of their populations over the coming decades. Box 5.6 considers how an ageing population could affect the long-term fiscal position of China.

⁴³ *Canada: 2004 Article IV Consultation - Staff Report; Staff Statement; and Public Information Notice on the Executive Board Discussion*, International Monetary Fund, March 2004, page 13.

⁴⁴ *Ibid*, page 12. The IMF reaches similar conclusions in its 2005 Report. See *Canada: 2005 Article IV Consultation - Staff Report; Staff Statement; and Public Information Notice on the Executive Board Discussion*, International Monetary Fund, March 2005.

⁴⁵ *Economic Implications of an Ageing Australia*, Australian Government Productivity Commission, March 2005.

⁴⁶ *Ibid*, page 306.

⁴⁷ *Intergenerational Report 2002-03*, Department of the Treasury of Australia, May 2002.

⁴⁸ *Ibid*, page 1.

⁴⁹ *Charter of Budget Honesty Act 1998*, section 20.

⁵⁰ *Public Finance Amendment Act 2004*, section 26N.

⁵¹ *Population ageing and government health expenditure*, John Bryant, Audrey Sonerson, Martin Tobias, Jit Cheung and Mhairi McHugh, New Zealand Treasury Policy Perspectives Paper 05/01, March 2005.

⁵² *Saving for Retirement: New Evidence for New Zealand*, Grant Scobie, John Gibson and Trinh Le, New Zealand Treasury Policy Perspective Paper 04/12, September 2004.

Box 5.6: Ageing in China

The demographic old-age dependency ratio in China is projected to increase from just over 10 per cent in 2000 to around 33 per cent by 2050.^a As a developing economy with an underdeveloped social security system, some of the challenges this demographic change poses for China differ from those discussed above in relation to developed economies. As Jackson and Howe note in *The Graying of the Middle Kingdom*: “China may be the first major country to grow old before it grows rich”.^b

According to Jackson and Howe, the existing Chinese state pension system is largely limited to urban workers in state-owned enterprises, and private pensions are extremely rare. As a result only one in four Chinese workers has a pension. The scope of publicly provided health care coverage is only slightly higher. In 1998, less than 10 per cent of the rural population had access to publicly funded health care, compared with 90 per cent in the 1960s and 1970s. While the proportion of the urban workforce with government health insurance has not fallen in recent years, the generosity of coverage has not kept pace with rising health-care costs.

In spite of the limited scope of its coverage, the existing state pension system is already under strain because state-owned enterprises, where coverage is concentrated, are downsizing. In 2000, the World Bank estimated implicit pension debt of the Chinese pension system to be as high as 71 per cent of GDP.^c Jackson and Howe argue that: “The downsizing of the state-owned sector is rendering China’s pension system unaffordable even before the age wave rolls in”.^d

As Jackson and Howe explain, the elderly in China, especially in rural areas, have traditionally relied on their children as almost their only source of support in old age. In 2000, nearly two thirds of those aged 65 and over lived with their children. However, this informal safety net is threatened by two trends: declining birth rates and urbanisation. As a result of lower birth rates, individual children will have to bear a greater proportion of the burden of supporting elderly family members. Urbanisation exacerbates this problem. The urban population is projected to rise from 37 per cent of China’s total population in 2001 to 60 per cent by 2030. As more young people migrate to the cities, the elderly in rural areas will increasingly need to rely on alternative sources of support.

In *Aging China* England argues that China: “...cannot grow its way out of its aging problem without significantly advancing reforms”.^e The form such reform should take, particularly in relation to pensions, is a subject of considerable debate. Jackson and Howe, for example, argue that: “The best solution may be to combine a modest but universal pay-as-you-go floor of protection with a mandatory system of genuinely funded personal retirement accounts”.^f However, there are concerns about the appropriateness of a funded pension system given the immaturity of China’s financial markets.^g What is less controversial is that, as England notes: “Aging will add significantly to the burden of China’s already costly transition to a developed country with a market economy”.^h

^a *Aging China*, Robert Stowe England, 2005.

^b *The Graying of the Middle Kingdom*, Richard Jackson and Neil Howe, April 2004, page 3.

^c *Implicit Pension Debt, Transition Cost, Options and Impact of China’s Pension Reform*, Wang et al., World Bank Policy Research Working Paper, February 2001. The implicit pension debt is equal to the present value of benefits owed to current pensioners plus the present value of benefits that would be payable to current workers if the pension system were frozen today.

^d *The Graying of the Middle Kingdom*, Richard Jackson and Neil Howe, April 2004, page 14.

^e *Aging China*, Robert Stowe England, 2005, page 99.

^f *The Graying of the Middle Kingdom*, Richard Jackson and Neil Howe, April 2004, page 4.

^g For a further discussion of this issue see *Aging China*, Robert Stowe England, 2005, pages 101 to 102.

^h *Aging China*, Robert Stowe England, 2005, page 117.

CONCLUSIONS

5.53 The Report provides updated bottom-up projections of spending and revenue (and their respective components). Total spending is projected to increase by more, 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, revenue is projected to continue to rise as a share of GDP through to the end of the projection period, in contrast with last year's projections, where revenue as a share of GDP more or less stabilised by the mid 2030s.

5.54 As in previous years, this Report also assesses the long-term sustainability of the public finances using a series of fiscal sustainability indicators, including the intertemporal budget gap/constraint and fiscal gaps. The updated results confirm the findings of previous reports 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.

5.55 In addition, the Report updates the illustrative long-term fiscal projections presented in Annex A of the EFSR and confirms the findings in Budget 2005. Given the assumed profile for tax revenue and the projected profile for transfers, current consumption can grow at around the same rate as GDP growth in the long term while meeting the Government's golden rule. In addition, the 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 in the long term.

A

WHOLE OF GOVERNMENT ACCOUNTS AND NATIONAL ACCOUNTS

INTRODUCTION

A.1 The Government announced in 2003 that it will publish Whole of Government Accounts (WGA) for the 2006-07 year onwards, once the methodological issues that have been raised by the development work are resolved through dry-run processes. The 2004 *Long-term public finance report* discussed the key differences in approach between WGA and national accounts and explained how these resulted in costs being recognised at different times under the two frameworks.¹

A.2 WGA 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 WGA will represent an important complement to the existing national accounts and WGA will provide more reliable data. Among the benefits from the WGA programme are:

- new and better quality information to support the publication of national accounts and the conduct of fiscal and macroeconomic policy;
- greater comparability of financial information across the public sector;
- additional impetus to improvements in the quality of individual body accounts and to financial management systems; and
- improved accountability with greater scrutiny through the audit process.²

A.3 This annex discusses the ways in which the new information from GAAP-based accounts is already being used and considers the differences between WGA and national accounts using two specific examples – student loans and Single Use Military Equipment (SUME). Box A1 discusses national accounts and GAAP³ as indicators of fiscal sustainability.

¹ See 2004 *Long-term public finance report: an analysis of fiscal sustainability*, HM Treasury, December 2004, Annex A.

² See *Delivering the benefits of accruals accounting for the whole public sector*, HM Treasury, December 2005, for more details.

³ Generally Accepted Accounting Practice.

Box A1: National accounts and GAAP as indicators of fiscal sustainability

Previous Long-term public finance reports have discussed the different approaches that could be used to assess fiscal sustainability. These approaches are:

- National accounts measures of (net) debt;
- GAAP-based balance sheet data;^a and
- Indicators based on comprehensive projections.

In the past, national accounts measures of public debt have been the prime focus when analysing the sustainability of the public finances. The national accounts approach has the advantage that it is based on internationally-agreed rules, allowing for international comparisons. Furthermore debt itself is an easily understood concept. However, as a backward-looking indicator, it cannot provide a full picture of long-term sustainability; that is, whether the government can meet its future obligations if and when they arise in the future.

One of the key advantages of the GAAP-based balance sheet is that it will show a wider range of assets and liabilities than net debt, including financial and non-financial assets, as well as provision for future liabilities where they arise out of past events (such as pensions). This is likely to be more informative than purely cash-based indicators in illustrating the ability of the government to meet current and future obligations. However, as with debt, GAAP-based balance sheets are mainly backward looking.

Indicators based on comprehensive projections, by taking account of future spending and revenue streams, are designed to directly address the question of long-term fiscal sustainability. The main drawback is that such projections are inevitably subject to a high degree of uncertainty.

^a Generally Accepted Accounting Practice.

USING GAAP DATA IN NATIONAL ACCOUNTS

A.4 In many respects, the conventions of national accounts are similar to GAAP. Both sets of accounts generally record transactions on an accruals basis, i.e. when transactions or events occur, rather than on a cash basis. This means that the GAAP-based accruals data from individual public sector bodies can be used to address a number of the challenges in national accounts preparation, including the consistency of data and limitations of estimation and modelling.

A.5 For example, as part of the work on converging accounting policies and disclosure across central government, standardised fixed asset disclosure categories were required. The new categories were chosen in order to maximise compatibility with those used in national accounts, within the formats prescribed for the private sector by the Companies Act.⁴

A.6 National accounts are prepared for the economy as a whole; however, the difficulty of assembling reliable audited data for the whole economy means that the Office for National Statistics (ONS) is generally reliant on ‘top-down’ statistical modelling and estimation techniques to generate much of the necessary detail. The process of consolidation allows audited data to be transmitted to the ONS, thus supporting the ONS in its continuing efforts to improve national accounts.

⁴ The Companies Act 1985 (as amended) sets the basis for accounting in the private sector and is thus highly influential in setting GAAP in both in the private and public sectors.

A.7 As a result of these changes the ONS has already begun using departmental data consolidated by the Treasury to inform estimates of capital stock for the central government sector. However as the recent Atkinson Report on methods of preparing national accounts public sector data acknowledges, fully realising “the very substantial potential improvements in quality [depends on] several data classification issues.”⁴ These include timing differences and differences in coverage between GAAP-based accounts and the national accounts central government sub-sector. HM Treasury and the ONS are working together to address these issues.

DIFFERENCES BETWEEN WHOLE OF GOVERNMENT ACCOUNTS AND NATIONAL ACCOUNTS

A.8 The Annex to the 2004 *Long-term public finance report* outlined three major differences between WGA and national accounts:

- provisions against future costs which are included in WGA when the cost is first incurred but accounted for in national accounts when the cost becomes payable;
- public service pensions, which are accounted for in GAAP on the basis of benefits earned during the year and in national accounts based on the pensions payable for the year; and
- SUME assets, such as warships, which are treated as consumed when purchased in national accounts, but depreciated over their useful lives in WGA.

A.9 As outlined in the Annex, these differences reflect differences between the two frameworks regarding when costs are recognised. The first two cases result in earlier cost recognition in WGA, while the final case results in earlier cost recognition in national accounts. Overall the net effect is likely to be that WGA will recognise these costs sooner than they would otherwise be recognised in national accounts.

A.10 In all three cases above, the timing difference may remain for a long period, because of the long-term nature of the commitments. For example, pensions benefits earned today may not be payable for 40 years, while the lives of some weapon systems exceed 20 years. However, in all three cases the cash flows are unaffected by the differences in approach to cost recognition. This is illustrated in more detail below by two examples – the treatment of student loan provisions and the treatment of SUME.

Student loans A.11 There are three main differences between WGA and national accounts relating to the treatment of student loan provisions, two of which affect the time when costs are recognised and one of which concerns how the costs are reported:

- student loans may be written off for a number of reasons (for example the former student’s income not meeting the repayment threshold). Under GAAP a provision is made each year for future write-offs, based on best estimates of the amount that will eventually need to be written off, with write-offs charged against the provision as they occur. In national accounts write-offs are recorded as they occur;

⁴ Atkinson Review: *Final Report – Measurement of Government Output and Productivity for National Accounts*, Office for National Statistics, 2005, page 69.

- the Department for Education and Skills (DfES) makes a provision for the difference between the interest payable by former students and current interest rates when the loan is made. In national accounts the subsidy is not separately accounted for; instead the cost is reflected in the difference between amounts paid and received; and
- National accounts distinguish between bad debt write-offs and debt forgiveness where the debt is not 'bad' as such (for example on grounds that the student's income will not exceed the threshold), which are treated as capital transfers. No equivalent distinction exists in GAAP.

A.12 In 2003-04 the DfES provided £219.8 million in its GAAP accounts in relation to future debt write-offs from all causes, while the amount actually written-off (and therefore recorded in the national accounts) was £2.7 million. Thus GAAP required a significantly earlier recognition of costs compared with national accounts, reflecting the different purposes for which the frameworks were developed. The GAAP treatment allows users of accounts to see the best estimate of the amount likely to be unrecoverable, thus reflecting the financial position of the scheme at the balance sheet date. Conversely the national accounts treatment shows economic activity in the year when it occurs and presents this in a way that supports macro-economic analysis.

**Single use
military
equipment**

A.13 All expenditure on military weapons and their supporting systems is treated as consumption in national accounts as it is incurred, and so no asset is recognised in the national accounts balance sheet. Under GAAP, weapon systems are treated as fixed assets and depreciated over the life of the system, because they are an investment in the UK's defence infrastructure. As major weapon systems can have relatively long lives, this difference results in costs being recognised significantly earlier in national accounts than GAAP, for any given weapon system.

A.14 The inclusion of SUME assets in the GAAP balance sheet results in reported non-financial assets being £71.1 billion higher compared to the national accounts balance sheet totals (including both SUME fixed assets and related stocks). The total depreciation and impairment of SUME fixed assets recorded under GAAP in 2003-04 was £3.1 billion. In comparison, expenditure on new weapon systems, recorded as consumption in national accounts, was £5.2 billion.

A.15 As with student loans the difference in treatment reflects the different purposes of the two accounting frameworks. National accounts treat SUME as consumed when purchased, as its use is not part of the productive process, which reflects the needs of economic analysis. However the inclusion of SUME in the assets of the Ministry of Defence (MoD) in its GAAP accounts and capital budgets reflects the on-going nature of the use of these assets by the armed forces, and increases the incentives on MoD to take an integrated view of asset management.⁵

⁵ Note that there are ongoing international discussions on potential changes to the System of National Accounts (SNA) and European System of Accounts (1995) on which the UK national accounts are based. Among the changes being considered is the inclusion of SUME as an asset, which would bring national accounts and GAAP closer into line.

B

PROJECTING EMPLOYMENT TRENDS

INTRODUCTION

Approaches to projecting employment

B.1 As stated in Chapter 4, there are a number of approaches to projecting future labour-market trends. The simplest approach is to assume that the current total employment rate remains constant and that changes in employment levels are entirely driven by changes in the size of the working-age population. However, while transparent, this approach, *inter alia*, does not account for the effect of an ageing population on participation rates. A more sophisticated approach would be to use current age- and gender-specific employment rates to project future employment levels. This approach would account for the effect of an ageing population on participation rates and would also capture any changes in the male/female ratio within the working-age population.

B.2 However, even this method does not capture all the likely factors that could affect future employment levels. The 2004 *Long-term public finance report* therefore introduced another approach, the so-called ‘cohort’ method of projecting employment levels. This annex discusses in more detail how the cohort model works, what assumptions are made and what additional extensions could be envisaged.

COHORT METHOD OF PROJECTING EMPLOYMENT

Projecting employment trends

B.3 The cohort method of projecting future participation and employment rates uses historic lifetime participation profiles of different cohorts to track current cohorts through the projection period. To achieve this, the model first calculates the probability of entry into or exit from the labour market at each age-band from historical data, and then holds these probabilities constant to project future participation rates. The cohorts that are tracked over time are therefore ‘synthetic’, as they are not actually observed over the projection period. Instead, to achieve the tracking, it is assumed that the population aged $x+1$ in year $t+1$ is representative of those aged x in year t observed one year later. This requires that any inflows or outflows from the population (due, for example, to net migration or deaths) exactly offset each other.

B.4 The basis of the model is the probabilities of entry into and exit from the labour force, which are then used to calculate projected participation rates.¹ The probability that an individual of age x enters the workforce between times t and $t+1$, $p(ent^{x+1})$, is defined as:

$$p(ent^{x+1}) = \frac{(PR_{t+1}^{x+1} - PR_t^x)}{(1 - PR_t^x)} \quad (1)$$

where PR_t^x is the participation rate of workers aged x at time t .

¹ The outline of the model is based on a dynamic version of the methodology found in *Effective retirement age and the duration of retirement in the industrial countries between 1950 and 1990*, Denis Latulippe, ILO, 1996 and developed in *Age of withdrawal from the labour market in OECD countries*, Peter Scherer, OECD, 2002. For ease of notation this is based on single years, although the same method also applies to 5-year age bands.

B.5 An expression for the ‘projected’ participation rate of workers of age $x+1$ at time $t+1$, in terms of probability of entry and the participation rate of workers aged x at time t , can be derived by rearranging equation (1):

$$PR_{t+1}^{x+1} = PR_t^x + p(ent^{x+1})(1-PR_t^x). \quad (2)$$

B.6 Similarly, the probability that an individual of age x exits the workforce between times t and $t+1$, $p(ex^{x+1})$, is defined as:

$$p(ex^{x+1}) = 1 - \frac{PR_{t+1}^{x+1}}{PR_t^x}. \quad (3)$$

B.7 An expression for the participation rate of workers of age $x+1$ at time $t+1$, in terms of historical participation rates and probability of exit, can be derived by rearranging equation (3):

$$PR_{t+1}^{x+1} = PR_t^x - p(ex^{x+1})PR_t^x. \quad (4)$$

B.8 Bringing equations (2) and (4) together generates the projected participation rate of individuals aged $x+1$ at time $t+1$:

$$PR_{t+1}^{x+1} = p(ent^{x+1})(1-PR_t^x) + PR_t^x - p(ex^{x+1})PR_t^x \quad (5)$$

where $p(ent^{x+1})=0$ if $p(ex^{x+1})\geq 0$ and $p(ex^{x+1})=0$ if $p(ent^{x+1})\geq 0$.

B.9 It can be seen from equation (5) that appropriate values of PR_t^x are required to calculate the projected participation rates for all ages. In principle, these values should be based on the latest available data so that the most recent trends in participation can be captured. However, this may generate spurious results arising from cyclical effects. This problem can be minimised if two years are chosen that correspond to close to on-trend points. This is the approach adopted in this Report, where the years 1997 and 2002 are used as the basis for the projection calculations.

Accounting for increasing enrolment in higher education

B.10 A notable trend in recent years has been the expansion in the proportion of younger individuals entering higher education. The effect of this has been to reduce the participation rate of the youngest cohort, so that the participation rate of 16-19 year olds in 2002 was lower than the participation rate of 16-19 year olds in 1997. As the probabilities of exit and entry will be identical for both of these cohorts, the lower starting point of the cohort aged 16-19 in 2002 implies that the projected participation rates for this cohort will be lower at each age than for the cohort aged 16-19 in 1997. However, this result appears unreasonable given that greater educational attainment would typically be expected to increase future participation rates of the youngest cohort. A simple and plausible method used to eradicate this problem is to increase the youngest cohort’s participation rate so that it is equal to the participation rate of the previous cohort at that age.

Accounting for the increase in the female state pension age **B.II** The UK already has the highest employment rate of the major industrialised nations.² Nevertheless, the labour force participation rates for older workers, and women (aged between 60 and 64 years) in particular are lower than those observed in a number of other developed countries.³ Table B1 describes employment rates by age and gender.

Table B1: UK employment rates by age and gender in 2004 (per cent)

	Age bands								
	16–59/64	16–17	18–24	25–34	35–49	50–54	55–59	60–64	65–69
Men	79	39.2	71	87.5	88.8	83.5	74.6	53.4	17.7
Women	70.1	44.2	64.1	72.1	75.3	74.2	61.1	29.7	9.7
Total	74.8	41.6	67.5	79.7	82	78.8	67.7	41.3	13.6

Source: Office for National Statistics, *Labour Force Survey, 2004*.

B.I2 The noticeable decline in female employment rates beyond 60 years suggests that the state pension age has a significant impact on labour supply decisions. The Government's policy has been both to improve the information necessary for individuals to make informed labour supply decisions, and to make it more attractive for individuals to remain in the labour market by increasing the financial incentive to defer state pensions.⁴ However, the increase in the UK female state pension age from 60 years to 65 years between 2010 and 2020 provides an opportunity to quantitatively evaluate the effect of the state pension age upon labour supply. Indeed, the likely importance of this change is supported by recent evidence from New Zealand (see Box B1 below).

² 'Industrialised nations' refers to the countries of the G7, and the 'employment rate' is defined as the number of persons aged 15–64 in employment as a proportion of the total number of persons aged 15–64. See *OECD Employment Outlook 2005*, OECD, July 2005, Statistical Annex, Table B.

³ For example, the labour market participation rate of those aged between 60 and 64 years in 2004 is lower in the UK than the equivalent rates for the US, Japan and Canada (see *Labour Force Statistics*, OECD, 2005).

⁴ For example, individuals that defer their state pension for at least one year are eligible for an increase in their state pension of 10.4 per cent per year. This increased from 7.4 per cent in April 2005.

Box BI: The evolution of labour-market participation rates in New Zealand.

New Zealand is one of the few countries to introduce an increase in the female state pension age in recent years and its experience is therefore worthy of examination. In New Zealand, the state pension age (both for men and women) was increased from 60 years to 65 years between 1992 and 2001. The New Zealand reform of its state pension age appears to have had substantial effects on female participation rates. Assessing the trend over the episode of the reform (see the chart below), it can be seen that the participation rate for women between the ages of 60 years and 64 years more than doubled, and by 2004 its level was almost thirty percentage points higher than at the outset of the reform in 1992. In contrast, the UK female participation rate increased by just over 3½ percentage points for the 55-59 year age group, and just over 4 percentage points for those aged between 60 and 64 over the same period. This suggests that the increase in the female state pension age was an important contributory factor in the increase of female participation rates in New Zealand after 1992. Furthermore, individuals below and above the state pension age were affected equally by this policy change. It is possible that the increase in the UK female state pension age from 60 years to 65 years between 2010 and 2020 will have similar effects upon female participation rates.

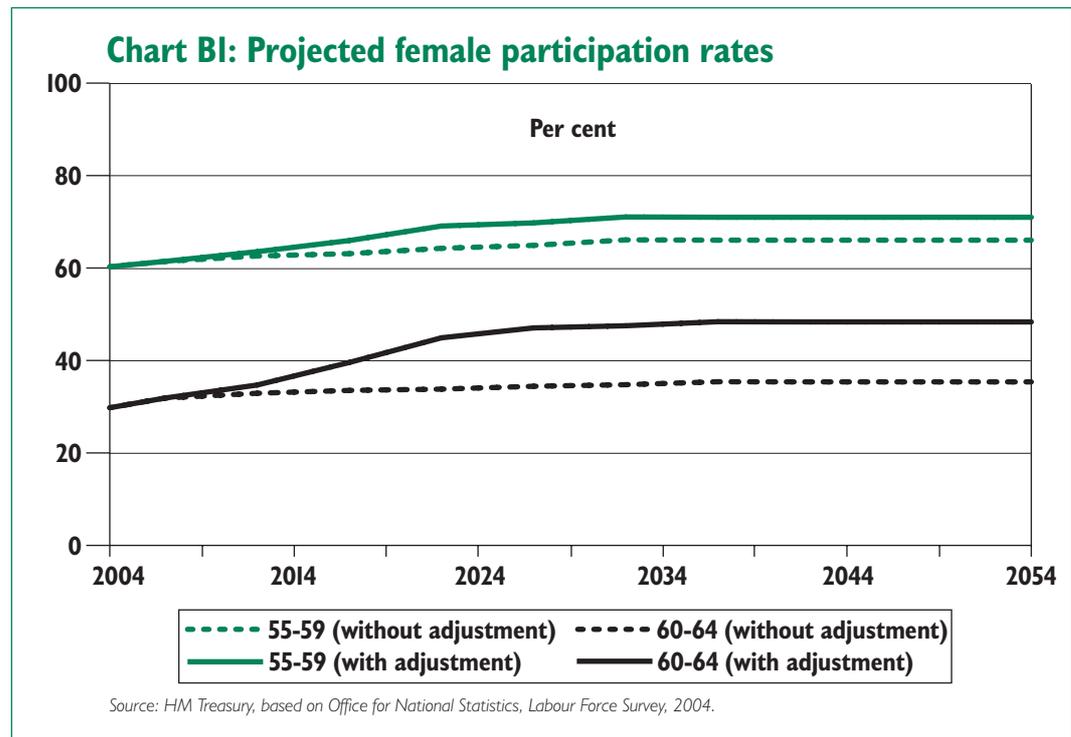


The increase in the female state pension age is only one of the factors that could drive significant growth in female participation rates in the future. Rising educational attainment, implementation of the EU Directive on Age Discrimination in Employment and Training^a and a more general trend of rising labour market activity among older workers are all likely to have a positive impact upon future participation rates, contributing to higher levels of future employment.

^a In October 2006.

B.I3 To account for this, the cohort model is adjusted by gradually reducing the exit probability of females aged between 55 years and 64 years over the period 2010 to 2020, under the assumption that female and male exit probabilities will equalise by 2020. For example,

before any adjustment for the rise in the pension age, the probability of exiting the labour market for females aged 55 to 59 years is just over 45 per cent. It is assumed that the exit probability for females converges linearly to the male exit probability from 2010 onwards and eventually equals the equivalent male exit probability of 32 per cent in 2020. Chart B1 shows that this adjustment to exit probabilities leads to an increase in the participation rates of females aged between 55 and 64 years from 2010 onwards. The projected increase in female participation rates is relatively conservative, however, when set against the recent experience of New Zealand (see Box B1 above). Indeed, equalisation of the exit probabilities does not imply equalisation of participation rates. This is because projected participation rates, at any given time, depend upon both the probability of exit (or entry) and participation rates in the past (see equation (5) above).



B.14 The probability of exiting the labour market for those aged 65-69 years is then assumed to increase as female workers gain eligibility for a pension, linearly converging to the equivalent male exit probability by 2020.

From participation rates to employment levels **B.15** Projected employment levels can then be calculated by applying the projected participation rates at each age group to the population projections provided by the Government Actuary’s Department (GAD). For example, GAD projects that there will be around 2¼ million females aged between 30 and 34 years in 2022, and the cohort model projects their participation rate will be 76 per cent. Therefore, the female labour force for that particular age group will be approximately 1.7 million. By adding up the projected participation levels of each age and sex group, a projection of the total labour force can be estimated. The number of people in employment is then projected by reducing those participating in the labour market by the unemployment rate, which is assumed to be 5 per cent beyond the medium term.⁵

⁵ This assumption is more or less in line with the Non-Accelerating Inflation Rate of Unemployment (NAIRU) identified in *Trend Growth: Recent Developments and Prospects*, HM Treasury, April 2002.

Potential refinements B.16 At least in theory, a number of further refinements to the cohort model could potentially be envisaged, yielding an even fuller picture of future employment trends. One such refinement could be to distinguish between part-time and full-time employment. Part-time employment has risen rapidly over the last decade or so, and it is females who constitute the majority of the part-time workforce. For example, figures produced by the Organisation for Economic Co-operation and Development (OECD) suggest that there are 3½ times as many female as male part-time workers in the UK.⁶ Furthermore, the recent rise in female employment is to a large degree in the form of part-time employment, with 57 per cent of the rise in female employment in the UK between 1985 and 2004 arising from growth in part-time work.⁷

B.17 Differentiating between full-time and part-time employment would allow the projections to capture differences in labour market behaviour and therefore help to provide a more refined GDP growth projection. For example, as discussed above, females aged 55 to 59 years have a lower labour market participation rate than, say, males aged 30 to 34 years. Additionally, it is likely that the former group will participate to a greater extent in part-time work relative to the latter group. When projecting GDP, the refinement would attach weights to this difference.

B.18 A further refinement could be to decompose the employment projections by constituent country of the UK. As noted in Chapter 2, GAD publishes population projections for England, Wales, Scotland and Northern Ireland individually, as well as for the UK as a whole. By incorporating these population projections along with country-specific participation rates into the cohort model, employment levels by constituent country could be projected. This would help to distinguish where in the UK employment growth is projected to be greatest. Similarly, population projections and participation rates at a sub-national level could easily be incorporated into the cohort model, and used to project employment trends on a regional basis.

B.19 Additionally, the cohort method of projecting employment assumes that cohorts that have not yet reached working age—including, for example, the cohort that will be aged between 16 and 19 in 2012 – will observe a lifetime participation profile identical to the cohort aged between 16 and 19 in 1997. However, it is reasonable to suppose that the ‘cohort effect’ observed in recent years is likely to continue in the future, with the cohort entering the labour market in 2012 likely to observe a different lifetime participation profile than preceding cohorts. Accounting for this when projecting future participation rates may also help to provide a more refined employment projection.

⁶ *Labour Force Survey*, Office for National Statistics, 2004. The estimates use a common definition for the part-time/full-time distinction.

⁷ *Labour Force Survey*, Office for National Statistics, 2004. Recent cross-country studies by the OECD indicate a significant positive effect of the share of the female workforce in part-time employment upon the level of female participation in the labour market. See *Female labour force participation: past trends and main determinants in OECD countries*, Florence Jaumotte, OECD, 2003.

BIBLIOGRAPHY

- Accounting Standards Board: Financial Reporting Standard 12: Provisions, contingent liabilities and contingent assets, *ASB*, 1998.
- Alderson, M. and Ashwood, E: Projection of mortality rates for the elderly, *Population Trends No.42*, pp.22-29, 1985.
- Auerbach, A.J., Gokhale, J. and Kotlikoff, L.J.: Generational accounts: a meaningful alternative to deficit accounting, in (D. Bradford, ed.), *Tax Policy and the Economy*, MIT Press, pp.55-110, 1991.
- Auerbach, A.J.: The US fiscal problem: where we are, how we got there, and where we're going, in (S. Fischer and J. Rotemberg, eds.), *NBER Macroeconomics Annual*, *NBER*, pp.141-175, 1994.
- Auerbach, A.J., Gale, W.G. and Orszag, P.R.: Reassessing the fiscal gap: Why tax deferred saving will not solve the problem, *The Brookings Institution*, 2003.
- Auerbach, A.J., Gale, W.G. and Orszag, P.R.: Sources of the Long-Term Fiscal Gap, *Tax Notes*, May 2004.
- Australian Government Productivity Commission: Economic Implications of an Ageing Australia, *Australian Government Productivity Commission*, March 2005.
- Bryant, J., Sonerson, A., Tobias, M., Cheung, J. and McHugh, M.: Population ageing and government health expenditure, New Zealand Treasury Policy Perspectives Paper 05/01, *New Zealand Treasury*, March 2005.
- Bundesministerium der Finanzen: Bericht zur Tragfähigkeit der öffentlichen Finanzen, *Bundesministerium der Finanzen*, 2005.
- Cardarelli, R., Sefton, J. and Kotlikoff, L.J.: Generational accounting in the UK, *Economic Journal*, pp. F547-F574, 2000.
- Congressional Budget Office: The Long-term Budget Outlook, in Long-term Budgetary Pressures and Policy Options, *CBO*, 1998.
- Congressional Budget Office: The Long-term Budget Outlook: An Update, *CBO*, 1999.
- Congressional Budget Office: The Long-term Budget Outlook, *CBO*, December 2003.
- Congressional Budget Office: Measures of the U.S. Government's Fiscal Position Under Current Law, *CBO*, August 2004.
- Congressional Budget Office: The Economic costs of long-term federal obligations: CBO testimony before the Committee on the Budget, United States Senate, *CBO*, February 2005.
- Congressional Budget Office: Updated Projections for Social Security, *CBO*, March 2005.
- Congressional Budget Office: Quantifying Uncertainty in the Analysis of Long-term Social Security Projections, *CBO*, November 2005.

Department for Education and Skills: Participation in Education, Training and Employment by 16-18 year olds, *DfES*, June 2005.

Department for Work and Pensions: Simplicity, security and choice: Working and saving for retirement, *DWP*, December 2002.

Department of the Treasury of Australia: Intergenerational Report 2002-03, 2002-03 Budget Paper No.5, *Treasury of Australia*, May 2002.

England, R.S.: Aging China: the demographic challenge to China's economic prospects, *Center for Strategic & International Studies*, 2005

European Commission: Public Finances in EMU – 2004, European Economy Reports and Studies, 3, Directorate General for Economic and Financial Affairs, *European Commission*, No. 3, 2004.

European Commission: European Commission services' working documents on Member States' stability and convergence programmes 2005, *European Commission*, 2005.

European Commission: Public Finances in EMU – 2005, European Economy Reports and Studies, 3, Directorate General for Economic and Financial Affairs, *European Commission*, No. 3, 2005.

European Union Economic Policy Committee's Working Group on Ageing: The impact of ageing populations on public finances: overview of analysis carried out at EU level and proposals for a future work programme, *EPC*, October 2003.

European Union Economic Policy Committee's Working Group on Ageing: The 2005 projections of age-related expenditure (2004-2050) for the EU-25 Member States: underlying assumptions and projection methodologies, *EPC*, November 2005.

Eurostat population projections, *Eurostat*, 2005, <http://www.europa.eu.int/comm/eurostat/>.

G10: Ageing and pension system reform: implications for financial markets and economic policies, *G10*, 2005.

Gokhale, J. and Smetters, K.: Fiscal and Generational Imbalances: New Budget Measures for New Budget Priorities, *The American Enterprise Institute Press*, July 2003.

Government Actuary's Department, National Population Projections: Review of Methodology for Projecting Mortality, *Government Actuary's Department*, 2001.

Government Actuary's Department: 2002-based, 2003-based interim and 2004-based population projections, <http://www.gad.gov.uk/Population/index.asp>.

Heller, P.S. and Hauner, D.: Characterizing the Expenditure Uncertainties of the Industrial Countries in the 21st Century, *International Monetary Fund*, April 2005.

HM Revenue and Customs, http://www.hmrc.gov.uk/stats/income_tax/index.htm.

HM Treasury: Code for Fiscal Stability, *HM Treasury*, 1998.

HM Treasury, Analysing UK Fiscal Policy, *HM Treasury*, 1999.

HM Treasury: Budget 2002: Economic and Fiscal Strategy Report: The strength to make long-term decisions: Investing in an enterprising, fairer Britain, *HM Treasury*, April 2002.

- HM Treasury: Trend Growth, Recent Developments and Prospects, *HM Treasury*, April 2002.
- HM Treasury: Long-term public finance report: an analysis of fiscal sustainability, *HM Treasury*, November 2002.
- HM Treasury: The Green Book: Appraisal and Evaluation In Central Government, *HM Treasury*, 2003.
- HM Treasury: Long-term public finance report: fiscal sustainability with an ageing population, *HM Treasury*, December 2003.
- HM Treasury: Long-term public finance report: an analysis of fiscal sustainability, *HM Treasury*, December 2004.
- HM Treasury: Long-term global economic challenges and opportunities for the UK, *HM Treasury*, December 2004.
- HM Treasury: Budget 2005: Economic and Fiscal Strategy Report: Investing in our future: Fairness and opportunity for Britain's hard-working families, *HM Treasury*, March 2005.
- HM Treasury: Written statement to Parliament on the Spending Review, *HM Treasury*, July 2005.
- HM Treasury: Delivering the benefits of accruals accounting for the whole public sector, *HM Treasury*, December 2005.
- HM Treasury: Pre-Budget Report 2005, *HM Treasury*, December 2005.
- International Monetary Fund: Manual on Fiscal Transparency, *IMF*, <http://www.imf.org/external/np/fad/trans/manual/gloss.htm>.
- International Monetary Fund: Japan: Selected Issues, *IMF*, September 2003.
- International Monetary Fund: Canada: 2004 Article IV Consultation – Staff Report; Staff Statement; and Public Information Notice on the Executive Board Discussion, *IMF*, March 2004.
- International Monetary Fund: US: 2004 Article IV Consultation – Staff Report; Staff Supplement; and Public Information Notice on the Executive Board Discussion, *IMF*, July 2004.
- International Monetary Fund: Japan: 2004 Article IV Consultation – Staff Report; Staff Supplement; and Public Information Notice on the Executive Board Discussion, *IMF*, August 2004.
- International Monetary Fund: Canada: 2005 Article IV Consultation – Staff Report; Staff Statement; and Public Information Notice on the Executive Board Discussion, *IMF*, March 2005.
- Jackson, R.: Building human capital in an ageing Mexico: A report of the U.S.-Mexico binational council, *Center for Strategic and International Studies*, July 2005.
- Jackson, R. and Howe, N.: The Graying of the Middle Kingdom – The Demographics and Economics of Retirement Policy in China, *Center for Strategic & International Studies*, April 2004.
- Janssen, J.: Long-term fiscal projections and their relationship with the intertemporal budget constraint: an application to New Zealand, New Zealand Treasury Working Papers, *New Zealand Treasury*, 2002.

- Jaumotte, F.: Female labour force participation: past trends and main determinants in OECD countries, OECD Economics Department Working Papers No. 276, *OECD*, 2003.
- Kennedy, S. and Matier, C.: Comparing the Long-term Fiscal Outlook for Canada and the United States Using Fiscal Gaps, Department of Finance Working Paper 2003-04, *Department of Finance Canada*, 2003.
- Latulippe, C.: Effective retirement age and the duration of retirement in the industrial countries between 1950 and 1990, Issues in Social Protection Discussion Paper No.2, *ILO*, 1996.
- Lisiankova, K. and Wright, R.E.: Demographic Change and the European Union Labour Market, *National Institute Economic Review*, No.194, October 2005.
- Office for National Statistics: Atkinson Review: Final Report – Measurement of Government Output and Productivity for National Accounts, *ONS*, 2005.
- Office for National Statistics: Labour Force Survey, *ONS*, 2004.
- Oliveira Martins, J., Gonand, F., Antolin, P., de la Maisonneuve, C., and Yoo, K., The impact of ageing on demand, factor markets and growth, OECD Economics Working Papers No. 420, *OECD*, March 2005.
- Organisation for Economic Co-operation and Development: Coping with Ageing: A Dynamic Approach to Quantify the Impact of Alternative Policy Options on Future Labour Supply in OECD Countries, *OECD*, June 2004.
- Organisation for Economic Co-operation and Development: Sustainable budget policy: concepts and approaches, *OECD*, May 2005.
- Organisation for Economic Co-operation and Development: OECD Economic Outlook No. 77, May 2005, *OECD*, June 2005.
- Organisation for Economic Co-operation and Development: OECD Education Online Database, *OECD*, <http://www1.oecd.org/scripts/cde/members/linkpage.html>.
- Organisation for Economic Co-operation and Development: OECD Employment Outlook 2005, *OECD*, July 2005.
- Organisation for Economic Co-operation and Development: OECD Economic Survey of the United Kingdom 2005, *OECD*, October 2005.
- Organisation for Economic Co-operation and Development: Labour Force Statistics, *OECD*, 2005, <http://www1.oecd.org/scripts/cde/members/lfsdataauthenticate.asp>.
- Pensions Commission: A New Pension Settlement for the Twenty-First Century: The Second Report of the Pensions Commission, *Pensions Commission*, November 2005.
- Pensions Commission: Sanity in the numbers, *Pensions Commission*, December 2005.
- Scherer, P.: Age of withdrawal from the labour market in OECD countries, Labour market and social policy occasional papers No.49, *OECD*, 2002.
- Scobie, G., Gibson, J. and Le, T.: Saving for Retirement: New Evidence for New Zealand, New Zealand Treasury Policy Perspective Paper 04/12, *New Zealand Treasury*, September 2004.
- Sefton, J. and Weale, M.: Fiscal Implications of Demographic Uncertainty for the United Kingdom, *National Institute of Economic and Social Research*, January 2005.

Shaw, C.: Accuracy and uncertainty of the national population projections for the United Kingdom, *Population Trends No.77*, pp.24-32, 1994.

United Nations: World Population Prospects, The 2004 Revision, *United Nations*, 2005.

United States Social Security Administration: 2005 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds, *US Social Security Administration*, 2005.

Wang, Y., Xu, D., Wang, Z. and Zhai, F: Implicit pension debt, transition costs, options, and impact of China's pension reform, World Bank Policy Research Working Paper, *World Bank*, February 2001.

Wanless, D.: Securing our Future Health: Taking a Long-term View, April 2002.

Woods, R.: The role of public debt in the UK fiscal rules, *Bank of Italy*, April 2004.

LIST OF CHARTS

- 2.1 Total UK population
- 2.2 Population indices by age group
- 2.3 Demographic old-age dependency ratios
- 2.4 Demographic old-age dependency ratios
- 2.5 Change in demographic old-age dependency ratios in EU15 countries (2004-2050)
- 2.6 Change in demographic old-age dependency ratios in EU10 countries (2004-2050)
- 2.7 Demographic old-age dependency ratios in non-EU G7 countries and less-developed regions

- 3.1 Overview of approaches

- 4.1 Historic female lifetime participation profiles
- 4.2 UK employment projections
- 4.3 Real interest rates
- 4.4 Profiles of education

- 5.1 Public sector net debt, net worth and indicative net liabilities
- 5.2 Spending
- 5.3 Revenue
- 5.4 Primary balance
- 5.5 Net debt
- 5.6 General government net financial liabilities in G7 countries
- 5.7 Age-related spending in selected EU countries
- 5.8 Projected changes in demographic old-age dependency ratio and age-related spending in EU15

- B1 Projected female participation rates

LIST OF TABLES

- 2.1 Assumptions for principal and high variant population projections
- 2.2 Assumptions for population projections

- 4.1 Real GDP growth and its components in the baseline scenarios (per cent)

- 5.1 Spending projections (per cent of GDP)
- 5.2 Intertemporal budget gaps (per cent of GDP)
- 5.3 Fiscal gaps in baseline productivity scenario (per cent of GDP)
- 5.4 Fiscal gaps in lower productivity scenario (per cent of GDP)
- 5.5 Fiscal gaps in higher productivity scenario (per cent of GDP)

- B1 UK employment rates by age and gender in 2004 (per cent)

LIST OF BOXES

- 2.1 Decomposition of population projections by constituent country
- 2.2 The evolution of the mortality assumption
- 3.1 Approaches to assessing long-term fiscal sustainability
- 3.2 Liabilities in Whole of Government Accounts
- 3.3 The European Commission's sustainability indicators
- 4.1 Ultra-long gilt issuance by the UK Debt Management Office
- 4.2 Long-term expenditure on state pensions
- 5.1 Spending projections and uncertainty
- 5.2 Primary balances in different scenarios
- 5.3 Inter-generational balance
- 5.4 Updated illustrative long-term fiscal projections
- 5.5 Long-term budgetary projections by the Economic Policy Committee
- 5.6 Ageing in China
- A1 National accounts and GAAP as indicators of fiscal sustainability
- B1 The evolution of labour-market participation rates in New Zealand

LIST OF ABBREVIATIONS

CBO	Congressional Budget Office
DfES	Department for Education and Skills
DMO	Debt Management Office
DWP	Department for Work and Pensions
ECOFIN	Council of European Finance Ministers
EFSR	Economic and Fiscal Strategy Report
EPC	Economic Policy Committee
EU	European Union
GAAP	Generally Accepted Accounting Practice
GAD	Government Actuary's Department
GDP	Gross Domestic Product
GEMMs	Gilt-edged market makers
IBC	Intertemporal budget constraint
IBG	Intertemporal budget gap
IGG	Inter-generational balance gap
IMF	International Monetary Fund
MIT	Massachusetts Institute of Technology
MOD	Ministry of Defence
NAIRU	Non-Accelerating Inflation Rate of Unemployment
NBER	National Bureau of Economic Research
NHS	National Health Service
NIESR	National Institute of Economic and Social Research
OAT	Obligation Assimilable du Trésor
OBERAC	Operational balance excluding revaluations and accounting policy changes
OECD	Organisation for Economic Co-operation and Development
ONS	Office for National Statistics
PDV	Present discounted value
PFI	Private Finance Initiative
RPB	Required primary balance
SNA	System of National Accounts
SUME	Single use military equipment
WGA	Whole of Government Accounts

ISBN 1-84-532123-5



9 781845 321239