Office for
Budget Responsibility

Fiscal sustainability report

July 2011

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Foreword

The Office for Budget Responsibility (OBR) was created in 2010 to provide independent and authoritative analysis of the UK's public finances. As part of this role, the Budget Responsibility and National Audit Act 2011 requires us to produce "*an analysis of the sustainability of the public finances*" once a year. This *Fiscal sustainability report* is our first such analysis.

Our approach here is twofold. First, we look at the fiscal impact of past public sector activity, as reflected in the assets and liabilities that the public sector has accumulated on its balance sheet. Second, we look at the potential impact of future public sector activity, by examining how spending and revenues may evolve over the next 50 years – and the impact this would have on public sector assets and liabilities. Broadly speaking, the fiscal position is unsustainable if the public sector is on course to absorb an ever-growing share of national income simply to pay the interest on its debts. This notion of sustainability can be quantified in a number of ways.

The analysis set out in this report builds on provisional work published by the interim OBR in June 2010 and on earlier analyses published by HM Treasury in its *Long-term public finance reports* from 2002 to 2009. We have also benefited from responses to our March 2011 discussion paper *What should we include in the fiscal sustainability report?* We are very grateful to all those who made submissions.

Fiscal sustainability is a wide-ranging issue and we cannot hope to cover every dimension in depth in a single report. In this first report we set out our analytical framework and identify a range of relevant issues that can be addressed within it. We examine some of these issues in detail, while a full exposition of others will have to wait for future reports. We would welcome feedback both on the framework we have set out and on the issues that readers feel would merit different or more detailed exploration. This can be sent to OBRfeedback@obr.gsi.gov.uk.

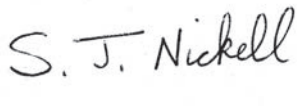
It is important to emphasise that the long-term outlook for public spending and revenues is subject to huge uncertainties. Even backward-looking balance sheet measures are clouded by difficulties of definition and measurement. The long-term figures presented here should be seen as broad brush illustrative projections rather than precise forecasts. Policymakers need to be aware of these

uncertainties, but should not use them as an excuse for ignoring the long-term challenges that lie ahead.

The analysis and projections in this document represent the collective view of the three independent members of the OBR's Budget Responsibility Committee. We take full responsibility for the judgements that underpin them and for the conclusions we have reached. We have, of course, been supported in this by the full-time staff of the OBR, to whom we are as usual enormously grateful. We have also drawn on the help and expertise of our advisory board and of officials across government, including the Department for Work and Pensions, HM Revenue and Customs, HM Treasury, the Department of Energy and Climate Change, the Department for Business, Innovation and Skills, the Government Actuary's Department, the Office for National Statistics, the UK Debt Management Office and Ofcom. We have also had very useful discussions with Professor David Heald of the University of Aberdeen, Ian Carruthers of the International Public Sector Accounting Standards Board, and Doug Elmendorf and colleagues at the US Congressional Budget Office.

The process for finalising our long-term projections has been similar to the one described in previous *Economic and fiscal outlooks*. Our central long-term outlook is partly based on individual projections for spending streams provided by relevant Government departments. Those were, in turn, based on long-term assumptions and methodology requirements set out by the Budget Responsibility Committee.

We provided the Chancellor of the Exchequer with a draft set of our projections and conclusions on 30 June, to give him the opportunity to decide whether he wished to make further policy decisions that we would be able to incorporate in the final version. He did not. We provided a full and final copy of the report 24 hours prior the publication, in line with the standard pre-release access arrangements. At no point in the process did we come under any pressure from Ministers, special advisers or officials to alter any of our analysis or conclusions. A full log of our substantive contact with Ministers, their offices and special advisers can be found on our website.



Robert Chote Steve Nickell Graham Parker

The Budget Responsibility Committee

Executive summary

1 The past three years have seen a severe deterioration in the fiscal position of governments around the world, especially in developed countries. In the UK, the banking crisis and recession of 2008 and 2009 fuelled the largest budget deficit in our peacetime history and a big increase in public sector indebtedness.

2 In our March 2011 *Economic and fiscal outlook (EFO)*, we forecast that public sector net borrowing would shrink from 11.1 per cent of GDP in 2009-10 to 1.5 per cent in 2015-16 as the economy recovers and as the Government's fiscal consolidation is implemented. We forecast that public sector net debt would peak at 70.9 per cent of GDP in 2013-14, before falling back slightly to 69.1 percent in 2015-16.

3 In this *Fiscal sustainability report* we consider the outlook beyond this medium-term forecast horizon and ask whether the UK public finances are sustainable over the long term. Our approach is twofold:

- first, we look at the fiscal impact of past government activity, as reflected in the assets and liabilities accumulated on the public sector's balance sheet. Some balance sheet measures include the present value of some future spending flows; and

- second, we look at the potential fiscal impact of future government activity, by making 50-year projections of all public spending, revenues and significant financial transactions, such as government loans to students.

4 These projections suggest that the public finances are likely to come under pressure over the longer term, primarily as a result of an ageing population. Under our definition of unchanged policy, the Government would end up having to spend more as a share of national income on age-related items such as pensions and healthcare. But the same demographic trends would leave government revenues roughly stable as a share of national income.

5 In the absence of offsetting tax increases or spending cuts this would eventually put public sector net debt on an unsustainable upward trajectory. It is likely that such a path would lead to lower long-term economic growth and higher interest rates, exacerbating the fiscal problem. The UK, it should be said, is far from unique in facing such pressures.

6 Needless to say, while our remit is to look at the fiscal challenges of an ageing population, the fact that people are living longer – and longer in good health – is clearly something that society should welcome.

7 Separate from our central projections, we also present evidence that non-demographic trends are likely to reduce revenue from sources such as transport taxes and North Sea oil as a share of national income over the next 30 years. Governments are likely to need some replacement sources of revenue to keep the tax burden constant, let alone to meet the costs of an ageing population.

8 Long-term projections such as these are highly uncertain and the results we present here should be seen as broad brush illustrations rather than precise forecasts. We illustrate some of the uncertainties around them through sensitivity analyses – by varying key assumptions regarding demographic trends, whole economy and health sector productivity growth, and the position of the public finances at the end of our medium-term forecast horizon.

9 It is important to emphasise that we focus here on the additional fiscal tightening that might be necessary beyond this parliament. The report should not be taken to imply that the substantial fiscal consolidation already in the pipeline for the next four years should be made even bigger. That said, policymakers and would-be policymakers should certainly think carefully about the long-term consequences of any policies they introduce or propose in the short term. And they should give thought too to the policy choices that will confront this and many other industrial countries once the challenge of the current crisis-driven consolidation has passed.

Public sector balance sheets

10 We assess the fiscal impact of past government activity by looking at measures of assets and liabilities on the public sector balance sheet. In this report we draw on longstanding National Accounts balance sheet measures and also the long-awaited Whole of Government Accounts (WGA) that the Treasury is publishing for the first time alongside this report in unaudited summary form.

11 The current and previous governments have both set targets for the National Accounts measure of public sector net debt (PSND) – the difference between the public sector's liabilities and its liquid financial assets. In March 2011, PSND stood at £906 billion, 60 per cent of GDP or £35,000 per household. Public sector net worth (PSNW) is a broader measure, which also includes physical and illiquid financial assets. At the end of 2009, PSNW stood at £138 billion, 10 per cent of GDP or £5,700 per household. The Treasury has never used PSNW as a target, because reliable estimates of physical assets are hard to construct.

12 Commentators often criticise the use of PSND as an indicator of fiscal health (and the same criticisms would apply to PSNW) as this measure excludes future liabilities arising from past government action, for example payments to Private Finance Initiative (PFI) providers and the accrued rights to pension payments built up over the past by public sector workers.

13 More information on future and potential liabilities arising from past government action is available in the WGA. These are produced using commercial accounting rules and they have somewhat broader coverage than PSND and PSNW, both in the accounts themselves and in accompanying notes. According to the unaudited WGA:

- the net present value of future **public sector pension payments** arising from past employment was £1,133 billion or 78.7 percent of GDP at the end of March 2010. This was £331 billion higher than a year earlier, but almost £260 billion of this increase had nothing to do with changes in the size of prospective pension payments. Instead, it reflected a fall in the discount rate used to convert these future payments into a one-off sum. The discount rate is linked to the real yield on high-quality corporate bonds, which fell over the year;

- the total capital liabilities arising from **Private Finance Initiative** contracts were around £40 billion or 2.9 per cent of GDP in March 2010. (Only £5.1 billion of these were on the public sector balance sheet in the National Accounts and therefore included in PSND and PSNW);

- there were a further £105 billion (7 per cent of GDP) in **provisions** for future costs that are expected (but not certain) to arise, most significantly the hard to predict costs of nuclear decommissioning; and

- there were also £207 billion (14.4 per cent of GDP) of quantifiable **contingent liabilities** – costs that could arise in the future, but where the probability of them doing so was seen as less than 50 percent. These included £175 billion of guarantees and similar undertakings arising from interventions to stabilise the financial sector. Contingent liabilities appear in the notes to the WGA, rather than on its balance sheet.

14 Compared to PSND, the WGA balance sheet also includes the value of tangible and intangible fixed assets, estimated at £759 billion or 52.7 percent of GDP in March 2010. The overall public sector net liability in the WGA was £1,216 billion or 84.5 per cent of GDP at end-March 2010, compared to a PSND of £760 billion or 52.8 per cent of GDP at the same date.

15 The publication of the WGA is a welcome contribution to the transparency of the public finances and we look forward to seeing the final audited version. The

WGA will become increasingly useful as a time series builds up, allowing users to compare movements in the two sets of balance sheet measures over time.

16 That said, there are significant limitations in what public sector balance sheets alone can tell us about fiscal sustainability. For one thing, there is the sensitivity of balance sheet measures to the choice of – and movements in – the discount rate, as the change in the public service pension liability between 2009 and 2010 illustrates. We cannot easily quantify how much difference the choice of discount rate makes in aggregate, as the different accounts consolidated into the WGA use a variety of different discount rates according to their own accounting rules.

17 More fundamentally, balance sheet measures look only at the impact of past government activity. They do not include the present value of future spending that we know future governments will wish to undertake, for example maintaining health, education and pension provision. And, just as importantly, they exclude the public sector's most valuable financial asset – its ability to levy future taxes. This means that we should not overstate the significance of the fact that PSND and the WGA balance sheet both show the public sector's liabilities outstripping its assets, or that our latest EFO forecast shows PSNW turning negative this year.

Long-term projections

18 We assess the potential fiscal impact of future government activity by making long-term projections of government revenue, spending and financial transactions on the basis of our assumptions regarding long-term policy. In doing so we assume that spending and revenues initially evolve over the next five years as we forecast in our March 2011 EFO. This allows us to focus on long-term trends rather than making revisions to the medium-term forecast.

Demographic and economic assumptions

19 Demographic change is a key source of long-term pressure on the public finances. Like many developed nations, the UK is projected to have an 'ageing population' over the next few decades. This reflects increasing life expectancy, declining fertility, and the 'demographic bulge' created by the post-WWII 'baby boom'.

20 We base our analysis on projections of the UK population produced by the Office for National Statistics (ONS) every two years. Under the ONS scenario that we use for our central projection, the proportion of the population aged 65 and above rises from roughly 17 per cent in 2011 to roughly 26 per cent in 2061, and net inward migration flows average roughly half the rate seen in

recent years. We examine various alternative scenarios in which the age structure is older or younger, and in which migration flows stay closer to recent levels.

21 As regards the economy, we assume in our central projection that whole economy productivity growth will average 2 per cent a year on an output per worker basis, in line with the average rate over the past 50 years. But we also run alternative scenarios with productivity growth averaging 1.5 and 2.5 percent. We assume CPI inflation of 2 per cent (in line with the Bank of England's target) and a long-term GDP deflator inflation rate of 2.7 per cent.

Defining 'unchanged' policy

22 Fiscal sustainability analysis is designed to identify whether and when changes in government policy may be necessary to move the public finances from an unsustainable to a sustainable path. To make this judgement, it is necessary to define what we mean by 'unchanged' policy in our long-term projections.

23 Government policy is rarely clearly defined over the long term. And, in many cases, simply assuming that a stated medium-term policy continues for 50 years would lead to an unrealistic outcome. Where policy is not clearly defined over the long term, the *Charter for Budget Responsibility* allows us to make appropriate assumptions. These are set out clearly in the report.

24 The most significant definitions of unchanged policy that we need to make are regarding how to up-rate income tax allowances and thresholds, and working age benefit rates. Our medium-term forecasts assume that governments increase these in line with inflation in the absence of a stated decision to do otherwise. But there is no stated policy for us to adopt over the long term. Over the long term, earnings tend to rise more quickly than prices. So if the medium-term definition of unchanged policy was sustained over the longer term, the average tax rate would rise relentlessly as people found more of their income moving into higher tax brackets ('fiscal drag') and working age benefits would become steadily less generous relative to the average incomes of those in work.

25 We assume instead that income tax allowances and thresholds, and working age benefit rates, rise in line with earnings rather than prices beyond 2015-16. This would keep income tax receipts and benefit costs broadly constant as a share of GDP, other things being equal. Up-rating in line with inflation would increase income tax and national insurance contributions by roughly 2.6 per cent of GDP and reduce working age benefit costs by 1.6 per cent of GDP by 2030-31.

26 Consistent with the *Charter for Budget Responsibility*, we only include the impact of policy announcements in our central projections when they can be quantified with "reasonable accuracy". The Government has identified a number of public

sector assets that it is considering to sell, but it has not announced firm decisions as to whether, when and how to sell them. For that reason, we do not include estimates of the resulting sale proceeds and losses of future income flows in our central projection. But we do discuss their potential impact in online Annex A.

27 In our central projections, our assumption for unchanged policy is that beyond 2015-16 underlying spending on public services, such as health, rises in line with per capita GDP. But health care is relatively labour intensive, so we might expect productivity growth in the sector to lag the rest of economy even though wages have to keep up. This implies that if we were to define unchanged policy as keeping health sector output growing at the same rate as the economy, governments would need to spend an increasing share of GDP to do so. We therefore show an alternative set of projections in which health care spending per capita rises by 3 per cent a year in real terms rather than our central projection of 2 per cent.

Results of our projections

28 Having defined unchanged policy we apply our demographic and economic assumptions to produce projections of spending and revenue streams over the next fifty years.

Expenditure

29 Population ageing will put upward pressure on public spending. In our central projection, spending other than on debt interest rises from 36.3 per cent of GDP at the end of our medium-term forecast in 2015-16 to 41.7 percent of GDP by 2060-61, an increase of 5.4 per cent of GDP or £80 billion in today's terms.

30 The main drivers are upward pressures on key items of age-related spending:

- **health spending** rises from 7.4 per cent of GDP in 2015-16 to 9.8 per cent of GDP in 2060-61, rising smoothly as the population ages. If healthcare spending per capita was to rise by 3 per cent a year in real terms, as explained above, this could increase spending by a further 5.3 percent of GDP by 2060-61;

- **state pension costs** increase from 5.5 per cent of GDP to 7.9 per cent of GDP as the population structure ages and State Second Pension entitlements mature. We assume that the 'triple guarantee' means that the value of the Basic State Pension rises by earnings growth plus 0.2 percentage points a year; and

- **social care costs** rise from 1.2 per cent of GDP in 2015-16 to 2 per cent of GDP in 2060-61. The broad trend is in line with projections published by

the Commission on the Funding of Care and Support on July 4, although the results are not directly comparable. We have not pre-judged the Government's response to the report.

31 These increases are partially offset by a fall in **gross public service pension payments** from 2 per cent of GDP in 2015-16 to 1.4 per cent in 2060-61. These costs fall as a result of the decision to up-rate pensions in payment by CPI rather than RPI, the current pay freeze and planned workforce reductions. These projections are very similar to those in the final report of the Independent Public Service Pensions Commission, chaired by Lord Hutton. We have not made any assumptions about the implementation of Lord Hutton's recommendations.

Revenue

32 Demographic factors will have less impact on revenues than on spending. Total revenues are projected to rise from 38.4 per cent of GDP at the end of our medium term forecast in 2015-16 to 39.3 per cent of GDP in 2060-61, an increase of 0.9 per cent of GDP or £13 billion in today's terms.

33 The biggest increase is in capital tax receipts, which are projected to rise from 1.2. per cent of GDP in 2015-16 to 1.7 per cent of GDP in 2060-61. More than half this rise comes from inheritance tax, reflecting the fact that the elderly will be a growing proportion of the population.

34 Long-term fiscal sustainability analyses tend to assume that revenues are constant as a share of GDP or (as in our central projection) that they move only in line with demographic changes. But we also include in this report a detailed discussion of non-demographic factors that might affect the size of particular revenue streams over the long term. The key areas covered are:

- **income tax**, where we show that revenues increase if income growth is skewed toward the top end of the income distribution, as has been the case over the past couple of decades;
- **transport taxes**, where improvements in fuel efficiency could reduce revenue from fuel duty and VED by around 1 per cent of GDP by 2030;
- **North sea revenues,** which are projected to decline by around 0.8 per cent of GDP from 2011-12 as production falls; and
- **other environmental taxes,** where revenue from the climate change levy, EU ETS auction receipts and the carbon price floor could rise by around 0.3 per cent of GDP. Tobacco duty is also expected to decline by 0.3 per cent of GDP as consumption falls.

35 Overall, this analysis suggests that revenue from these sources could decline by up to 2 per cent of GDP in the next thirty years. So future governments are likely to need to find replacement revenue streams to keep the tax burden constant, let alone to meet the costs of the ageing population.

Financial transactions

36 In order to move from spending and revenue projections to an assessment of the outlook for public sector net debt, we need also to include the impact of public sector financial transactions that affect net debt directly.

37 For the majority of financial transactions, we assume that the net effect is zero. One exception is the impact of the student financial support arrangements announced in December 2010. Student loans are projected to increase net debt by a maximum of 4.3 percent of GDP (£63 billion in today's terms) around the early 2030s, falling to 3.3 percent of GDP (£49 billion) by 2060-61 as the value of loan repayments rises relative to the value of new loans made.

38 If we were to include all off balance sheet Private Finance Initiative capital liabilities in PSND, then as of March 2010 this would have increased PSND by around £35 billion or 2.5 per cent of GDP.

39 We do not include the potential impact of mooted asset sales in our central projections, as their impact cannot be quantified with "reasonable accuracy". But we do note them as fiscal risks. The two most likely to have a material impact are the shareholdings in public sector banks, which if sold at current market prices would generate a loss of £13.5 billion for the taxpayer, and the sale of spectrum, which is an upside risk to the public finances, but one that is very hard to quantify.

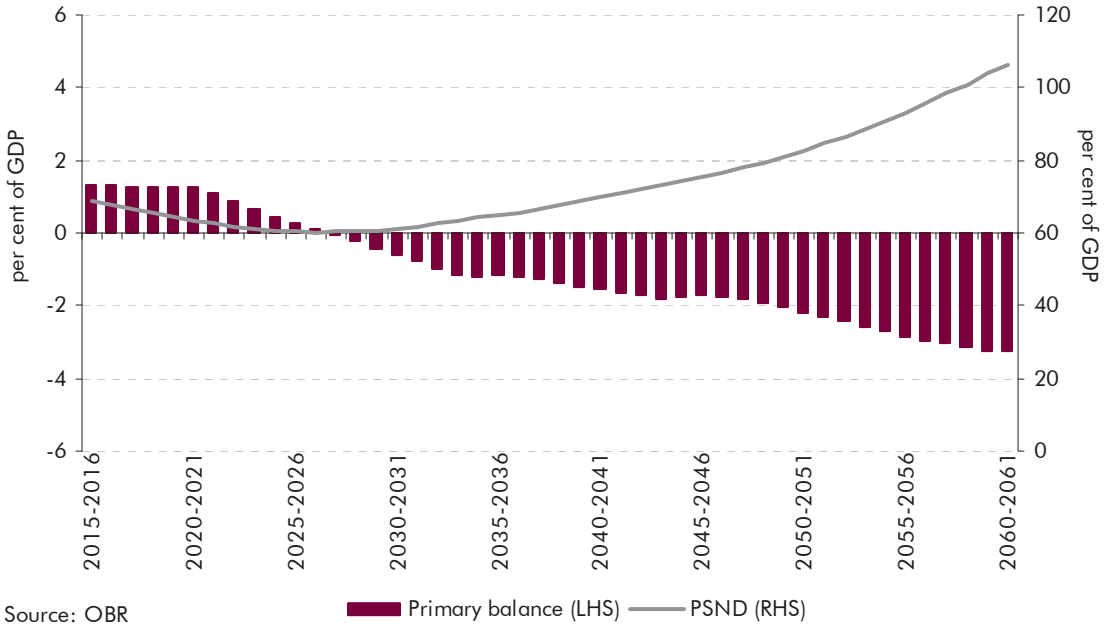
Projections of the primary balance and public sector net debt

40 Our central projections show public sector revenues increasing as a share of GDP beyond our medium-term forecast horizon, but not as quickly as public spending. As a result, the primary budget balance (the difference between revenues and non-interest spending), which is shown in Chart 1 is projected to move from a surplus of 1.3 per cent of GDP in 2015-16 to a deficit of 3.2 per cent of GDP in 2060-61 – a deterioration of 4.5 percent of GDP or £66 billion in today's terms.

41 Taking this and our projection of financial transactions into account, PSND is projected to fall from 69 per cent of GDP in 2015-16 to a trough of 60 per cent in the mid-2020s, before rising increasingly quickly to reach 107 per cent of GDP in 2060-61. The importance of demographic pressures in driving this

increase is evident from that fact that if instead the primary balance remained constant beyond 2015-16 PSND would fall to zero by the late 2050s.

Chart 1: Central projection of the primary balance and PSND



Source: OBR

42 Needless to say, there are huge uncertainties around any projections extending this far into the future. And it is therefore important to be aware of the sensitivity of our central projections to the assumptions that underlie them.

43 The position of the public finances at the end of our medium term forecast horizon is a key sensitivity, as the structural difference between spending and revenue at that point is effectively locked into the long-term projections. If the structural primary balance in 2015-16 was worse by 1 per cent of GDP than in our EFO forecast then net debt would increase to around 150 per cent of GDP rather than 107 per cent by 2060-61. A structural gap one per cent better than in our central projection in 2015-16 would keep debt on a relatively sustainable path.

44 The eventual increase in PSND would be bigger than in our central projection if long-term interest rates turned out to be higher relative to long-term economic growth, if long-term productivity growth was weaker (as this pull down receipts, but not those areas of spending linked to prices), or if the age structure of the population was to turn out older than in our central projection.

45 Higher net inward migration than in our central projection – closer to the levels we have seen in recent years, for example – would put downward pressure on borrowing and PSND, as net immigrants are more likely to be of working age than old age than the population in general. This effect would reverse over a longer time horizon, when the immigrants reach old age.

46 Under the scenario in which governments respond to relatively weak productivity growth in the health service by increasing underlying health spending per capita by 3 per cent a year in real terms, the upward debt trajectory would be much more steep. PSND would be in excess of 200 per cent of GDP by the late 2050s.

Economic feedbacks

47 Left unaddressed, persistent fiscal deficits could have a number of negative consequences for the economy, and therefore for fiscal sustainability, that are not captured by our central projections. If fiscal deficits reduce national saving, raise interest rates and 'crowd out' investment, this would lead to lower levels of output and a reduction in living standards. Higher levels of debt can also restrict policymakers' ability to respond to future economic difficulties.

48 Persistent deficits should be distinguished from temporary deficits, which may be used to help boost economic activity in the short run when economic activity is below its trend level. The short-run effects of current fiscal policy on the economy are captured in our medium-term forecasts. In the longer-term projections in this report, output is assumed to remain at its sustainable trend level from 2017-18 onwards.

49 Historical correlations suggest that a £1 increase in the fiscal deficit is associated with an increase in private saving of around 80p and a widening of the current account of 1p. Assuming, for the purposes of illustration, that this holds true in the future, then if the deficit evolved as in our central projection, the capital stock would be around 4 per cent smaller and the level of real GDP around 1 per cent lower by 2060-61 than our central projections assume.

50 Using a simple illustrative rule of thumb that a 1 per cent increase in the fiscal deficit raises interest rates by 20 to 30 basis points, the path of deficits in our central projection would also increase the debt-to-GDP ratio by 2 to 3 per cent of GDP in 2060-61 (including the impact of crowding out).

Summary indicators of fiscal sustainability

51 Our central projections, and several of the variants we calculate, show that on current policy we would expect the budget deficit to widen sufficiently over the long-term to put public sector net debt on a continuously rising trajectory as a share of national income. This is clearly unsustainable.

52 Summary indicators of sustainability can be used to illustrate the scale of the challenge more rigorously and to quantify the tax increases and/or spending cuts necessary to return the public finances to different definitions of sustainability.

53 Most definitions of fiscal sustainability are built on the concept of solvency – the ability of the government to meet its future obligations. In formal terms the government's 'inter-temporal budget constraint' requires it to raise enough revenue in future to cover all its non-interest spending and also to service and eventually pay off its outstanding debt over an infinite time horizon. Under our central projections, the government would need to increase taxes and/or cut spending permanently by a little over 3 per cent of GDP (£45 billion in today's terms) from 2016-17 onwards to satisfy the inter-temporal budget constraint through an immediate and permanent adjustment.

54 The inter-temporal budget constraint has the attraction of theoretical rigour, but it also has several practical limitations. For example, it assumes that governments will eventually wish to eliminate their debts entirely, which relatively few have expressed a desire to do. Revenue and spending projections over 50 years are uncertain enough; projections over an infinite horizon are clearly far more so. And the use of an infinite horizon could also allow governments to run substantial deficits for a considerable period as long as they promise offsetting surpluses in the potentially far distant future. This is hard to promise credibly.

55 For these reasons sustainability is more often quantified by asking how big an immediate and permanent spending cut or tax increase is necessary to move public sector net debt to a particular target level at a particular target date. This is referred to as the 'fiscal gap'. The current Government does not have such a long-term target. So, for illustration, we calculate the additional fiscal tightening necessary from 2016-17 to return PSND to its roughly pre-crisis level of 40 per cent of GDP and to return it to the near-term peak we forecast in the EFO of 70 per cent of GDP, both at the end of our projection horizon in 2060-61.

56 Under our central projections, the government would need to implement a permanent tax increase or spending cut of 1.5 per cent of GDP (£22 billion in today's terms) in 2016-17 to get debt back to 40 per cent and 0.8 per cent of GDP (£12 billion in today's terms) to get it back to 70 per cent.

57 These calculations depend significantly on the health of the public finances at the end of our medium-term forecast. If the structural budget balance was 1 per of GDP weaker or stronger in 2015-16 than we forecast in the EFO (which would imply an underlying deficit that much greater throughout the projection horizon), then the necessary tightening would be bigger or smaller by the same amount.

58 The sensitivity factors that we identified in the previous section as posing upward or downward risks to our central projections for PSND similarly pose upward or downward risks to our estimates of fiscal gaps. The most dramatic would be the scenario of annual 3 per cent per capita real growth in health spending; this would increase the necessary permanent policy adjustment in 2016-17 to 3.9 per cent of GDP for the 40 per cent target or 3.2 per cent of GDP for the 70 per cent target.

59 Governments need not respond to fiscal pressures with a one-off permanent tightening, of course. As an alternative to the tightening of 1.5 per cent of GDP in 2016-17 necessary to meet the 40 per cent target, governments could opt for a series of tax increases or spending cuts worth an additional 0.5 per cent of GDP each decade. A more gradual adjustment would mean a smaller fall in the debt to GDP ratio in the early years before PSND begins to rise again towards the target level as the upward pressures on spending mount.

60 There is considerable uncertainty surrounding the scale of the fiscal challenge that confronts future governments, but the fact there is such a challenge is not in doubt. Neither is this a challenge confined to the UK. As the International Monetary Fund argued in their Fiscal Monitor in April: *"Although substantial fiscal consolidation remains in the pipeline, adjustment will need to be stepped up in most advanced economies, especially to offset the impact of age-related spending… From an even longer-term perspective, spending on pensions – and especially, health care – constitutes a key challenge to fiscal sustainability."*

1 Introduction

A framework for analysing fiscal sustainability

1.1 This chapter sets out the framework we use to analyse fiscal sustainability in this report. This draws on the material we presented in our March 2011 discussion paper: *What should we include in the Fiscal sustainability report?*

1.2 Our approach in this report is to assess the sustainability of the public finances by examining both the fiscal consequences of past government activity and the potential fiscal consequences of future government activity.

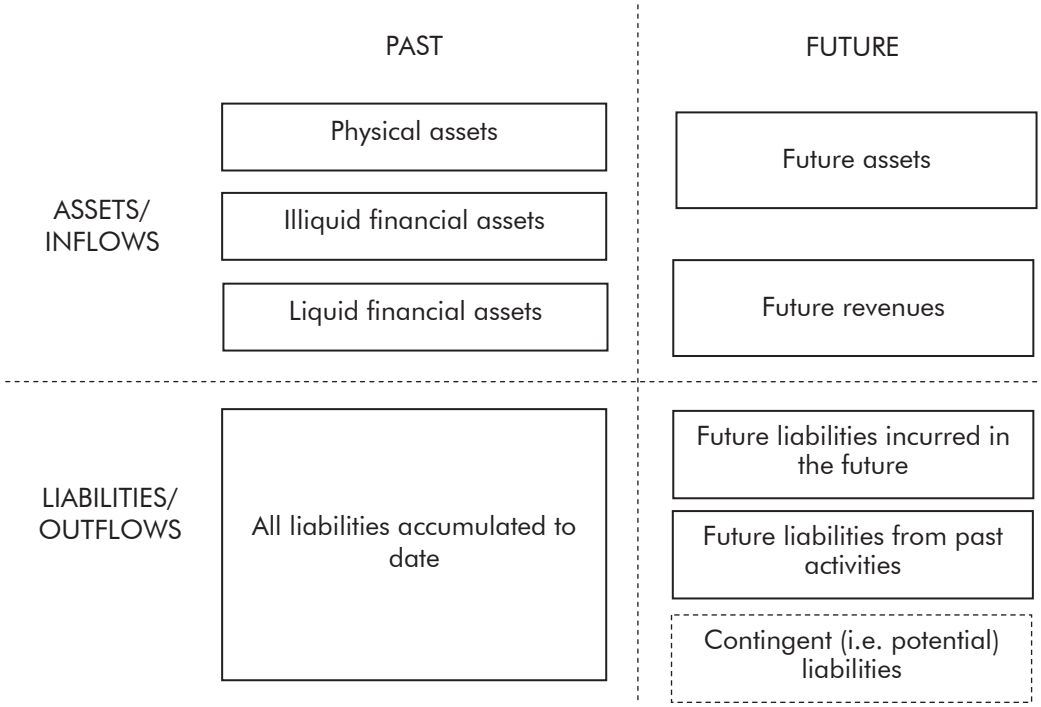
1.3 As a consequence of its past activity, the government has accumulated assets (physical and financial) and liabilities. Past activity also creates some reasonably certain future financial flows, for example contractually-agreed public service pension payments. The government's past activity also creates various 'contingent liabilities', where there is a non-zero probability that it will face some cost in the future, such as making good a loan guarantee.

1.4 Looking forward, the government's future activity will involve financial outflows, some to invest in assets but mostly to pay for spending on public services and transfer payments. But it will also receive future revenues, mostly from taxation. The government may also find itself in possession of valuable assets it has not had to pay to accumulate, for example access to the electromagnetic spectrum that it can auction.

1.5 Assessing the long-term sustainability of the public finances involves summarising the fiscal consequences of some or all of this past and future activity. Figure 1.1 illustrates the potential elements.[1]

[1] Adapted from HM Treasury (2003) *Long-term public finance report;* and International Federation of Accountants (2009) *Reporting on the long-term sustainability of the public finances,* available from http://www.ifac.org/Guidance/EXD-Details.php?EDID=0133

Figure 1.1: Government activity: past and future, stocks and flows



1.6 In summarising the fiscal consequences of government activity we can focus on flows (future revenues and spending, including those generated by existing assets and liabilities) or stocks (existing assets and liabilities, plus the present value of expected future revenues and spending). In principle, these approaches should tell the same story. In practice, they rarely appear to because the coverage of the different summary stock and flow measures used in policy presentation and discussion differs widely. We try in this report to tell a coherent story using both approaches and to warn against drawing inappropriate conclusions from an unrepresentative subset of government activity.

1.7 Our analysis of stocks focuses on measures of the public sector balance sheet. These provide a snapshot of the fiscal consequences of the government's past activity at any point in time, by providing information on its stock of assets and liabilities. Balance sheets provide interesting information, but their usefulness as an indicator of long-term fiscal sustainability is limited by their backward-looking nature – most notably that they exclude the present value of future revenue flows. The greatest financial asset of any government is its ability to levy future taxes.

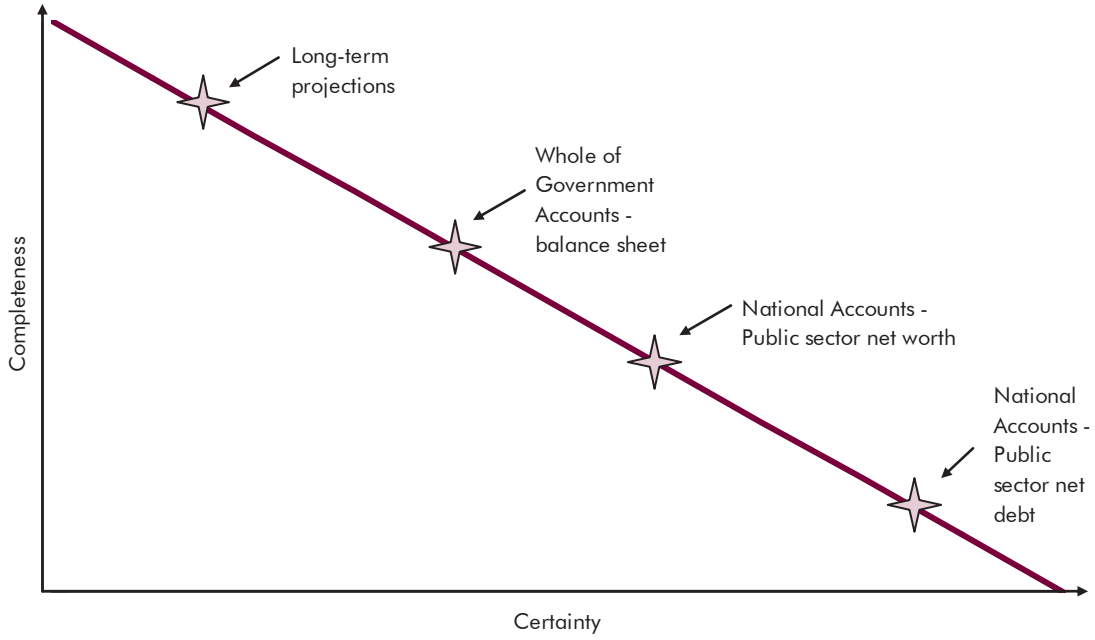
1.8 Greater transparency regarding the public sector balance sheet is very welcome. But in assessing fiscal sustainability, we place more emphasis on our analysis of flows. We make projections of future government expenditure and revenue flows and assess their implications for fiscal sustainability, taking into account the initial

balance sheet position. We look at indicators that can be used to summarise fiscal sustainability on the basis of such projections.

1.9 Another advantage of looking at flows of spending and revenue is that they provide a more intuitive guide to the nature of the potential policy response: the bulk of any adjustment to shift the public finances from an unsustainable path to a sustainable one is likely to have to take the form of increasing revenues and/or reducing spending rather than undertaking transactions in assets or liabilities.

1.10 In analysing these stocks and flows there is a trade-off between completeness and certainty, as shown in Chart 1.1. Balance sheets provide reasonably reliable estimates of assets and liabilities related to past activity (though even here there are a number of difficulties with estimation and data availability). But they are incomplete as they do not account for many elements of future activity. Long-term projections permit a more complete picture, but they are by their nature extremely uncertain.

Chart 1.1: Certainty versus completeness



1.11 Recognising this trade-off, this report examines both balance sheet information and future projections. This enables us to say something about most sections of the schematic in Figure 1.1, with varying degrees of certainty. The remainder of this introduction explains in more detail how the material in subsequent chapters of the report is structured around this analytical framework.

Past activity: the public sector balance sheet

1.12 The focus of Chapter 2 of this report is to examine the impact of past government activity using measures of the public sector balance sheet. We consider three alternative presentations of the public sector balance sheet – two from the longstanding National Accounts framework and one from the long-awaited Whole of Government Accounts (WGA), which are being published by the Treasury for the first time alongside this report in summary and unaudited form.

1.13 National Accounts measures are produced by the Office for National Statistics (ONS) and have been used by the current and previous governments to assess the fiscal position. In particular public sector net debt (PSND) has been used as a key target indicator of fiscal health. This is defined as the public sector's consolidated gross debt less liquid financial assets – that is, those assets that could be readily sold. Governments have also reported estimates of public sector net worth (PSNW), which compares the public sector's liabilities with *all* its assets, so including the illiquid assets that are excluded from PSND.

1.14 As seen in Figures 1.2 and 1.3, and explained further in Chapter 2, both measures encompass a relatively narrow and entirely backward-looking subset of the government's activities. In particular, PSND has been criticised as a measure of the public sector's financial health (and a similar criticism would apply to PSNW) because it excludes future liabilities and contingent liabilities arising out of past activity. These include:

- future public service pension payments, where the liability to pay the pension was incurred as a result of past employment;
- capital payments to PFI providers and other payments from previous long-term contracts. In particular, the National Accounts classify most PFI deals as 'off balance sheet';
- the future costs of student loans, to the extent that previous loans or the costs of servicing those loans are not fully recovered; and
- provisions, contingencies, guarantees and other risks of future costs that might materialise as a result of past activities.

1.15 To some extent some of these gaps will be addressed by information provided by WGA. The WGA are consolidated financial statements for the public sector. These accounts are completed in line with Generally Accepted Accounting Principles, specifically the International Financial Reporting Standards as adapted for the public sector. They include an accruals-based balance sheet.

Figure 1.2: Coverage of public sector net debt

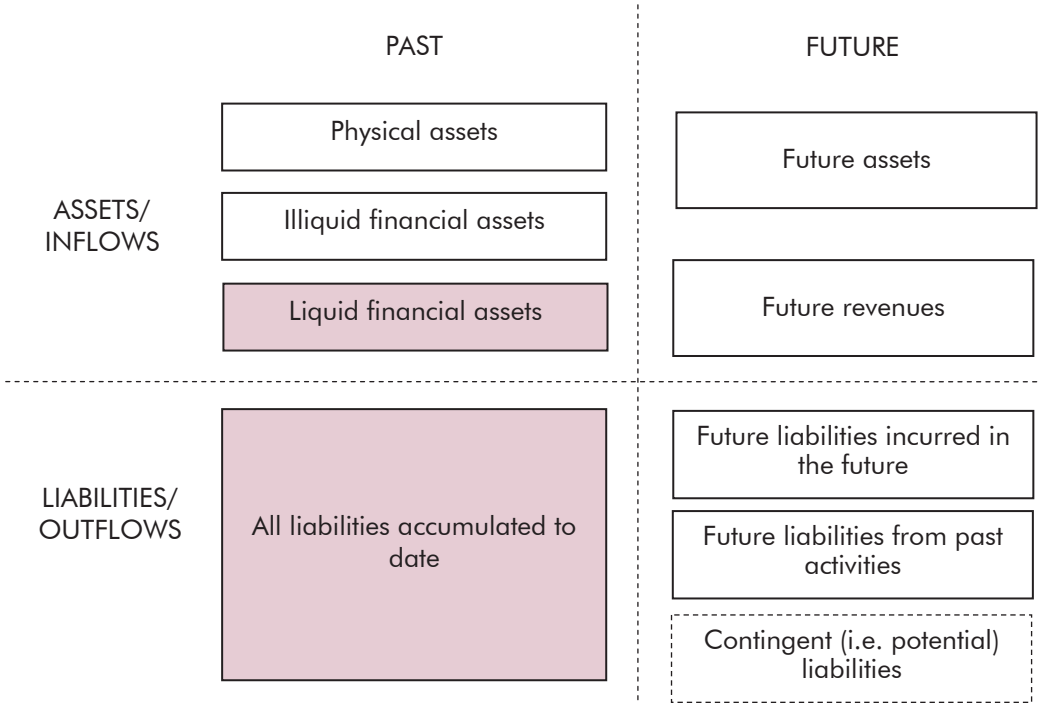
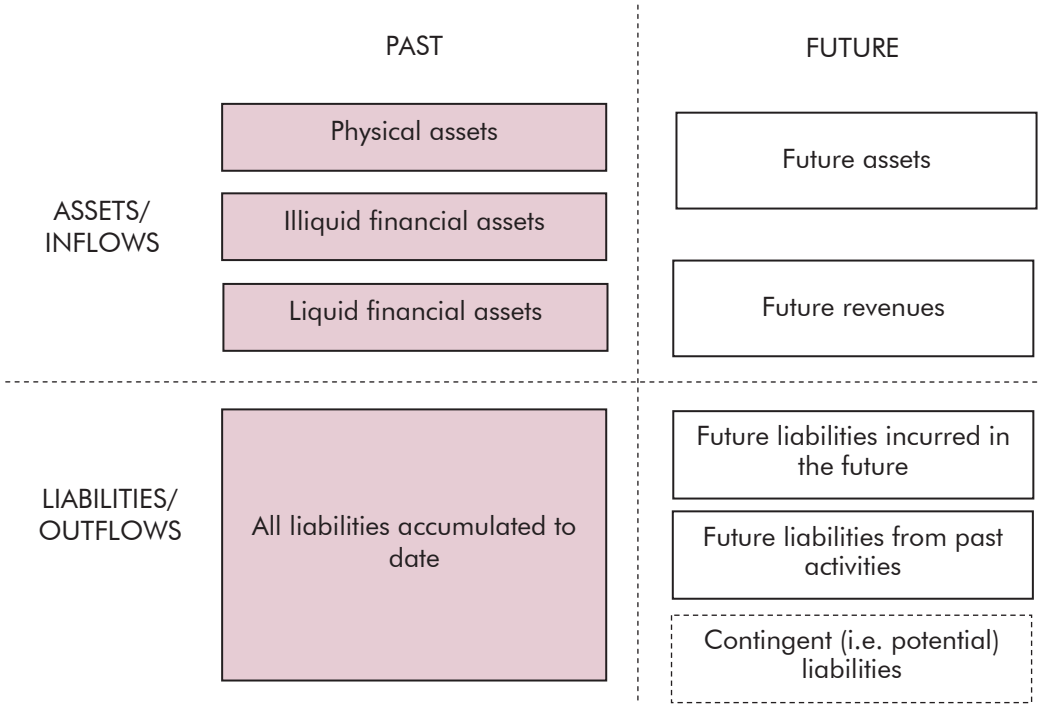


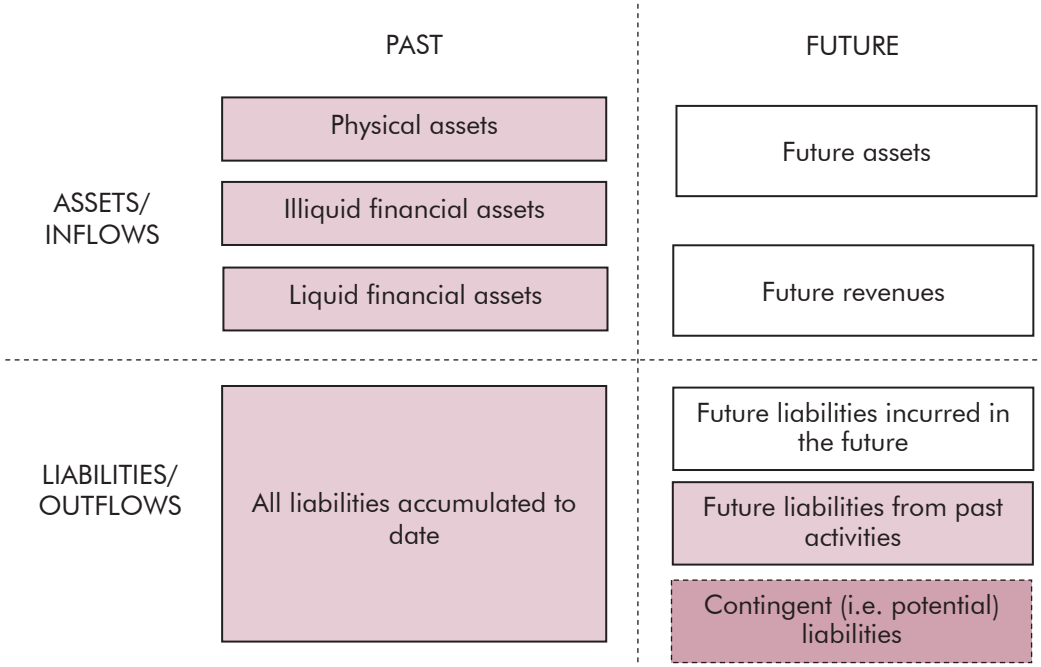
Figure 1.3: Coverage of public sector net worth



1.16 WGA capture a wider, but still not complete, range of the activities identified in the previous section, as shown in Figure 1.4. They include financial and non-financial assets and liabilities, plus some costs incurred in the past for which the cash flows will occur in the future. In particular, they take account of commitments for both finance and operating leases under PFI, net pension liabilities and provisions.

1.17 In Chapter 2 we consider the new information available from WGA and analyse its implications for sustainability. One important issue to bear in mind is that present value estimates of future financial flows, such as those included in the WGA, are very sensitive to the choice of discount rate used to convert the projected flows into a one-off upfront sum.

Figure 1.4: Coverage of the WGA measure of net liabilities



Future activity: Long-term spending and revenue projections

1.18 Balance sheets contain useful information on the fiscal consequences of past government activity, including its implications for some future cash flows. But, to assess long-term sustainability, we also need to understand how future government activity might affect these balance sheets.

1.19 In Chapter 3, we analyse future flows by undertaking a 'bottom-up' analysis, aggregating long-term projections of different spending and revenue streams as shares of GDP on the presumption of unchanged government policy. This is a similar approach to the one taken by the Treasury in its previous *Long-term public*

finance reports and by a number of other fiscal bodies around the world, such as the US Congressional Budget Office (CBO).

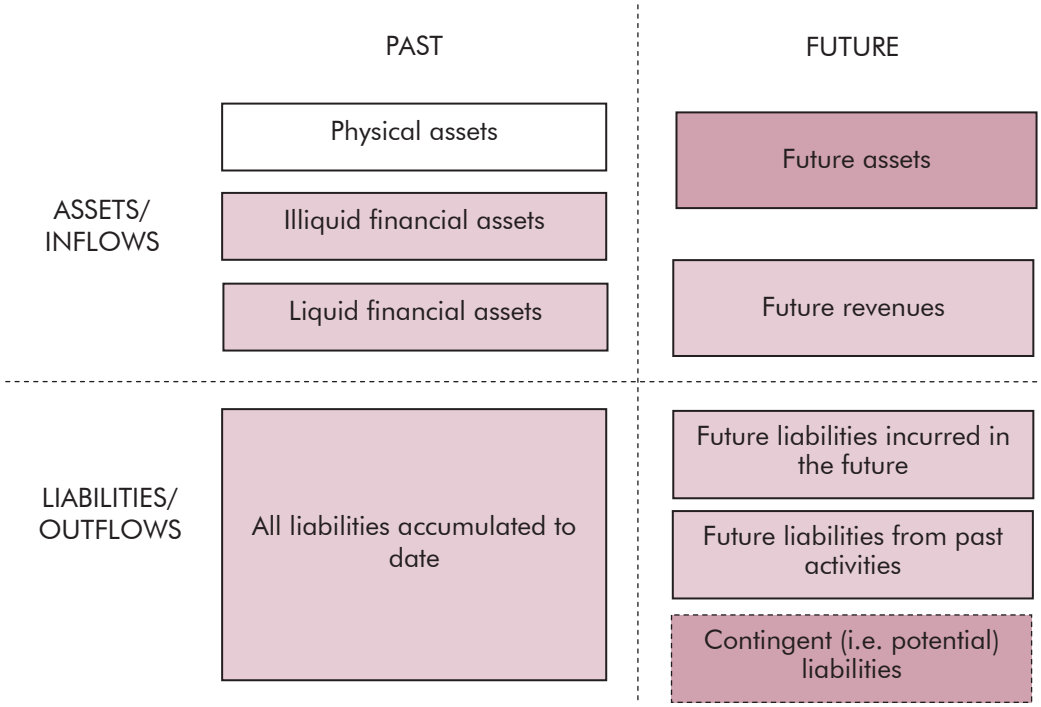
1.20 Using long-term projections of this type provides a relatively comprehensive way of assessing fiscal sustainability. It takes into account items such as the cost of public service pensions, but without the same sensitivity to the choice of discount rate as in the balance sheet approach. It also takes into account the fact that the government has many non-contractual but nonetheless meaningful ongoing spending commitments, for example, that it is likely to wish to continue to provide state education and healthcare. Crucially, it also recognises that the government has the ability to raise future tax revenues.

1.21 Figure 1.5 shows the content of our revenue and spending projections. The relatively comprehensive coverage of these projections can be appreciated in comparison to historically focused measures. However, there are still potential inflows and outflows that it is impossible to incorporate fully. These are lightly shaded in the schematic. A full assessment of fiscal sustainability must also attempt to encompass these. It is important to emphasise that given the huge range of uncertainty around these issues and over these timescales these remain illustrative and broad brush projections rather than precise forecasts.

1.22 In their previous long-term projections, the Treasury focused on the implications of future changes in the age structure of the population for demand for particular broad categories of spending. We have followed a similar approach but have extended the analysis to take greater account of non-demographic drivers of spending and of long-term influences on the buoyancy of different revenue streams. A particular issue discussed in Chapter 3 is the potential interaction between the outlook for the public finances and the long-term performance of the economy.

1.23 On the expenditure side, health spending is a particular focus in this report. There is an extensive international literature showing how prospective changes in health spending can have a significant impact on the long-term health of the public finances – it is, for example, the main factor leading the CBO to conclude that current fiscal policy in the US is unsustainable. In addition to an increase in the number of older people, on whom health spending is concentrated, costs will be affected by changes in the proportion of people's lives spent in ill health. Productivity of workers in this sector will also have an important impact, not only on health spending at particular ages but also on the underlying direction of overall spending.

Figure 1.5: Content of our revenue and spending projections



1.24 On the revenue side, there are a number of non-demographic factors that might affect the size of particular revenue streams over the long term. This issue was not analysed in depth in previous Treasury reports. In Chapter 4 of this report we look at various revenue streams that the government receives and ask whether there is a good argument for assuming that the tax base will rise by a rate other than the growth rate of nominal GDP over the long run. For example, due to technological changes, resource depletion or behavioural change.

Summary indicators of sustainability

1.25 Given a set of long-term projections for spending and revenues, there remains the need to summarise their implications for fiscal sustainability in a rigorous yet meaningful and comprehensible way. We discuss and illustrate various approaches to doing so in Chapter 5.

1.26 Most definitions of fiscal sustainability are built on the concept of solvency – the ability of the government to meet its future obligations. A formal solvency condition can be given by the government's inter-temporal budget constraint (IBC). The IBC will be satisfied if the projected outflows of the government (given by the current public debt and the discounted value of all future expenditure) are covered by the discounted value of all future government revenue. Intuitively this means that over an infinite horizon the so-called primary balance (government receipts less spending on items other than debt interest) must be large enough to

service the government's debt. Given a particular set of projections for revenues and non-interest spending we can calculate by how much the government would need to strengthen the long-term primary balance in order to fulfil the infinite horizon IBC.

1.27 In some respects the IBC is an unrealistic constraint to apply in practice. For one thing, it assumes that governments will eventually wish to eliminate their debts entirely, which relatively few have expressed a desire to do. For another, the IBC permits a government to run large budget deficits for a significant period in the short and medium turn as long as they hold out the promise of surpluses in the potentially far distant future. For these reasons, we place greater focus on fiscal gap indicators that measure the immediate and permanent adjustment in the primary budget balance needed to bring the debt-to-GDP ratio to a particular level at a particular future date. We also look at more gradual ways to fill the same gaps.

Assumptions regarding Government policy

1.28 The goal of this report is to identify whether government policies are likely to be sustainable in the long term or whether there is likely to be a need to spend less or tax more in order to make them so. To make such a judgement we first need to set out the assumptions we use regarding long-term policy.

1.29 Over the five year forecasting horizon of our *Economic and fiscal outlooks,* a government's tax and spending policies are usually publicly announced and reasonably well defined. But assuming that governments would maintain them over decades is sometimes unrealistic and would paint a misleading picture of fiscal sustainability. In the absence of a well-defined long-term policy, we have to make an appropriate assumption about what 'unchanged policy' would look like. As required by the *Charter for Budget Responsibility*: *"where a long-term policy has not yet been set by the Government, the OBR will set out the assumptions it makes in its projections regarding policy transparently"*.

1.30 Given the importance of these assumptions, we aim to be clear and transparent about them and our reasons for choosing them. The key policy assumptions are set out in Chapter 3.

1.31 In making long-term spending and revenue projections, we also need to decide how to deal with policies that are currently being considered by the Government but where no final, detailed announcement has yet been made. We use the same principle as in our medium-term forecast, and which is required of us in the *Charter,* namely that we should include policies in our projections where final details have been announced that allow the fiscal impact to be quantified with "*reasonable accuracy*". Consistent with the *Charter*, this report notes significant

policy commitments and aspirations that are not included in the central projections as fiscal risks, and where possible sets out the potential impacts of such policies.

Structure of the report

1.32 We use the analytical framework set out above to structure the material in the rest of this report:

- Chapter 2: analyses the fiscal consequences of past government activity through alternative measures of the public sector balance sheet;
- Chapter 3: analyses the fiscal consequences of future government activity through long-term projections of revenue and expenditure;
- Chapter 4: focuses on the sustainability of revenue flows; and
- Chapter 5: considers summary indicators of sustainability.

1.33 We also provide a set of Annexes, available in a separate online document on our website at www.budgetresponsibility.independent.gov.uk, which provide more detail on:

- Annex A: classification and valuation of asset sales;
- Annex B: demographic and economic assumptions in the long-term projections;
- Annex C: income tax and benefit uprating assumptions in the long-term projections; and
- Annex D: long-term trends in health spending.

2 The fiscal impact of past government activity: the public sector balance sheet

Introduction

2.1 This chapter examines the fiscal impact of past government activity by considering measures of the public sector's assets and liabilities. We consider three alternative measurements of the public sector balance sheet – two based on the longstanding National Accounts framework and one from the new Whole of Government Accounts (WGA), which is being published by the Treasury for the first time in summary and unaudited form.

2.2 As explained in Chapter 1, the National Accounts and WGA differ in how much of the balance sheet they cover, the extent to which they include future liabilities, and in the accounting conventions they follow. This chapter considers the information available from both frameworks and what this can tell us about the sustainability of the UK fiscal position.

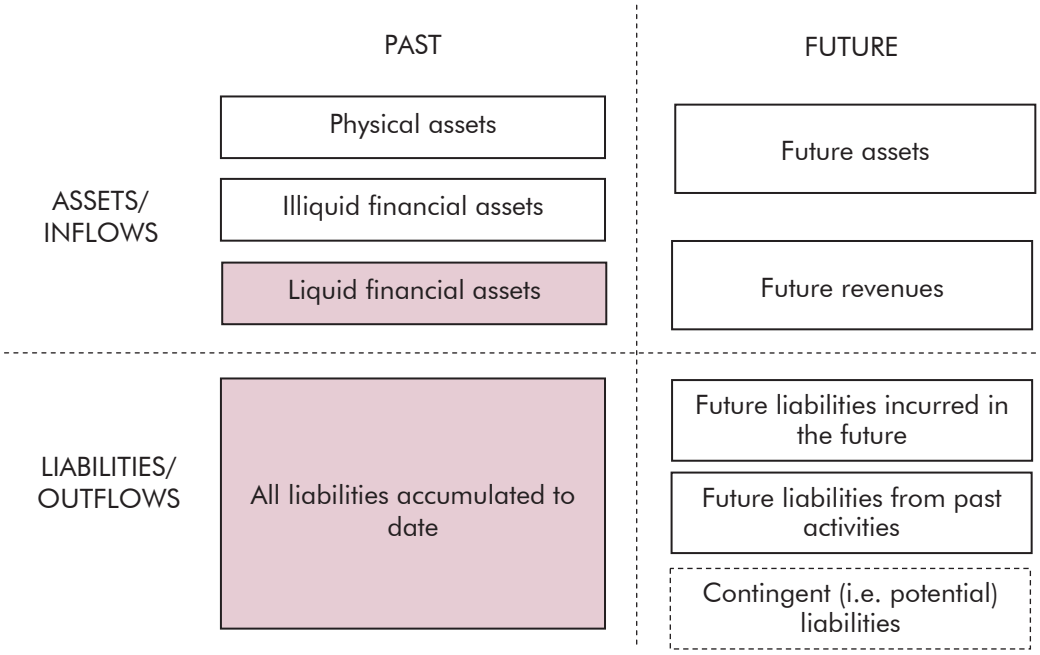
Balance sheet measures in the National Accounts

2.3 In this section we consider two balance sheet measures – public sector net debt (PSND) and public sector net worth (PSNW) – that are based on the National Accounts framework. The National Accounts are compiled according to internationally agreed national accounting frameworks, such as the European System of Accounts (ESA), which is in turn based on the UN System of National Accounts (SNA). The National Accounts aim to provide a fully articulated view of each sector of the whole economy, where transactions between different sectors are fully and consistently accounted for. International institutions, such as the IMF, the OECD, and the European Commission, use national accounting frameworks to assess a country's economic and fiscal outlook.

Public sector net debt

2.4 The current and previous Governments have both set targets for the National Accounts based measure of PSND. PSND is defined as the public sector's consolidated gross debt[1] less liquid assets – that is, those assets that could readily be sold. The coverage of PSND is illustrated by the shaded areas shown in Figure 2.1. PSND covers all government liabilities accumulated to date, but has relatively limited coverage of government assets, and no coverage of future liabilities or assets.

Figure 2.1: Coverage of public sector net debt



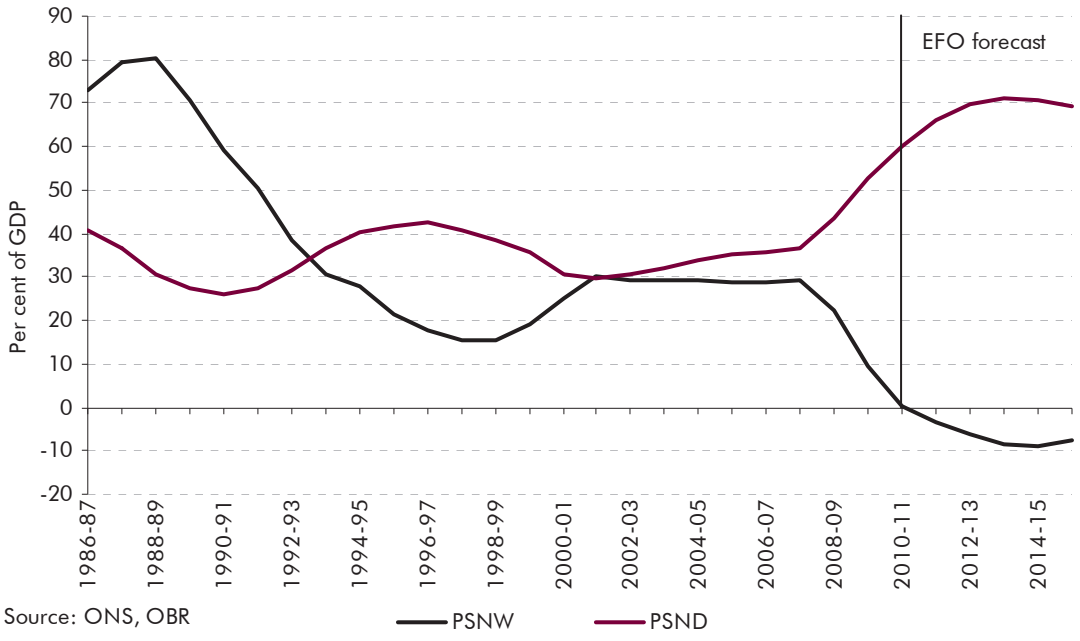
2.5 The level of PSND changes each year by the amount of public sector net borrowing (PSNB - the gap between spending and receipts) plus changes in public sector financial transactions (which includes student loans and other government lending), less changes in liquid assets. PSND also includes an estimate of the additional debt that the government would have had to issue if it had purchased the buildings and other assets that the public sector uses through Private Finance Initiative (PFI) deals, where those assets are classified as 'on

[1] Public sector consolidated gross debt is measured as the nominal value of all debt issued by general government and public corporations, which includes most wider liabilities, less the amount of this debt held by government bodies ('official holdings') and public corporations, including the Bank of England.

balance sheet' in the National Accounts.[2] The measurement of PFI deals within the various balance sheet measures is discussed further below.

2.6 The previous Labour Government's 'sustainable investment rule' required it to keep PSND below 40 per cent of GDP over the economic cycle.[3] But the financial crisis and recession pushed PSND well above this level and in 2010 the new Coalition Government announced a 'supplementary target' for debt, alongside the fiscal mandate, to have PSND falling as a share of GDP at a fixed date of 2015-16. The measure of PSND that is targeted, and which is used throughout this document, is 'PSND ex'. This excludes the temporary effects of the recent interventions to stabilise the financial sector.[4]

Chart 2.1: Recent levels and forecasts of PSND and PSNW



Source: ONS, OBR

[2] More details of how PSND is measured are available in O'Donoghue (2009).

[3] This rule stated that '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'.

[4] PSND ex and the associated measure of PSNB ex both exclude the temporary effects of the financial interventions, but include their permanent costs. Without these adjustments the full measures of PSND and PSNB are distorted by the liabilities and the profits of the banks that are temporarily classified to the public sector.

2.7 Chart 2.1 shows the recent levels of PSND and PSNW, which is discussed further below, and our most recent forecasts for both measures to 2015-16. PSND has increased sharply in recent years as a result of the increased government borrowing caused by the financial crisis and recession and is forecast to rise further until 2013-14. At the end of 2010-11, PSND was £906 billion, or 60 per cent of GDP, or £35,000 per household.[5]

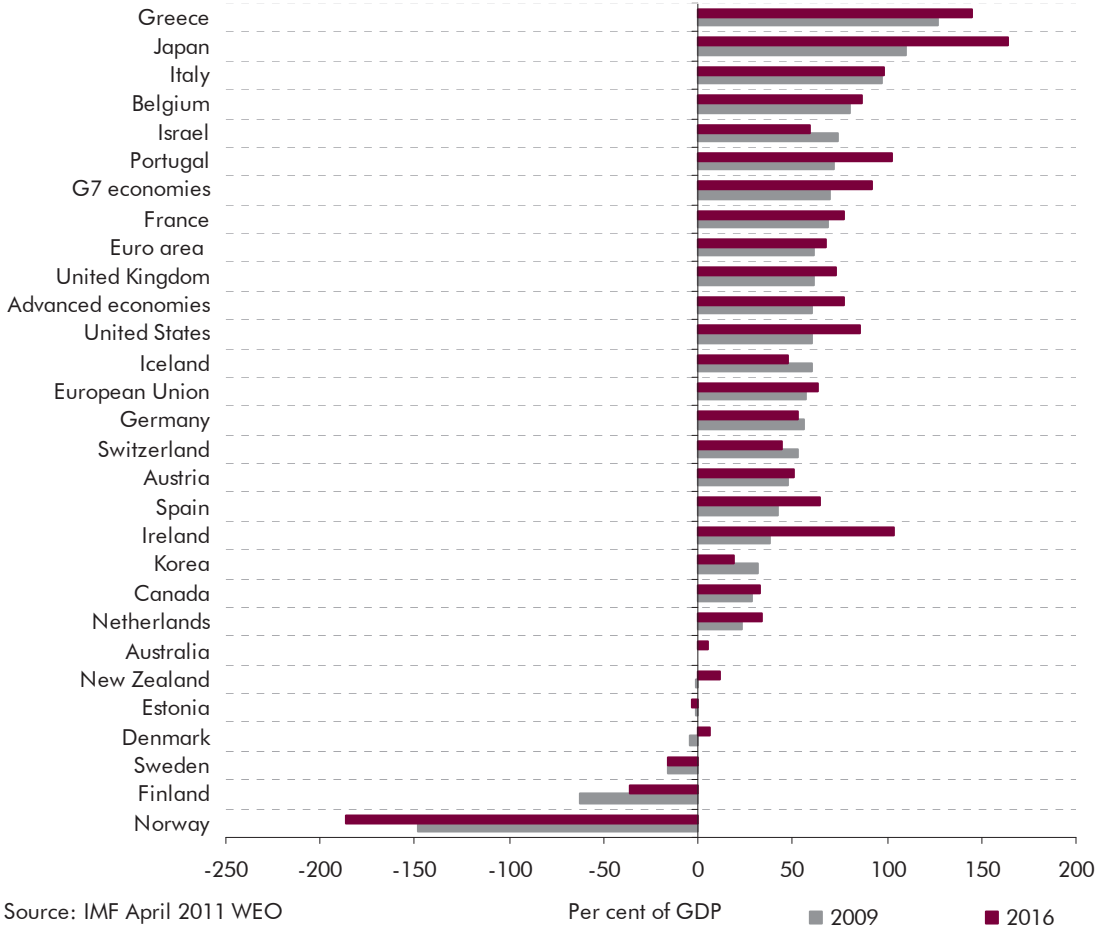
2.8 Because National Accounts measures are compiled under internationally agreed rules, they have the advantage of allowing cross-country comparisons. Not all countries measure net debt in a way that permits direct comparison with the UK's measure of PSND, but internationally comparable figures are available for general government net debt, which excludes the net debt of public corporations from the public sector total.

2.9 The IMF publishes estimates of general government net debt for different countries in its *World Economic Outlook (WEO*). Chart 2.2 shows the IMF's estimates for 2009 and forecasts for 2016 for those countries included in the IMF's grouping of advanced economies. These figures were taken from the April 2011 *WEO*. On this measure, UK general government net debt was 61 per cent of GDP in 2009 and is forecast by the IMF to grow to 73 per cent in 2016. This is lower than the G7 average of 70 per cent in 2009 and 92 per cent in 2016, although the G7 average is somewhat skewed by the very high levels of debt in Japan. In future *Economic and fiscal outlooks* we hope to publish forecasts using internationally comparable definitions of fiscal aggregates, which could include general government net debt on this IMF definition, to enable direct comparison with international forecasts.

2.10 Chart 2.2 shows that in Norway, Sweden and Finland, cash reserves and assets more than cover obligations, resulting in negative net debt levels. Norway owes much of its comfortable position to oil revenues. In addition, these countries shared severe financial crises in the late 1980s and early 1990s, as a result of which they implemented structural and institutional reforms to consolidate their fiscal positions.

[5] Based on number of UK households in 2010, from ONS Statistical Bulletin *Families and households in the UK, 2001 to 2010* released April 2011. This source is used for all such calculations in this report.

Chart 2.2: IMF forecasts for general government net debt in advanced economies



Source: IMF April 2011 WEO

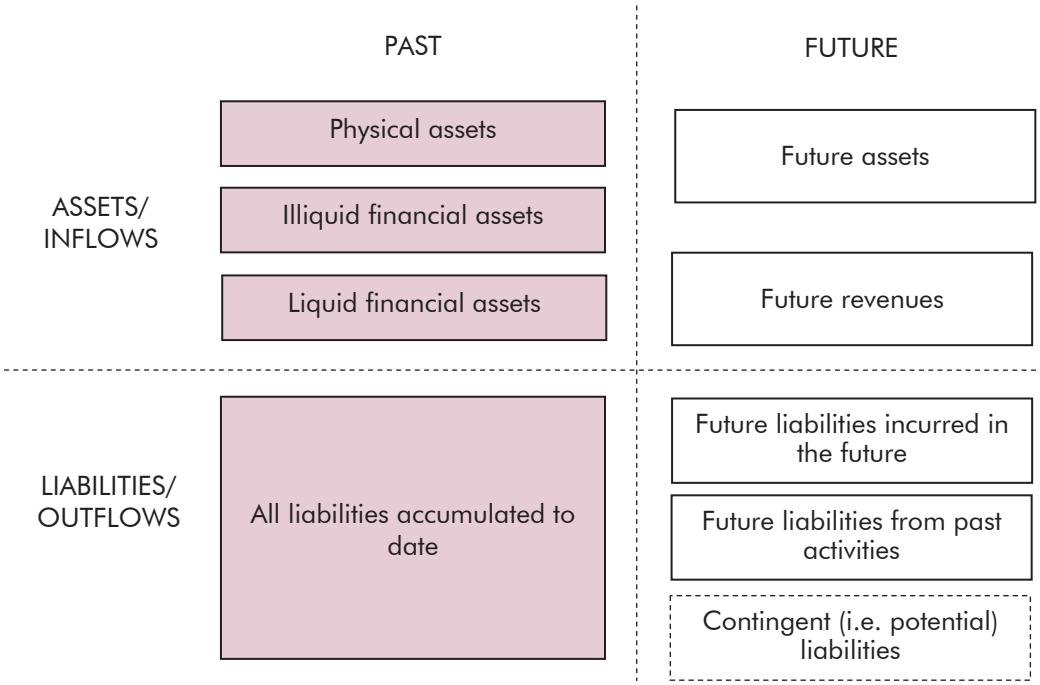
Public sector net worth

2.11 The Office for National Statistics (ONS) also publishes a wider National Accounts balance sheet measure, public sector net worth (PSNW), which compares the public sector's financial liabilities with *all* of its assets. These include financial assets such as shares and other equities, long-term loans, medium and long-term bonds, and also the public sector's stock of non-financial assets.

2.12 PSNW is derived from National Accounts estimates of general government and public corporations' assets and liabilities, which are published in the ONS *Blue Book*. The composition of PSNW is set out in Hobbs (2010), which also contains data for the National Accounts assets and liabilities series that are the components of PSNW.

2.13 Figure 2.2 illustrates how PSNW paints a more complete picture of the public sector balance sheet than PSND, by including estimates of all public sector assets, and in particular the physical assets and illiquid financial assets that are not included in PSND. But like PSND it does not include any future assets or liabilities.

Figure 2.2: Coverage of public sector net worth



2.14 Recent figures and the latest forecast for PSNW are set out in Chart 2.1 above. This shows that movements in PSND and PSNW tend to mirror each other. This is because the value of public sector non-financial assets, the main difference between the two measures, tends to follow a relatively stable trend over time as it comprises large stocks of assets that only depreciate slowly. PSNW fell sharply in 2008 and 2009. The last available outturn data for the end of 2009 gave a value for PSNW of £138 billion, or 10 per cent of GDP, or £5,700 per household. Our forecasts show it falling further and becoming negative from 2011-12 onwards. Much of the additional borrowing in recent years has been used to fund current rather than capital spending, which means the government has not accrued assets to offset the additional liabilities.

The limitations of National Accounts balance sheet measures

2.15 National accounting frameworks have been developed to provide information that is useful in economic and fiscal policy making, and they allow for international comparison. PSND itself is a relatively clearly defined indicator of the liabilities accumulated by the public sector, which is reasonably straightforward to construct.

2.16 However, there are limitations to the use of these measures in the analysis of fiscal sustainability. PSND's backward-looking coverage is limited as it only covers a small portion of public sector assets. One consequence is that PSND is reduced if the government sells assets. Asset sales should have little effect on a full balance sheet measure, as they replace one asset with another (cash). In theory this should be captured by PSNW. However, in practice, data on government assets in PSNW is very difficult to estimate and collate, and the Treasury has therefore not seen it as sufficiently reliable to use it as a fiscal target. Nonetheless, its better coverage of assets suggests that it could be a useful balance sheet measure.

2.17 Another limitation of both PSND and PSNW is that they do not include all future liabilities incurred as a result of past government activity, such as:

- future public service pension payments, where the liability to pay the pension was incurred as a result of past employment;
- capital payments to PFI providers and other payments from previous long-term contracts. In particular, the National Accounts classify most PFI deals as 'off balance sheet';
- the future costs of student loans, to the extent that previous loans or the costs of servicing those loans are not fully recovered; and
- provisions, contingencies, guarantees and other risks of future costs that might materialise as a result of past activities.

2.18 Concerns around these limitations will in part be addressed by new information available in WGA, which is the subject of the next section of this chapter.

Balance sheet measures in the WGA

2.19 The Whole of Government Accounts (WGA) is a set of financial statements for the whole of the public sector produced on the basis of commercial accounting standards rather than the National Accounts. Construction of WGA is a bottom-up exercise that consolidates the accounts of around 1,500 bodies – central government departments and agencies, devolved administrations, NHS Trusts, academies, local authorities, and public corporations. The accounts are prepared using EU adopted International Financial Reporting Standards (IFRS).[6] The first set of audited financial statements, for the year ended 31 March 2010, will be published later this year. We draw here on the unaudited summary of the WGA that the Treasury is publishing at the same time as this report.[7] In the rest of this chapter, whenever we refer to WGA data, we are using the unaudited WGA data from this summary publication.

2.20 The WGA is based on the audited accounts of public sector bodies, but WGA consolidates these, removing transactions and balances with other parts of government. The Treasury have not included the assets and liabilities of the public sector banks in the WGA, because they considered that the scale of their transactions and balances would distort the results, and because the Government does not intend to retain ownership of these banks in the longer term, and their assets and liabilities will therefore return to the private sector.

2.21 The WGA paints a broader picture of the public sector balance sheet [8] than the National Accounts, as shown in Figure 2.3. It includes all financial and non-financial assets and liabilities related to past activity accumulated to date. However it also includes information on future liabilities related to past activity. In particular this includes future liabilities related to public sector pensions for service to date, and provisions.

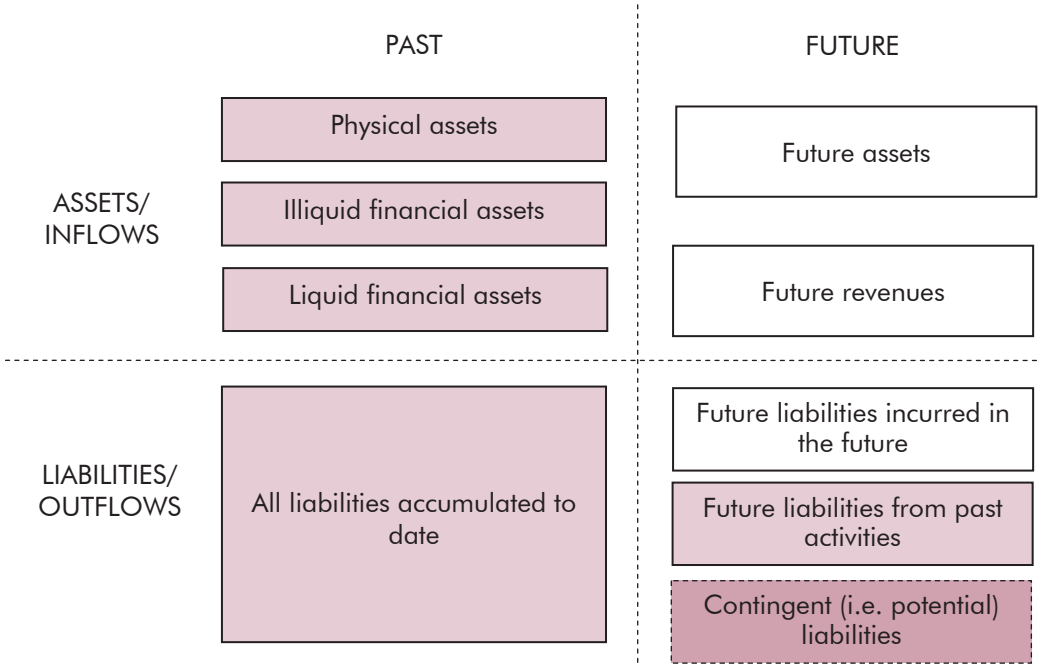
2.22 The WGA also includes information on the potential future costs of contingent liabilities. As explained below, these are risks that are not expected to materialise. The estimates of costs are therefore covered in the notes to the accounts, but are not included in the main accounts. This is illustrated by the dotted line drawn round the lighter shaded area in Figure 2.3.

[6] The WGA for 2009-10 is being prepared by HM Treasury in accordance with the 2009-10 *'Government Financial Reporting Manual'* (FReM). The accounting policies in the FReM apply EU-adopted IFRS, as adapted or interpreted for the public sector context.

[7] HM Treasury *'The Government of the United Kingdom of Great Britain and Northern Ireland. Unaudited Summary of the Whole of Government Accounts. Year ended 31 March 2010'*

[8] In the WGA, the balance sheet is now called 'the statement of financial position'

Figure 2.3: Coverage of the WGA measure of net liabilities



The WGA aggregates and their relationship with the National Accounts

2.23 The WGA and the National Accounts can both be used to summarise income and expenditure flows, and therefore to measure the public sector's fiscal deficit and net asset/debt position. However the accounting frameworks are quite different, with similar concepts measured on quite different bases, and this means that reading from one set of accounts to the other is not straightforward.

2.24 The public sector summary aggregates from the main WGA financial statements for 2009-10 are shown in Table 2.1 below.

Table 2.1: Unaudited 2009-10 WGA public sector summary aggregates

	£ billion	Per cent of GDP[1]
Balance sheet levels as at 31 March 2010:		
Liabilities	-2,422	-168.2
Assets	1,205	83.7
Net liabilities	**-1,216**	**-84.5**
Flows during 2009-10:		
Operating revenues	-586	-41.6
Operating expenses	669	47.5
Net financing cost and gains and losses on assets	81	5.8
Net deficit[2]	**164**	**11.7**

[1] The balance sheet figures as a percentage of GDP use GDP centred at end-March 2010.

[2] The net deficit in the WGA is the net deficit of operating expenses less operating revenue, where 'operating' expenditure and revenue are analogous to 'current' expenditure and receipts in the National Accounts.

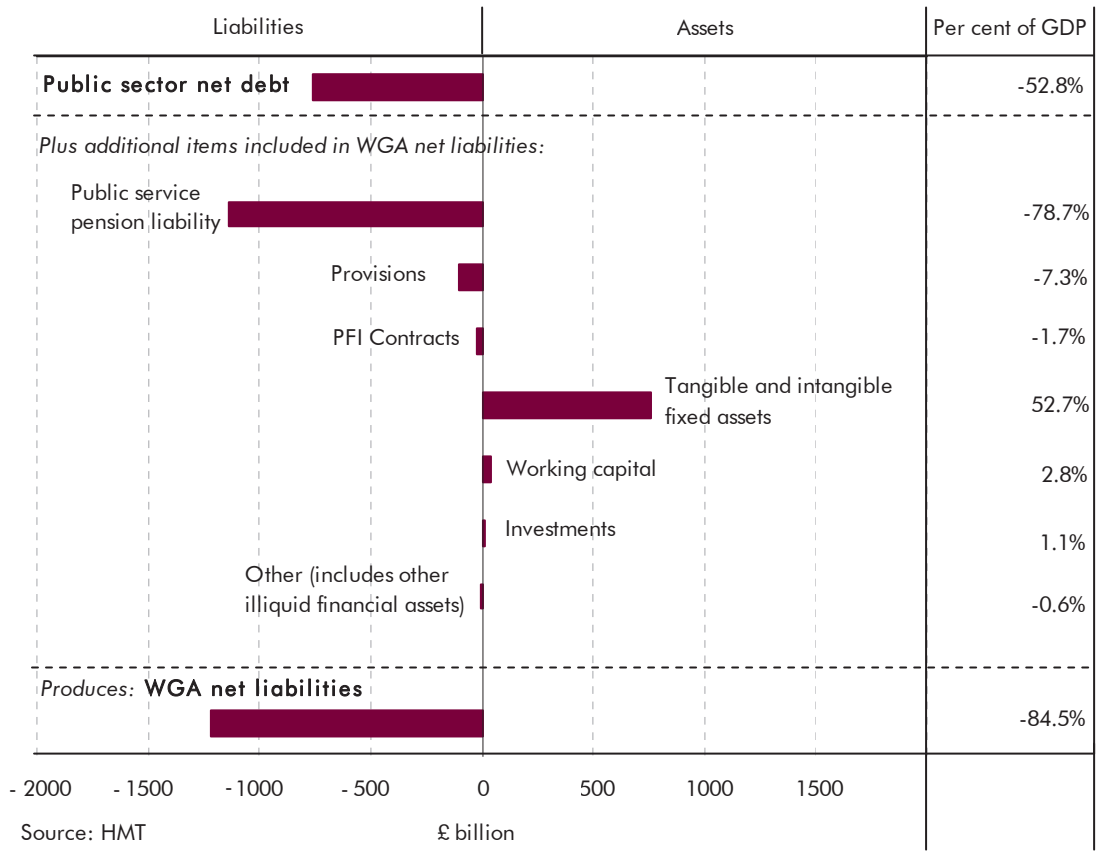
2.25 Charts 2.3 and 2.4 summarise the reconciliation between the WGA and the National Accounts aggregates. These start with the fiscal aggregates from the National Accounts, and then show the additional items included in the WGA aggregates.

2.26 Chart 2.3 shows that the differences on the balance sheet are mainly due to two particularly large and partially offsetting items:

- the treatment of liabilities arising from **public service pensions**. PSND only includes liabilities arising from past cash payouts. The WGA also includes an estimate of the net present value of future cash payouts arising from past employment. The 2009-10 WGA estimate of these liabilities is £1,133 billion, which more than accounts for the difference between the WGA net liabilities and PSND; and

- the inclusion of public sector **tangible and intangible fixed assets,** that are not included in PSND, offsets £759 billion of these additional liabilities.

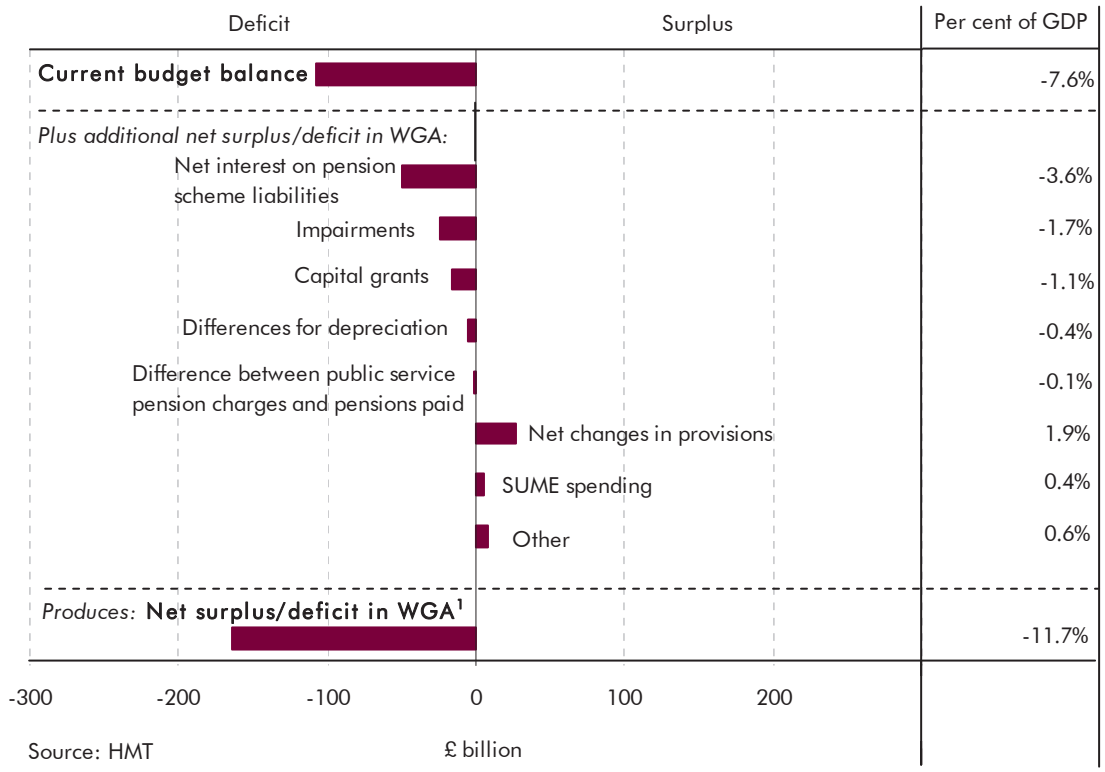
Chart 2.3: Summary of reconciliation between PSND and WGA net liabilities as of end-March 2010



2.27 Chart 2.4 shows that the differences on the flows on the current budget are mainly due to:

- the inclusion in the WGA net deficit of **net interest on pension liabilities** on the balance sheet. This is an imputed flow, representing the interest costs of a future liability where the spending has not happened yet;
- the inclusion in the WGA net deficit of impairments (**write-downs of assets**), and higher estimates of **depreciation**;
- the classification of **capital grants** which count as capital expenditure in the National Accounts but as current transfers in the WGA; and spending on **single-use military equipment** which is current spending in the National Accounts but capital investment in the WGA; and
- the inclusion of **provisions** in the WGA (liabilities for the present value of future spending where the spending obligation was incurred as a result of past government activity) , distinct from a liability for spending to date as in the National Accounts.

Chart 2.4: Summary of reconciliation between the National Accounts current budget balance and the WGA net deficit for 2009-10



[1] The net deficit in WGA is the net deficit of operating expenses less operating revenue, where 'operating' expenditure and revenue are analogous to 'current' expenditure and receipts in the National Accounts

2.28 The following sections look at each area of additional information in the WGA balance sheet, to see how it might help our assessment of fiscal sustainability.

Net liabilities of public service pensions

2.29 The WGA balance sheet includes an estimate of the current net liability for the future payment of pensions for all public service pension schemes, where the liability to pay the pension was incurred as a result of past employment. It does not include the expected value of future pension payments to current and future public service employees for employment after March 2010.

2.30 The 2009-10 WGA estimates that net public service pension liabilities rose from £802 billion at the end of March 2009 to £1,133 billion at the end of March 2010. This covers the liabilities of both unfunded and funded schemes.

2.31 The last official estimate of the public service pensions liability was £770 billion at the end of March 2008[9], but that estimate had a different coverage and a different discount rate. Further details of other previous estimates are given in Hobbs (2010).

2.32 The size of the net public service pensions liability depends critically on the discount rate used to convert the future flow of expected cash payments into a one-off upfront sum. As discussed in Box 2.1, the lower the discount rate, the higher the present value of future cash payments and the higher the total liability. The increase in the WGA liability in the year to March 2010 illustrates this in dramatic fashion.

2.33 This is shown in Table 2.2 below. The fall in the discount rate in 2009-10 – which had no bearing on the cost to the government of servicing public service pensions – explains almost £260 billion[10] of the £331 billion increase in the total net public service pensions liability recorded between March 2009 and March 2010.

2.34 The 2009-10 WGA uses discount rates specified in the 2009-10 *Government Financial Reporting Manual* (FReM). This applies the international accounting standards which require central government unfunded pension schemes to use a discount rate based on real yields of high quality corporate bonds. The discount rate based on these real yields fell from 3.2 per cent in 2008-09 to 1.8 per cent in 2009-10, reflecting a fall in the Bank of England's base rate and a narrowing of spreads on the debt capital markets for financially healthy companies over this period. For the 2010-11 accounts, this discount rate will rise back up to 2.9 per cent, which will reduce the net public service pensions liability once again.

Table 2.2: Changes to net liabilities of public service pensions

	£ billion	Per cent of GDP[1]
Net pension liability as at 31 March 2009	802	55.7
Net pension liability as at 31 March 2010	1,133	78.7
Change	**331**	**23.0**
Of which:		
Changes in assumptions underlying the value of liabilities	259	18.0

[1] GDP centred at end-March 2010.

[9] HM Treasury '*Long-term public finance report*', November 2009.

[10] The explanatory note 8.1 to the unaudited summary WGA for 2009-10 states that the £259 billion change in the assumptions underlying the value of liabilities balance is almost entirely due to the reduction in the discount rate.

Box 2.1: Discount rates

The discount rate is the interest rate used to convert future cash flows into an equivalent one-off upfront sum or present value. The higher the discount rate, the lower the present value of a given future amount. For a given future cash flow, the discount rate therefore has a significant impact on the present value of the liability.

There are many possible choices of discount rate. For example, in a separate context, outside of financial reporting, and following a recommendation from the Independent Public Service Commission (IPSPC), the Treasury ran a public consultation on which discount rate should be used to determine the levels of pension contributions required for unfunded public service pension schemes. This considered various plausible options outlined by the IPSPC, including a:

- rate consistent with the private sector and other funded schemes;
- rate based on the yield on index-linked gilts;
- rate in line with expected GDP growth; and
- social time preference rate – the value society places on current consumption as opposed to future consumption.

Following this consultation, the Treasury announced that it will use long-term expected GDP growth as the basis for this rate. For the purposes of shedding light on fiscal sustainability, a discount rate in line with expected GDP growth has the virtue of discounting future spending at the same rate that one might expect aggregate tax revenues to grow. That said, there is no single 'correct' discount rate and it is important to be aware of the impact that the choice of rate has on published liability estimates. As shown in Table A, WGA uses different discount rates in different parts of the accounts, depending on the relevant accounting conventions and standards.

Table A: Examples of different discount rates in the WGA

Liabilities in WGA	Basis of discount rate
Central government unfunded pensions	HM Treasury sets the rate based on the real yields for high quality corporate bonds on an annual basis, as required by international accounting standards. The rate can vary considerably from year to year and leads to significant volatility in overall liability figures.
Local government, police and fire pensions	Varies for each fund, based on the administering authority's or actuary's judgement as to the rate required under accounting standards. As with the rate used in central government it will be based on real yields for high quality corporate bonds.
Interest subsidies on student loans	Uses 2.2 per cent plus RPI excluding mortgage interest payments, to represent the cost of borrowing.
Other provisions and contingent liabilities	HM Treasury advised long-term discount rate of 2.2 per cent real. This is based on the real return on index-linked gilts (a risk free rate) as required by international accounting standards. It is currently set before each Spending Review period. Non-central government entities use a discount rate calculated on an equivalent basis.

2.35 The WGA includes net public service pension liabilities, but excludes the present value of future state pension payments to the population in general. The rationale for this is that the public service pensions are a contractual obligation, while state pensions are a liability that arises according to the circumstances and legislation prevailing at the time of the claim, which makes any estimate of future payments too uncertain. But this distinction is less clear in practice, as the government can alter – and has altered – the generosity of public service pension payments. In June 2010, the Coalition Government announced that public service pensions in payment would be uprated in line with consumer prices index (CPI) inflation rather than the generally higher rate of retail prices index (RPI) inflation from April 2011. This will reduce public service pension payments from 2011-12 onwards, and will therefore also reduce the WGA net pension liability when this is revalued for the 2010-11 WGA.

2.36 The final point to note about coverage is that the future pension payments that are covered by the pension liability are only a portion of total future payments. Future payments will also include payments for pensions in respect of current employees' future service and in respect of future employees' future service. This split of future pension payments is illustrated in Chart 3.6 in Chapter 3.

2.37 It is also important to note that, for the unfunded schemes, the WGA net pension liability is not reduced by any pension contributions receipts. Most of the employers' contributions are consolidated out, i.e. removed, because they are both paid and received within the public sector. And their employees' pension contributions are treated as income elsewhere in the WGA statements, where that income reduces the overall WGA net deficit, but does not reduce the public service pension liability.

2.38 For each unfunded scheme, contribution rates are set to meet the estimated costs of future pensions for current employees,[11] but the proceeds are not invested. The pension contributions might in some circumstances broadly match the change in the pensions liability in the accounts. However, the calculations of liabilities that are made to determine the contributions will use the long-term expected GDP discount rate discussed in Box 2.1, which differs from the discount rates in the WGA.

[11] This is done via an actuarial valuation, which each scheme carries out every four years. The rates are set to meet the estimated costs of future pensions for those who are employees over the three or four year period, after also allowing for past deficits or surpluses.

Estimates of assets in the WGA and the National Accounts

2.39 The second largest difference between the WGA and PSND balance sheet is the inclusion in WGA of non-financial and non-liquid financial assets that are excluded from PSND. These assets are also included in PSNW, but the PSNW and WGA estimates are different because they have been compiled under different frameworks.

2.40 The value of all public sector assets in WGA was £1,205 billion at the end of March 2010. This is significantly lower than the £1,408 billion National Accounts figure for the combined assets of the general government and public corporations sectors at the end of the calendar year 2009.[12] The difference between the two measures can be attributed to differences in:

- methodology, for instance on the assumed length of asset-lives, which affects the rate at which the assets are depreciated;
- coverage, where for example, the WGA includes the value of assets for single use military equipment (SUME), whereas the National Accounts treats SUME as current expenditure and has no SUME assets; and
- consolidation, where the WGA data are fully consolidated but the Blue Book data are not, which means that some of the general government assets could include some public corporations' liabilities, for instance, and this could inflate the Blue Book data, compared with the WGA.

2.41 A direct comparison between the WGA and the National Accounts estimates of public sector assets is also difficult as each contains different asset classes. In particular, the WGA includes a separate 'trade and receivables' category that consists of items such as student loans, taxation and duties due, and prepayments and accrued income. These are either not recorded or recorded as financial or non-financial assets in the National Accounts estimates of public sector assets.

Depreciation and impairments

2.42 In the WGA balance sheet, assets are valued net of depreciation and impairments (i.e. write-downs, for instance as a result of downward revaluations, or exceptional wear and tear, or catastrophic loss). Estimates of depreciation and impairments are also charged to the income and expenditure account and affect the WGA net deficit. Assets are revalued for each year's accounts, for each type

[12] ONS (2010)

of asset. Depreciation is charged to write off the revalued assets on a straight line basis, over the estimated life of each asset. This includes depreciation of SUME.

2.43 In the National Accounts, the value of assets and capital consumption (depreciation) is measured through the use of a Perpetual Inventory Method (PIM), and does not include any depreciation for SUME. The measures of depreciation are therefore very different between the WGA and the National Accounts. This affects the reconciliation between the flows (as shown above in Chart 2.4) and the reconciliation between the measures of assets included in WGA and PSNW, as discussed above.

2.44 ONS have announced that they propose to use WGA data for central government depreciation (except for roads) in the National Accounts and that they plan to implement this change in *Blue Book 2012*.[13] This will affect the size of the surplus on the current budget in the fiscal aggregates, since these are based on the National Accounts, and we would want to reflect this in our forecasts as soon as the size of the movement can be estimated.

2.45 The National Accounts do not include impairments in their measurement of the surplus on the current budget, or public sector net borrowing, except to the extent that impairments caused by normal wear and tear are included in the National Accounts measure of depreciation.

The Private Finance Initiative

2.46 Most public sector capital investment involves the public sector funding and completing capital projects itself. Under the Private Finance Initiative (PFI), a private sector firm will create and/or maintain the asset at its own cost. The public sector counterparty agrees to cover these costs over time, including the cost of capital, which is typically higher than if the public sector funded the project itself. As long as the higher cost of capital is offset by greater efficiencies elsewhere, such projects still offer value for money for the public sector.

2.47 The capital costs of some PFI deals are recognised as liabilities on the National Accounts public sector balance sheet, but those of many others are not. As well as lacking transparency, this has fuelled a perception that PFI has been used as a way to hold down official estimates of public sector indebtedness for a given amount of overall capital spending, rather than to achieve value for money.

2.48 The ONS includes an asset (and an associated liability) on the National Accounts public sector balance sheet if it believes that the public sector bears more of the

[13] McLaren,Saunders and Zammit (2011).

risks. In contrast, the WGA puts the asset on the balance sheet of whichever entity the accountants judge to have effective control of it. Box 2.2 details the accounting treatment for payments in both sets of accounts.

2.49 Broadly speaking, in either case the running costs (capital costs, interest and service charges) of the PFI contract are included in public sector current or capital spending. However, public sector net debt is higher over the course of the contract if the asset is classified as held on the public sector balance sheet.

2.50 As at March 2010, PSND included about £5.1 billion (0.4 per cent of GDP) in respect of PFI deals that were recorded as on balance sheet in the National Accounts. Based on the classification approach used for the WGA, PFI liabilities amounting to £29.9 billion were on the WGA public sector balance sheet at the same date. For these PFI projects on the balance sheet, the WGA also shows a further £5.9 billion of future capital commitments that have still to be incurred. These liabilities relate to about 90 per cent of all operational PFI assets, by value, which suggests the total capital liability of on and off balance sheet PFI contracts was closer to £40 billion (2.9 per cent of GDP). In Chapter 3, we consider the impact on our long-term projections if the PFI liabilities classified as off balance sheet by the ONS were also included in net debt. The WGA balance sheet will also include other finance leases and hire purchase contracts that are similarly off balance sheet in the National Accounts.

Box 2.2: Treatment of PFI contracts in National Accounts and WGA

In the National Accounts, an asset relating to a PFI contract must be on either the public sector balance sheet or the private sector balance sheet, but not on both. The treatment is determined by the ONS, based on where significant risks of the project are perceived to lie. Table B summarises the accounting treatment of any related payments, depending on whether the asset is on the public sector balance sheet or not. Such costs include the initial capital costs, and interest and where appropriate, service charges, which relate to the operation and maintenance of the asset.

Table B: Summary of National Accounts treatment of PFI payments

	Position on the public sector balance sheet	
	Off balance sheet	On balance sheet
Capital payments	- Current spending	- Total spending included as capital expenditure in year one - Present value of outstanding future capital payments added to net debt
Interest costs	- Current spending	- Current spending
Service charges	- Current spending	- Current spending
Depreciation cost	- None	- Current spending - No impact on either net borrowing or net debt

When the asset remains on the private firm's books, the transaction is treated in the public finances as if it was a long-term rental contract (an 'operating lease'). Payments are included in the public finances when they materialise, increasing current spending, lowering the current budget balance and pushing up net borrowing and net debt.

Conversely, where the asset resides on the public sector balance sheet, the transaction is equivalent to the purchase of the asset, matched by a deferred payment (a 'finance lease'). Capital costs are recognised upfront, through an increase in investment spending and therefore net borrowing. Although the full capital sum is not exchanged, public sector net debt, which is typically considered a cash-only measure, is raised by the present value of outstanding future capital payments. Over time, capital repayments reduce this liability and hence its impact on net debt. Interest and service charges are expensed as current spending as they are paid. In addition, as the asset is on the balance sheet, a depreciation charge is also made. This increases current spending but has no impact on either net borrowing or net debt.

Whether an asset is on or off the public sector balance sheet in the WGA is determined by which side has effective control over the asset. Thereafter, the treatment of costs is analogous to the National Accounts treatment above. If the asset is off the public sector balance sheet, all costs appear on the operating statement. But if the asset is on the balance sheet, there is a corresponding liability. Only interest and service costs appear on the operating statement, as well as a depreciation charge. Capital repayments lower the balance sheet liability over time.

Provisions and contingent liabilities

2.51 The WGA measure of net liabilities for 2009-10 includes £105 billion of provisions, or 7 per cent of GDP, as at the end of March 2010. Details of these provisions are shown in Table 2.3 below. Provisions record the current value of future costs that are expected to arise as a consequence of past events: under the resource accounting framework, whenever public sector bodies undertake activities that are expected to result in future costs, then they are required to include provisions for those future liabilities in their accounts

2.52 When public sector bodies record new provisions in their accounts, the provision increases the total of net liabilities recorded on their balance sheet, and the full provision for all of the future liabilities is also charged to their expenditure and income account, increasing the net deficit. When the future events occur, then the WGA balance sheet provisions are reduced. There is no charge to the WGA net deficit at that stage since the costs have already been included upfront. In contrast, the liabilities only appear on the National Accounts public sector balance sheet when the spending occurs.

2.53 As Table 2.3 shows, the biggest provisions included in the WGA for 2009-10 are for future nuclear decommissioning costs. The estimates of future cash flows are based on the best estimates of future required work, but these estimates are uncertain and the final costs are expected to change.

Table 2.3: Provisions in WGA for 2009-10

Discounted cash flows	£ billlion
Future liability covered by provision:	
Nuclear decommissioning	60.6
Clinical negligence	15.8
Other types of provision	28.6
Total provisions	**105.0**

2.54 The notes to the WGA accounts also record various contingent liabilities, which cover costs that could arise in future, but where the chances of this happening are judged by the accountants to be low, or remote. Because these costs are not expected to be incurred, the costs are recorded in the notes to the accounts, but are not included in the accounts themselves. They are also excluded from the summary aggregates. This distinction between provisions and contingent liabilities is summarised in Figure 2.4 below.

Figure 2.4: Distinction between provisions and contingent liabilities

	Spending expected to happen in future?	Probability	Included in main WGA accounts and summary aggregates?	Covered in notes to accounts?
Provisions	Yes	More likely than not (Probability > 0.5)	Yes	Yes
Contingent liabilities	Possible but not probable	Not likely (Probability < 0.5)	No	Yes
Remote contingent liabilities	No	No expectation of outflow (Probability close to 0)	No	Yes

2.55 Total quantifiable contingent liabilities are estimated to amount to £207 billion in the 2009-10 WGA, in net present value terms, or 14.4 per cent of GDP at end March 2010. Contingent liabilities in respect of the previous Government's financial stability interventions account for almost 85 per cent of this total. The other contingent liabilities identified in the 2009-10 WGA are small by comparison and are set out in Table 2.4 below.

Table 2.4: WGA quantifiable contingent liabilities

	£ billion
Financial Stability interventions	174.7
Export guarantees and insurance policies	9.0
Clinical negligence	7.5
Legal proceedings undertaken by HMRC	5.5
Supporting international organisations	1.9
Other	8.2
Total quantifiable contingent liabilities	**206.8**

2.56 The Government is exposed to a number of contingent liabilities as a consequence of the financial stability interventions. For 2009-10, these specifically related to underwriting the Special Liquidity Scheme (£165 billion) and making available contingent capital for RBS and Northern Rock. HM Treasury's forthcoming annual accounts for 2010-11 will include more recent estimates. But these estimates take no account of any offsetting assets held under the intervention schemes and unrealistically assume no recoveries would be made to set against losses. They also relate only to circumstances where the government may need to spend additional money, so do not cover previous losses or income from the interventions. Annex A of our accompanying

online document includes an estimate of the government's potential profit or loss on all financial interventions, which makes some allowance for the likelihood of recovery, although this is currently very uncertain.

2.57 The notes to the unaudited WGA accounts include quantifiable contingent assets as well as quantifiable contingent liabilities. The main quantifiable contingent assets are the possible net assets of the Nuclear Liabilities Fund, which might retain assets valued at £3.9 billion after financing British Energy's uncontracted decommissioning liabilities (although these estimates are highly uncertain).

Student loans

2.58 Government loans to students appear as assets in the WGA, while the borrowing to finance them appears as a liability. Student loans incur a cost to the public finances when the interest payments are subsidised (i.e. when the interest paid by students on the loans does not cover the government's borrowing costs) or when loans cannot be repaid and are written off. Write-offs occur when the graduate's income does not reach a level that requires them to repay the loan over its 25 year period or in other circumstances such as death or disability.

2.59 Student loan subsidies and write-offs appear in the Department for Business, Innovation and Skills' (BIS) resource accounts, and in the accounts of the devolved administrations, and are recognised in the WGA as balance sheet impairments. The impairments are first recognised when each loan is issued, in respect of the total estimated costs for the interest subsidies and write-offs over the life of each loan. These charges for impairments operate in a similar way to the provisions described above. They increase net liabilities on the balance sheet and are also charged to the income and expenditure account, increasing the WGA net deficit. When the actual subsidies and the write-offs materialise, over the life of a loan, then the balance sheet impairments are reduced (or 'utilised') and the net liabilities are reduced. The balance sheet impairments all impact on the WGA net deficit up front, when the loans are issued, and there is no impact on the WGA net deficit when the costs actually materialise.

2.60 In the National Accounts, the interest subsidy and the write-offs are charged to the deficit and net debt only when they arise. As with pensions and provisions, the differences between the two accounting frameworks are all about timing: the WGA includes the expected future spending when the liability for that spending is first incurred, whereas the National Accounts includes the costs when the spending happens. Neither includes the impact of loans that the government would expect to make to future students. We address this in Chapter 3.

2.61 The overall figure for WGA net liabilities at the end of 2009-10 will include the estimates in the BIS and devolved administrations' resource accounts for the stock

of impairments for future interest subsidies on existing student loans, which BIS estimated at £3.5 billion as at March 2010, and the stock of impairments for future write-offs of existing student loans, which BIS estimated at £2.3 billion as at March 2010. The BIS figures imply that the government expects the net present value of subsidies and write-offs to average around 24 per cent of the value of the loans it has made up to March 2010. In Chapter 3 we consider the impact of student loans on our long-term fiscal projections.

Conclusion

2.62 The publication of the WGA is a long-awaited and welcome development that will increase the transparency of the UK public finances. The WGA complements the balance sheet information in the National Accounts, notably in the broader coverage of the accounts themselves and the accompanying notes. The usefulness of WGA will increase over time as a historical time series develops.

2.63 Figure 2.5 summarises how WGA can add to our understanding of the public sector balance sheet. The main area where WGA provides new information is in future liabilities arising from past government activity, most notably public service pension payments. For those liabilities included in both the National Accounts and WGA, the main difference between the two methods of presentation is one of timing. WGA includes future liabilities arising from past events at the time when the liabilities are incurred, and so these are included in the balance sheet at that point. The National Accounts only include the spending when it occurs.

2.64 The appearance of WGA does much to increase the transparency of the public sector balance sheet, but it is important to recognise the limitations of balance sheet measures as a guide to the long term health of the public finances. For one thing, as we noted earlier, net present value calculations are highly sensitive to the choice of discount rate and to changes in that rate. WGA uses many different discount rates, as appropriate for different parts of the accounts. This means that the overall effects of changes to these rates cannot be easily quantified. However, the dramatic increase in the net public service pension liability between March 2009 and March 2010 is a case in point. This had nothing to do with the scale of the government's future public service pension commitments in respect of past employment, which remained relatively unchanged. But the valuation of the liability that aims to measure those commitments increased by over 30 per cent, only because the discount rate changed.

2.65 More fundamentally, balance sheet measures of the public finances are backward looking. The WGA includes future liabilities arising from past government activity – which the National accounts aggregates PSND and PSNW do not include – but neither approach includes the impact of future government activity. So, for example, on the spending side they do not include future state

pension payments, public service pension payments arising from future employment, or the future cost of sustaining public health and education systems. And, on the revenue side, they do not include the present value of future tax revenues – the power to tax is the government's most important financial asset. This is why we should not overstate the significance of the National Accounts measure of PSND and the WGA balance sheet both showing the public sector's liabilities outstripping its assets, or of our latest forecast showing the National Accounts measure of PSNW also turning negative this year.

2.66 What matters in assessing future fiscal sustainability is whether total future revenues can be expected to cover total future spending. To judge whether this is the case, we need to estimate how spending, revenues and financial transactions arising from future government activity will affect the balance between public sector assets and liabilities. We turn to this in the next chapter.

Figure 2.5: Conclusions on the new information from the WGA

New information in WGA	Difference in coverage between WGA and National Accounts	Use of the new information to help assess fiscal sustainability
Public service pensions	Timing difference: WGA includes estimates of liabilities for future payments in respect of past service; National Accounts includes the future payments when they occur.	Potentially useful to know how much forward spending is already committed. However WGA balance sheet estimates of the future liability only cover part of the future spending, exclude all future income, and are highly sensitive to discount rate assumptions.
Provisions	Timing difference: WGA includes estimates of liabilities for future payments in respect of past events; National Accounts includes the future payments when they occur.	
Student loans	Timing difference: WGA includes estimates of liabilities for the future costs of the subsidy on interest and write-offs associated with previous loans issued; National Accounts includes these future costs when they occur.	
Contingent liabilties	Both frameworks exclude these possible future costs unless they arise. WGA documents the possible future costs as notes to the accounts. These are currently mostly for financial sector interventions.	Contingent liabilities are not expected to materialise. But the WGA information can be helpful in considering risk exposure. Annex A of our online documentation includes our estimate of the potential profit or loss on all financial interventions.
Assets	The two frameworks have different estimates of assets, and different methods for estimating them.	New WGA data would seem useful for the National Accounts. ONS have announced that they intend to use the WGA estimates of depreciation for some central government assets, with effect from Blue Book 2012.
Depreciation and impairments	The two frameworks differ in their coverage of assets that are depreciated, and in the methodology for calculating depreciation. WGA includes more impairments in the net deficit than National Accounts, increasing net liabilities.	
PFI	National Accounts classifies fewer PFI deals as on the public sector balance sheet, compared to WGA. This means PSND includes lower estimates of debt in respect of financing PFI capital assets.	WGA information is useful to assess the liabilities from off balance sheet PFI. We look at this in Chapter 3.

3 The fiscal impact of future government activity: long-term spending and revenue projections

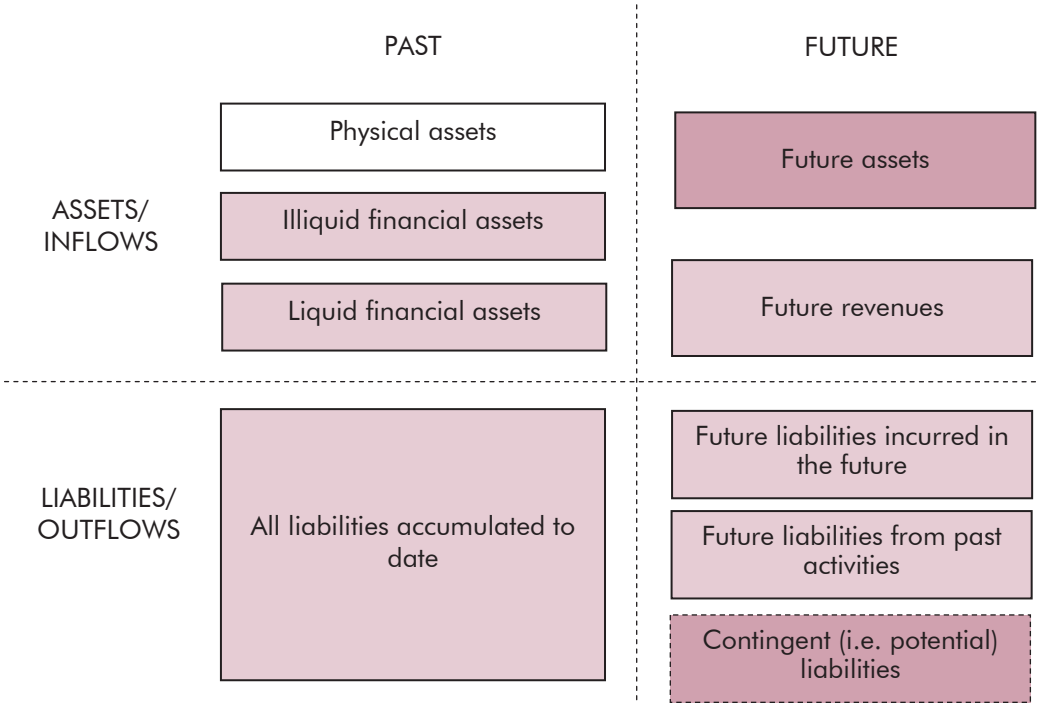
Introduction

3.1 Chapter 2 examined the fiscal impact of past government activity (including some future cash flows) as reflected in different presentations of the public sector balance sheet. But to assess long-term sustainability we also need also to estimate the potential fiscal impact of future government activity. In this chapter, we analyse these future flows by undertaking a 'bottom-up' analysis, aggregating long-term projections of different spending and revenue streams as shares of GDP on the basis of assumptions of unchanged government policy.

3.2 Using long-term projections of this type provides a relatively comprehensive way of assessing fiscal sustainability, as shown in Figure 3.1. It takes into account items such as the future cost of public service pensions, but without the same sensitivity to the choice of discount rate as in the balance sheet approach. It also takes into account the fact that the government has many non-contractual but nonetheless meaningful ongoing spending commitments, for example, that it is likely to wish to continue to provide state education and health care. Crucially, it also recognises that the government has the ability to levy taxes in the future.

3.3 Given the significant uncertainty inherent over the lengthy time-scales that we consider here, these should be treated as broad brush projections rather than detailed forecasts. The first five years of the projections are consistent with the medium-term forecasts to 2015-16 that we published in the March 2011 *Economic and fiscal outlook*, so as to focus on longer-term influences rather than revisions to our assessment of the short and medium-term outlook.

Figure 3.1: Content of revenue and spending projections



3.4 This chapter first outlines the policy, demographic and economic assumptions required to generate projections of this kind. We then explain how we make our central projections of spending and revenue and then present our results. This is followed by sensitivity analysis, focusing on the medium-term starting point, demographic influences and health spending scenarios. We then analyse the potential impact of these projections on economic performance.

Key assumptions

Policy assumptions in the long-term projections

3.5 The projections that we produce in this report are based on assumptions of unchanged government policy. Chapter 1 explained that it is often far from straightforward to define unchanged policy over a 50 year horizon. Table 3.1 sets out the major policy assumptions that we use here, the most significant of which are discussed in more detail below.

Table 3.1: Policy assumptions in the long-term projections

Policy	Long-term assumptions in the central projections
Taxes	Direct and indirect taxes uprated in line with earnings from 2016-17. All tax escalators to end by 2015-16.
Departmental spending	Constant expenditure as a share of GDP per capita, apart from demographic change.
Pensioner benefits	State Pension Age equalised at 65 by November 2018, with the Pension Credit and Winter Fuel Payment qualifying ages rising in line. State Pension Age reaches 66 by April 2020, and rises further to 67 between 2034 and 2036, and 68 between 2044 and 2046, and qualifying ages for Pension Credit, Winter Fuel Payments, Disability Living Allowance and Attendance Allowance rise in line with. Basic State Pension uprated using the 'triple guarantee' mechanism; State Second Pension uprated in line with CPI in payment. No modelling of single tier pension.
Other benefits (e.g. working age benefits and housing benefits)	All working age benefits uprated with earnings from 2016-17. Universal Credit introduced from 2013.
Student loans	Policy parameters (e.g. cap on tuition fees and repayment threshold) uprated in line with earnings from 2016-17. No changes to real interest rate applied to fees and maintenance loans (i.e. 3 per cent during study and between 0 to 3 per cent after graduation, depending on earnings).
Public service pensions	As in medium-term forecast, employee contributions to increase by a blanket 3 per cent. No modelling of implementation of Independent Public Service Pensions Commission recommendations. Public service pensions in payment uprated with CPI.

3.6 Consistent with the *Charter for Budget Responsibility*, this report notes significant policy commitments and aspirations that are not included in the central projections as fiscal risks, and sets out their potential impact where it is possible to do so. One example is the Government's desired asset sales programme, where in most cases it has not yet stated clearly which assets it will sell, when and in what precise form – all of which makes it impossible to quantify their impact with "reasonable accuracy". As a result, we do not include the potential proceeds and loss of income flows in our central projections, as we discuss in Box 3.1. But we do discuss their potential implications in detail in Annex A in the accompanying online document.

Box 3.1: Prospective asset sales

Consistent with the *Charter for Budget Responsibility* we only include the impact of asset sales in our medium-term forecasts and long-term projections once sufficiently firm details are available of the nature, size and timing of the transactions for the effects to be quantified with reasonable accuracy.

However, it is important to consider the risks that currently unquantifiable future asset sales may present to our projections. Annex A in our accompanying online document provides a detailed discussion of the potential impact of asset sales on the public finances. It includes an illustrative range of potential valuations, based on publically available information, for the assets the Government is considering selling.

In the first instance, the net impact of asset sales on the public finances will depend on how the proceeds are used. Income from the sale of fixed assets is likely to be recycled within the relevant public sector body. The Government also intends to use proceeds from asset sales to fund the Green Investment Bank from 2012-13. Under such circumstances, the immediate fiscal impact is likely to be negligible.

In other cases, by selling an asset the Government gives up the right to a future flow of income, for example following the sale of company securities. Such sales would affect the profile of net debt, particularly at the point of any given sale. However, the eventual net impact would be determined by the size of the one-off payment relative to the present value to the Government of all related future flows, including income foregone and savings on debt interest payments. Over the extended time horizon that this report considers, the net impact may be significantly less than the headline sale price. Of course, when considering an asset sale, the Government will consider a number of factors other than the net impact on the public finances, such as a reduction in the level of risk that it is exposed to following a sale.

Our analysis highlights two asset sales that could have a material impact on the public finances: spectrum and the Government's shareholding in public sector banks. At present, spectrum sales appear to be a favourable risk to the public finances. However, the potential value is extremely uncertain. Conversely, at current market prices, the sale of the public sector banks represents a downside risk.

If the Government were to complete its planned sale of company securities and spectrum towards the middle of the range of the most recently publicly available estimates, and leaving aside offsetting factors over time, it would broadly offset the current market value of losses on the public sector banks and other financial interventions. So in this case the impact on our long-term projections would not be material. But these estimates do not offer any reliable guide to the eventual proceeds were these assets to be sold. That is because a wide range of final policy decisions, which will determine the exact nature of any sales, are yet to be clearly defined. It is not therefore possible to quantify the potential impact with reasonable accuracy and so consistent with the *Charter*, we do not include these within our central projections.

Tax and benefits uprating

3.7 In our medium-term forecasts, unless the Government states otherwise, we assume that it will uprate income tax allowances and thresholds in line with inflation. But because earnings typically rise more quickly than prices, this definition of unchanged policy would result in the average tax rate rising steadily over time as people find more of their income falling into higher tax bands. This effect is known as 'fiscal drag'. Previous long-term analyses, including the Treasury's *Long-term public finance reports* (LTPFRs), have recognised that this fiscal drag could not be assumed to continue indefinitely. They assumed that allowances and thresholds rose in line with earnings rather than prices beyond the medium-term horizon, turning off fiscal drag after five years. We do the same in this report and in Annex C in our accompanying online document we set out in detail the impact that this has on our projections.

3.8 A similar issue arises on the spending side, where uprating working-age benefits in line with prices rather than average incomes over the long term would see the value of those benefits shrinking steadily relative to the living standards of the bulk of the population. We therefore assume that working-age benefits rise in line with earnings in the long term and also illustrate the impact this has on the projections in Annex C of the accompanying online document. This approach differs to that of the Treasury's LTPFRs, where benefits were assumed to rise with prices across the projection horizon, but it is more consistent with the approach to fiscal drag from taxes.

Public service pensions

3.9 The Government is currently formulating a response to the final report of the Independent Public Service Pensions Commission (IPSPC), chaired by Lord Hutton, which was published in March 2011.[1] We do not attempt to pre-judge the outcome of this consultation, and have instead continued to model our projections in line with the approach used in our medium-term forecast. This means that we have not accounted for the impact of cap and share, which still currently resides in scheme regulations. In line with the modelling in the IPSPC interim report our long-term projections do include the impact of the switch from RPI to CPI uprating of pension payments, and of the medium-term public sector workforce reductions and current pay freeze.

[1] IPSPC (2011)

Expenditure on public services

3.10 For public services such as health and education we assume an underlying real increase in expenditure per capita of 2 per cent per year from 2015-16 levels. We then apply our demographic projections to this to capture the effect of changes in the population structure on expenditure. The result is that we maintain expenditure as a constant share of national income per capita, subject to demographic trends. We do not make an explicit assumption about the level of service this implies, which will depend on factors such as public sector productivity and the demand for public services.

3.11 If public sector productivity was assumed to rise at 2 per cent a year – in line with our long-term assumption for whole economy productivity – then in our central projections the level of service provided per person would implicitly rise by the same amount. But it might be more realistic to expect that public sector productivity will not be able to keep up with that seen in the whole economy, given that many public services are labour intensive activities. Over the long term wages in the public sector would still need to rise in line with those in the whole economy. This would lead to what is known as 'Baumol cost disease' where costs in the public sector rise relative to other sectors.[2] This might place additional pressure on expenditure in the future. In order to maintain an increase in the level of service provided, in line with increases in national income, governments would have to increase expenditure more quickly.

3.12 This is particularly relevant for our projections of health spending and is discussed in detail in the subsequent section. We model a scenario in which the productivity of the health sector grows less quickly than whole economy productivity and in which the government chooses to raise spending more rapidly in response. This is an issue that is relevant to other areas of public service provision, so it is a topic we plan to return to in future reports.

Demographic assumptions in the long-term projections

3.13 One of the most important inputs into our long-term public finance model is a projection of the size and structure of the future population. This has significant implications both for the future size of the economy and for the future of the public finances. The projected size and structure of the population are determined by assumptions regarding longevity, fertility and net migration. In this report we use population projections produced by the ONS, based on 2008

[2] Baumol (1966)

population data.[3] Annex B in our accompanying online document outlines the population projections assumptions in more detail.

3.14 The population projections themselves are mechanical in production and very sensitive to the underlying assumptions, particularly over the long-term horizon of our projections. This highlights the uncertainty inherent in these estimates. For this reason we also consider some of the variant assumptions produced by ONS to show the sensitivity to alternative underlying assumptions. These are shown in Table 3.2.

Table 3.2: ONS population variants

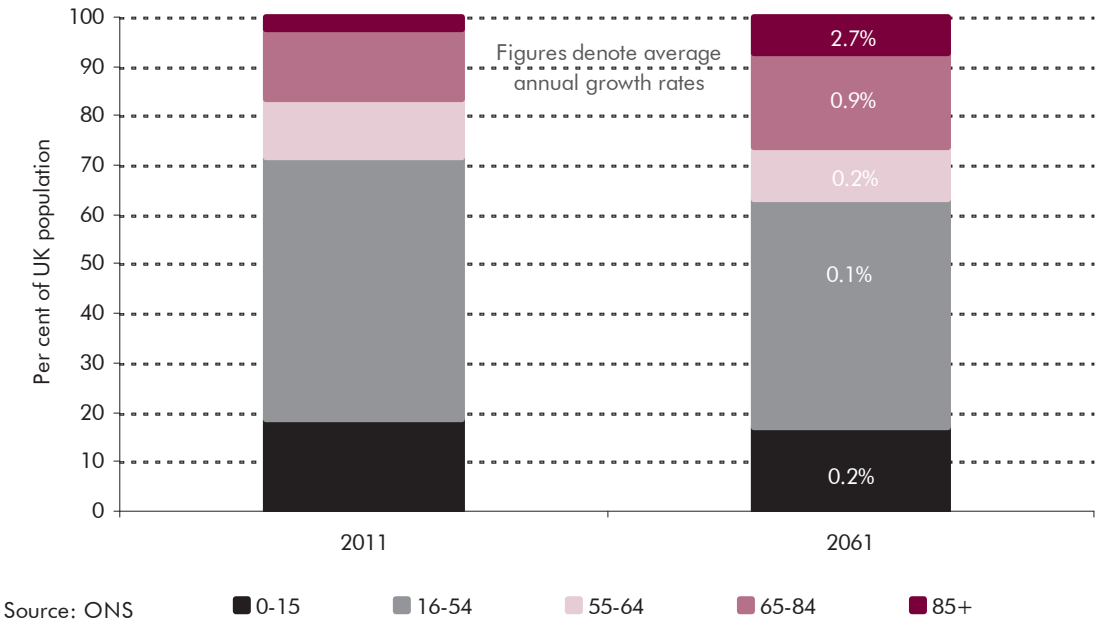
	Fertility rate	Life expectancy at birth in 2033 (years)		Long-term average annual net migration (thousands)	Size of population in 2060 (millions)	
		Males	Females		16-65	Total
Central[1]	1.84	83.1	86.9	120	43.4	75.1
Old age structure	1.64	85.0	88.1	120	40.4	72.1
Young age structure	2.04	81.2	85.7	240	52.3	87.4
High migration	1.8	83.1	86.9	240.0	49.2	83.9

[1] Consistent with ONS 'low migration' variant.

3.15 Some developments in population structure are relatively certain. In particular, the demographic bulge created by the post WWII baby boom will continue to pass through the projections as these cohorts age. Additionally, past trends in declining fertility and increasing longevity have created what is usually termed an 'ageing population'. Chart 3.1 demonstrates this phenomenon by showing the growth in the number of people aged over 85 compared to growth in other age bands. It is this ageing of the population that has the greatest impact on the future outlook for the public finances, if we assume (as we do in our central projection) that spending on different public services is held constant as a share of GDP for people of particular ages.

[3] ONS (2009)

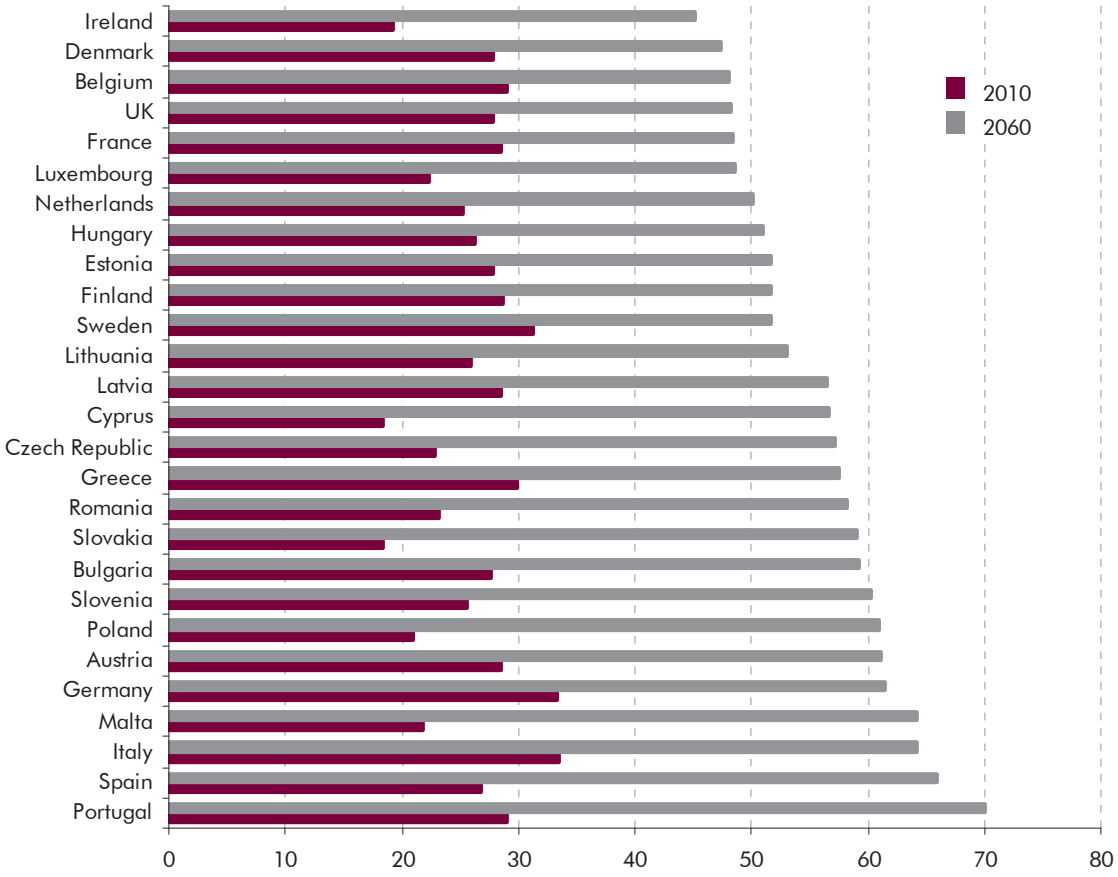
Chart 3.1: Projected changes in the size of population age groups



Source: ONS

3.16 The UK is not alone in having an ageing population structure. Many advanced economies will face similar pressures in the future. For example, Chart 3.2 shows the latest projections of changes to population structure produced by the European Commission (EC) in 2009 for EU countries. This suggests the ageing of the population structure in the UK is expected to be less sharp than in many other EU countries. Ageing population structures are also a feature of advanced economies outside of Europe, such as Japan and the US.

Chart 3.2: EC projections of changes to population structure in the EU



Source: EC

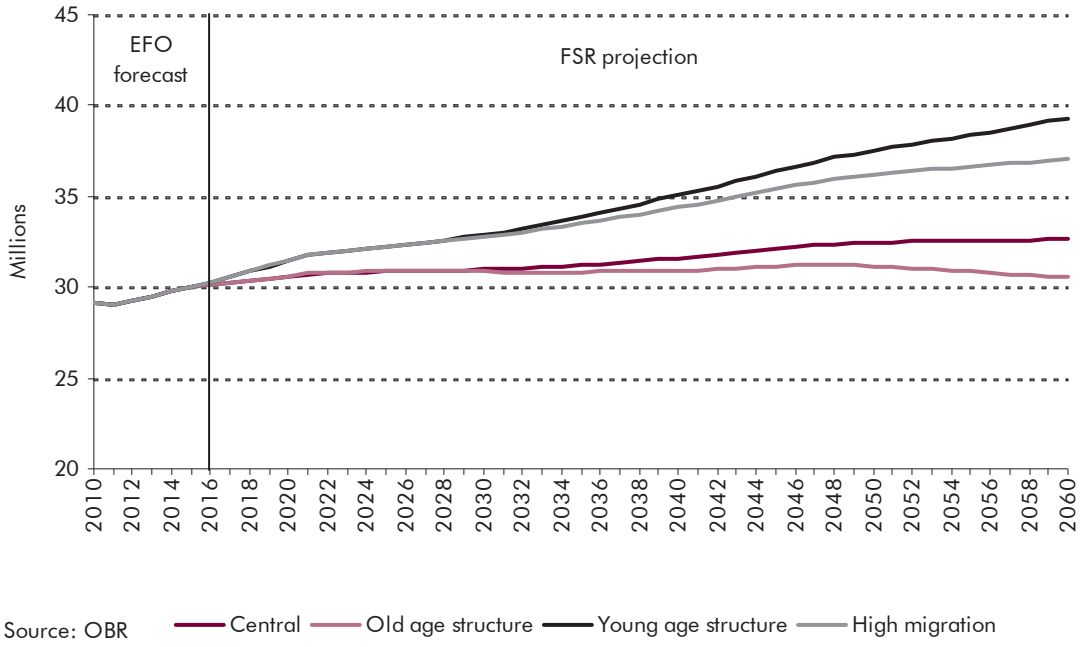
Economic assumptions in the long-term projections

3.17 Economic growth is the product of productivity growth and employment growth. Whole economy productivity growth in our central case is assumed to be 2 per cent per year measured in output per worker. This is based on the long-term historic average. However, to test the sensitivity of our projections to this assumption, alternative variants of 1.5 per cent and 2.5 per cent are also used.

3.18 We project long-run changes in the proportion of the working population in employment using historic labour market participation profiles for different cohorts (by gender and year of birth). This allows us to model the participation rate of current cohorts through the projection period. From this we calculate an employment rate consistent with an assumed non-increasing inflation rate of unemployment of 5.4 per cent. This approach is a simplified version of that used for the medium-term forecast period, although it does not take account of movements in average hours worked. More details of our approach are set out in Annex B of our accompanying online document.

3.19 Combining the population projections with our participation and employment rate projections, we can then project future employment levels as the population ages and cohort sizes vary accordingly, as shown in Chart 3.3. This leads to the long-term real growth rates set out in Table 3.3. In the long-term the growth rate of the GDP deflator is assumed to remain constant at 2.7 per cent, implying long-term nominal GDP growth rates from 4.8 to 5.1 per cent in our central projection.

Chart 3.3: Employment projections



Source: OBR

Table 3.3: Real GDP growth under variant population projections

	Annual GDP growth, per cent				
	2010-11 to 2019-20	2020-21 to 2029-20	2030-31 to 2039-40	2040-41 to 2049-50	2050-51 to 2060-61
Central	2.5	2.1	2.2	2.3	2.1
Old age structure	2.5	2.1	2.0	2.1	1.8
Young age structure	2.8	2.4	2.7	2.7	2.5
High migration	2.8	2.4	2.5	2.5	2.3

3.20 To project public service pension payments we need to make an assumption about public sector employment growth. In line with the central IPSPC projections that the Government Actuary's Department (GAD) have updated for this report, public service employment is projected to increase at 0.25 per cent per annum in the long term. This is roughly in line with our projections of overall population

growth, and therefore helps maintain public sector employment broadly the same as a share of the total population. Such an approach was recommended by the National Audit Office in a response to previous long-term projections that assumed constant absolute employment.[4] In future reports we will examine the possibility of including direct feedback from our projections of population growth and public services spending to public sector employment.

How we project the public finances

3.21 We construct long-term projections of spending and revenue streams through an unconstrained 'bottom-up' analysis. This attempts to capture the changes in both spending and revenue that would be caused by the changing demographic composition of the UK. Key spending and revenue items are sensitive to both the size and age structure of the population.

3.22 Intuitively one can see that people's consumption of and contributions to public services and transfers change over their lifetime. In early life people consume a relatively large amount of health care and state-funded education, while making little contribution to tax revenues through their income and spending. During working age they consume fewer public services, but pay more tax. In later life, they consume more health care and long-term care, claim state pensions and other benefits, but pay less tax as their incomes and spending decline.

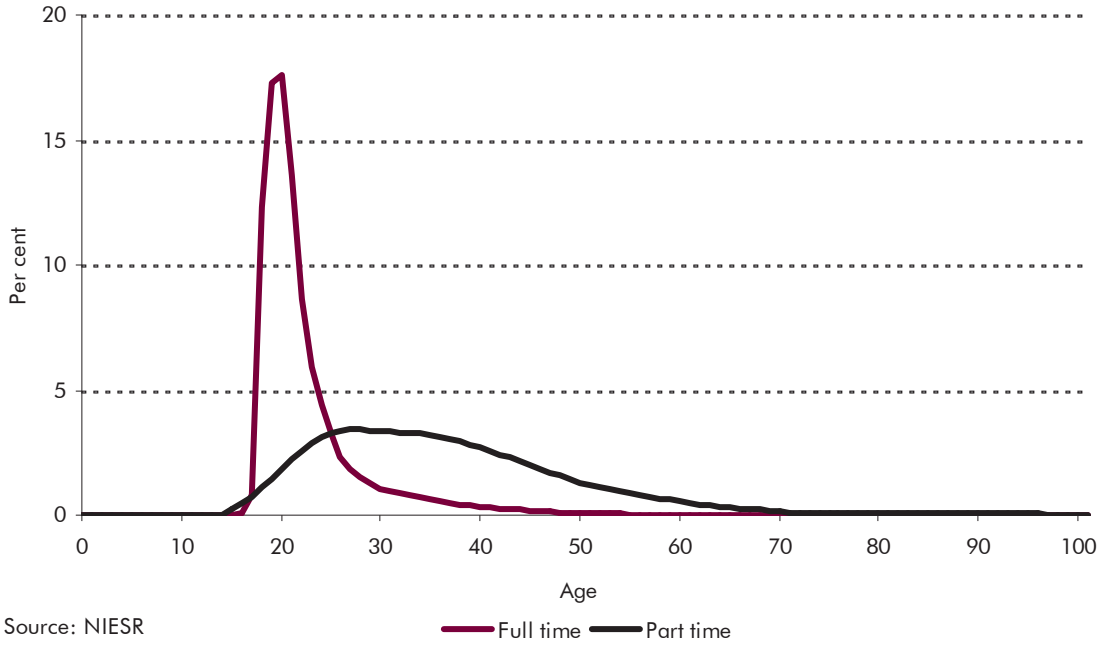
3.23 Our modelling approach makes use of individual spending and revenue profiles for males and females. The profiles capture the age distribution of spending or revenue over a representative individual's lifetime. By applying profiles and population projections to spending and revenue at the end of the medium-term forecast in 2015-16 it is possible to calculate the total spending per person of a given gender and year of age, and it is this calculation that forms the basis of our future projections of the public finances. These per capita allocations are raised in line with real earnings over the projection horizon. By combining these with population projections, spending and revenue streams can then be generated.

3.24 To illustrate, Chart 3.4 shows the representative profile for higher education spending for males. Intuitively one can think of the chart showing the proportion of lifetime spending on full and part-time higher education in each year of life. So nearly half of full-time higher education spending is consumed between the ages of 20 and 22. Then there is a rapid decline. However, this is not the case for part-time study in higher education. Older people, sometimes while still in work, enrol in part-time courses. This means that part-time higher education

[4] NAO (2010)

spending is much less concentrated by age, with a significant portion of total lifetime spending still occurring at ages 40 and over.

Chart 3.4: Profile for higher education (male)



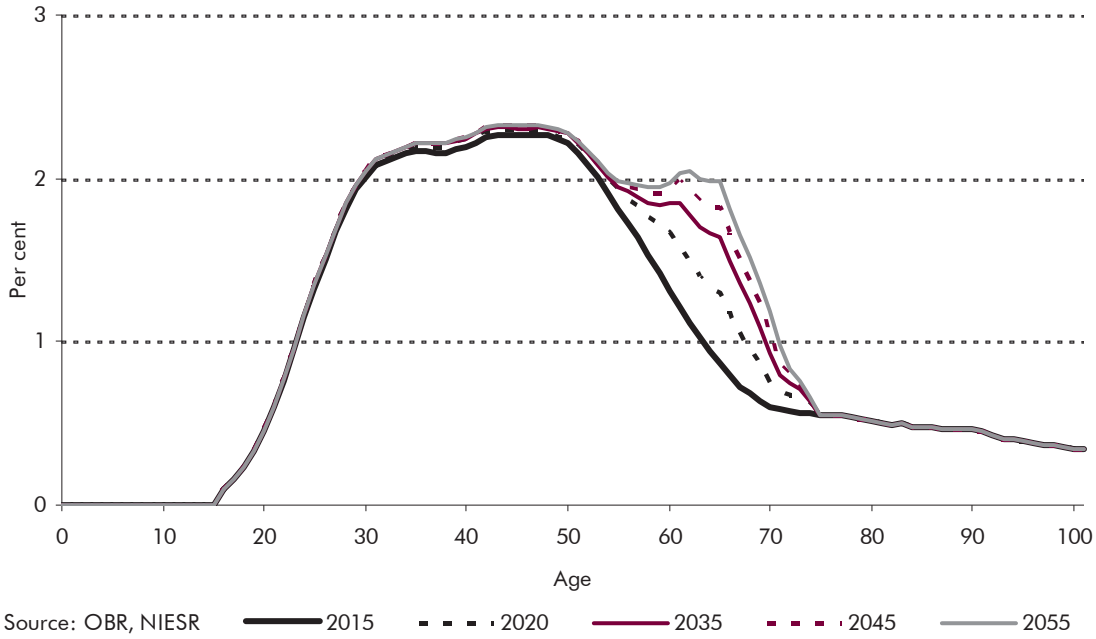
Source: NIESR

3.25 As a further illustration, Chart 3.5 shows the revenue profile for female income tax receipts. Payments become significant as people reach working age, increasing as they move through their careers, presumably getting promoted and increasing pay with experience. Income tax payments then begin to fall after age 50 as more people take early retirement or work less hours as the costs of children and mortgages decline. The pace of decline slows beyond the State Pension Age.

3.26 Chart 3.5 also shows projected shifts in this profile in future years. This allows us to maintain consistency with our employment projections for different cohorts, capturing increased employment created by changes to the State Pension Age. As female employment rates increase there should be a corresponding increase in the receipts of income tax and national insurance contributions.

3.27 Annex B in our accompanying online document includes a full list of the spending and revenue items used in this report. Each profile within this list needs to be calculated from available micro-data. One might expect the shape of most of the profiles to remain fairly constant over time, but we will need to maintain and improve them (and other modelling techniques) in future reports.

Chart 3.5: Profile of income tax (female)



3.28 Social security spending and public service pension spending are modelled outside our long-term projection model. The Department for Work and Pensions projects social security payments using OBR assumptions. This allows us to incorporate the additional complexities of these benefit items explicitly. Similarly, on this occasion GAD has projected unfunded public service pension payments. The approach follows closely that used in the IPSPC Interim Report of October 2010.

3.29 As a result of using different modelling inputs there are varying degrees of intricacy for different items within our projections. However, this does not mean that the results are any less subject to the inherent uncertainties involved in any projection looking over such long horizons.

Public spending and revenue projections to 2060-61

3.30 In this section we present the results of our bottom-up spending and revenue projections, using the methodology and modelling assumptions outlined in the previous section. These projections do not represent our prediction of the likely evolution of spending or revenue. Rather they show what might happen if policy was to remain unchanged on the basis of the assumptions we have chosen and if our other illustrative assumptions were to hold true. If the projections show the public finances on an unsustainable path, we would expect policymakers to take corrective action.

Public spending

3.31 Table 3.4 shows our central spending projections as a percentage of GDP, excluding interest payments on the national debt. The big picture is that we project total non-interest public spending to rise from 36.3 per cent of GDP at the end of our medium-term forecast in 2015-16 to 41.7 percent of GDP by 2060-61, an increase of 5.4 per cent of GDP – equivalent to £80bn in today's terms. We can see that from 2015-16 onwards the main drivers of the increase in non-interest spending are health, state pensions and long-term care costs, due mainly to the ageing population.

Table 3.4: Non-interest spending projections

	Per cent of GDP						
	Estimate[1]		FSR Projection				
	2010-11	2015-16	2020-21	2030-31	2040-41	2050-51	2060-61
Health	8.2	7.4	7.7	8.5	9.1	9.5	9.8
Long-term care	1.3	1.2	1.3	1.5	1.8	1.9	2.0
Education	6.3	5.0	5.1	5.2	5.0	5.0	5.0
State pensions	5.7	5.5	5.2	6.1	6.8	6.9	7.9
Pensioner benefits	1.2	1.0	1.0	1.2	1.2	1.2	1.2
Public service pensions	2.0	2.0	1.9	1.8	1.6	1.5	1.4
Total age-related spending	**24.6**	**22.0**	**22.1**	**24.3**	**25.6**	**26.0**	**27.3**
Other social benefits	6.2	4.9	5.1	5.1	5.0	5.0	5.0
Other spending	13.3	9.4	9.4	9.4	9.4	9.4	9.4
Spending[2]	**44.2**	**36.3**	**36.6**	**38.8**	**40.0**	**40.4**	**41.7**

[1] Total spending consistent with March *Outlook* .
[2] Excludes interest and dividends.

Health

3.32 The table shows spending on health rising from 7.4 per cent of GDP in 2015-16 to 9.8 per cent of GDP in 2060-61. This transition is smooth, and occurs as the population ages. We can see that this is the largest component of age-related spending within our projections. However, it is also one of the most uncertain. For this reason we include more detailed discussion of trends in health spending later in this chapter and in Annex D in our accompanying online document.

3.33 In particular we illustrate the impact on future spending of alternative assumptions on productivity growth in the health sector. We also consider alternative assumptions regarding the amount of time spent in ill health – known as morbidity.

Long-term care

3.34 Spending on long-term care is projected to increase from 1.2 per cent of GDP in 2015-16 to 2 per cent of GDP by 2060-61, although this does not include care administered by hospitals. Our modelling approach means that the costs of care follow a similar path to health spending, and therefore are likely to be subject to the same uncertainties that we outline later in this chapter.

3.35 The Commission on the Funding of Care and Support published its final report on 4 July this year. While that report focuses on potential new measures for the funding of care it also contains projections showing spending on long-term care increasing from 1.2 per cent of GDP in 2015-16 to 1.4 per cent of GDP in 2025-26. Their approach takes into consideration many additional factors that influence spending on residential care, such as rates of home ownership. This means that results are not directly comparable. However, the direction of travel is in line with our own projections. We have not attempted to pre-empt the Government's response to the report in our projections.

Education

3.36 While education spending is clearly a substantial component of total spending, it is projected to remain broadly flat after the end of our forecast, only rising slightly from 5 per cent of GDP in 2015-16 to 5.2 per cent of GDP in 2030-31, before returning to 5 per cent. This small increase is almost entirely due to increases in school spending, due to the effect of rising fertility rates just prior to the start of the 2008-based projections. As we return to a lower and more stable fertility rate in the population projections this effect reverses.

State pensions

3.37 The state pension projections increase from 5.5 per cent of GDP in 2015-16 to 7.9 per cent of GDP in 2060-61, driven largely by demographic trends and the maturing of State Second Pension entitlements. This line includes many items in addition to the Basic State Pension, such as the State Second Pension, Pension Credit and Winter Fuel Allowance. We also show other pensioner benefits, such as housing benefits, which are received by pensioners but are unrelated to pensions.

3.38 In these projections we increase the Basic State Pension in line with the 'triple guarantee' of the highest of earnings growth, CPI inflation or 2.5 per cent. In our modelling, we assume this results in the basic State Pension rising by earnings growth plus 0.2 per cent, in line with advice provided by GAD. We increase the State Second Pension in line with CPI in payment, in line with announced long-term policy. We do not include any adjustment to account for the Government's proposals for potential reform of the state pension system, given final details have not been announced.

Public service pensions

3.39 Gross public service pension payments are projected to fall from 2 per cent of GDP in 2015-16 to 1.4 per cent of GDP in 2060-61. These projections have been produced by GAD on a very similar basis to the projections they produced for the IPSPC in October 2010, but using our central economic assumptions.[5] As set out earlier in this chapter, in these projections we do not make assumptions about the implementation of the final IPSPC report recommendations.

3.40 Our projections follow a very similar profile to those in the IPSPC report, which fell from around 1.9 per cent of GDP in 2010-11 to around 1.4 per cent of GDP in 2060-61. As set out in the IPSPC interim report, the decline in payments over the projection period is due to the decision to switch from RPI to CPI uprating of pension payments, which reduces payments considerably particularly in the latter half of the projected period, combined with the effect of the current public sector pay freeze and workforce reductions.

3.41 In our medium-term forecasts we report public service pensions payments on a net basis and give detail of the net and gross payments. The long-term projections here are on a gross basis. The employer and employee contributions elements are contained within our projections of overall departmental spending and are simply assumed to rise in line with national insurance contributions (NICs) from the starting point in 2015-16 of 1.3 per cent of GDP.

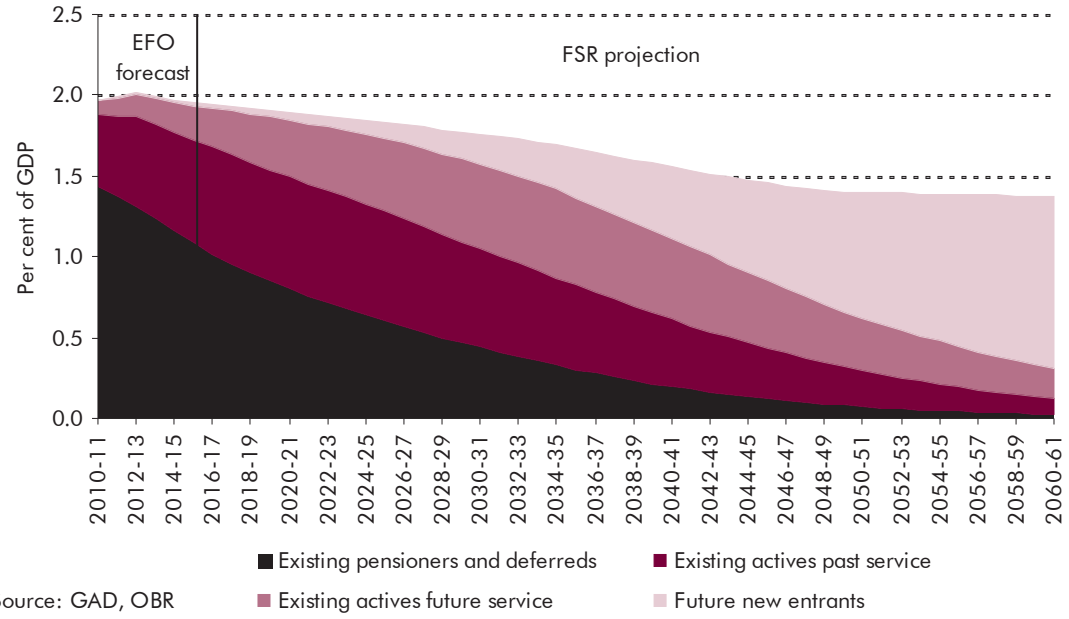
3.42 In Chapter 2 we discussed the treatment of public service pensions in the Whole of Government Accounts (WGA). These included a liability related to future public service pension payments accrued from past service, estimated to be £1,133bn in March 2010. The projections presented above are more complete as they cover future spending as a result of entitlements accrued in the past and as a result of entitlements built up in the future. As Chart 3.6 shows, the payments associated with liabilities incurred to date ('existing pensioners and deferreds' and 'existing actives past service') falls as a proportion of GDP over time. Payments for future service will make up the majority of future payments by the end of the forecast.

3.43 Our projections are based on our assumption of 0.25 per cent public sector employment growth from 2015-16 onwards. To the extent that we have projected increased spending pressures in areas such as health care and long-term care, we might expect increased public sector employment growth, which would in

[5] In order to align our long-term projections with the most recent medium-term forecast in the March *Economic and fiscal outlook* we have made an upward adjustment to the GAD projections of £1.3bn in cash terms in 2015-16, held constant across the projection period.

future push through to higher pension payments for future service, although contributions would also increase before payments. We will examine the possibility of modelling these feedbacks directly in future reports.

Chart 3.6: Composition of projected public service pension payments



Source: GAD, OBR

Other items

3.44 'Other social benefits' and 'other spending' relate to items that are not very responsive to ageing. In the medium-term forecast most working-age benefits are uprated in line with prices. As set out earlier in this chapter, to assume this continued over the long term would see the value of those benefits shrinking relative to general living standards. So we make an assumption for the purposes of these projections that most working-age benefits rise in line with earnings. This means that other social benefits are broadly flat as a share of GDP over the projection period. The analysis in Annex C of our accompanying online document shows that increasing working-age benefits with earnings rather than prices increases their cost by around 1.6 per cent of GDP by 2030-31.

3.45 We also include an adjustment for the Universal Credit which the Government intends to introduce in 2013 and which will replace several current benefits and tax credits. The approach taken in our projections is to model current benefits and tax credits, and add the estimated marginal cost of Universal Credit of £3bn in 2015-16. This addition is then projected in line with spending on the current benefits it will replace.

3.46 Other non-age related spending includes spending on items such as defence and transport, where we do not assume age-specific profiles. We assume that spending on such items is constant as share of GDP after 2015-16.

Revenue

3.47 As with spending, the revenue projections presented in Table 3.5 reflect changes in the absolute size and age composition of the population. The big picture is that non-interest revenues are projected to rise from 37.6 per cent of GDP at the end of our medium term forecast in 2015-16 to 38.5 per cent of GDP in 2060-61, an increase of 0.9 per cent of GDP – equivalent to £13bn in today's terms.

3.48 As we noted earlier in this chapter, this relatively flat picture depends crucially on our assumption that tax allowances and thresholds are uprated in line with earnings rather than prices over the longer term. Annex C in our accompanying online document sets out that if we had increased income tax and national insurance contributions allowances by prices instead, it would have increased revenues by around 2.6 percentage points of GDP in 2030-31.

Table 3.5: Non-interest revenue projections

	Per cent of GDP						
	Estimate[1]		FSR projection				
	2010-11	2015-16	2020-21	2030-31	2040-41	2050-51	2060-61
Income tax	10.3	10.7	10.8	10.8	10.9	10.8	10.9
NICs	6.5	6.6	6.6	6.5	6.5	6.4	6.4
Corporation tax	2.9	2.9	2.9	2.8	2.8	2.8	2.8
VAT	5.8	6.1	6.2	6.3	6.4	6.3	6.4
Capital taxes	1.0	1.2	1.3	1.4	1.5	1.6	1.7
Other taxes	10.4	10.1	10.2	10.3	10.4	10.4	10.4
Revenue[2]	**37.0**	**37.6**	**37.9**	**38.2**	**38.4**	**38.2**	**38.5**

[1] Total revenue consistent with the March *Outlook*.
[2] Excludes interest and dividends.

3.49 The modest overall projected increase in revenue beyond our medium-term forecast horizon is the result of a rise in the shares of income tax, VAT and capital taxes as a share of GDP. This reflects the ageing population structure. Older age groups usually continue to pay income tax (on pensions), VAT and capital taxes, but do not contribute to output once they have left the labour market. Therefore, the revenue from these streams increases as a share of output.

3.50 Largely for this reason, income tax receipts rise as a share of GDP from 10.7 per cent in 2015-16 to 10.9 per cent in 2060-61. In contrast, NICs are projected to fall from 6.6 per cent to 6.4 per cent over the period, mainly because pension

income is not liable to NICs. Likewise, VAT receipts rise as a share of GDP, since people in retirement will consume out of pension income.

3.51 Capital taxes, which consist of inheritance tax, capital gains tax and stamp duties are expected to rise from 1.2 per cent of GDP in 2015-16 to 1.7 per cent of GDP in 2015-16. Over half of this rise reflects an increase in inheritance tax, reflecting the fact that pensioners are a growing proportion of the overall population. Receipts from capital gains tax also rise with an ageing population, as those nearing retirement or in retirement sell off businesses and other financial assets.

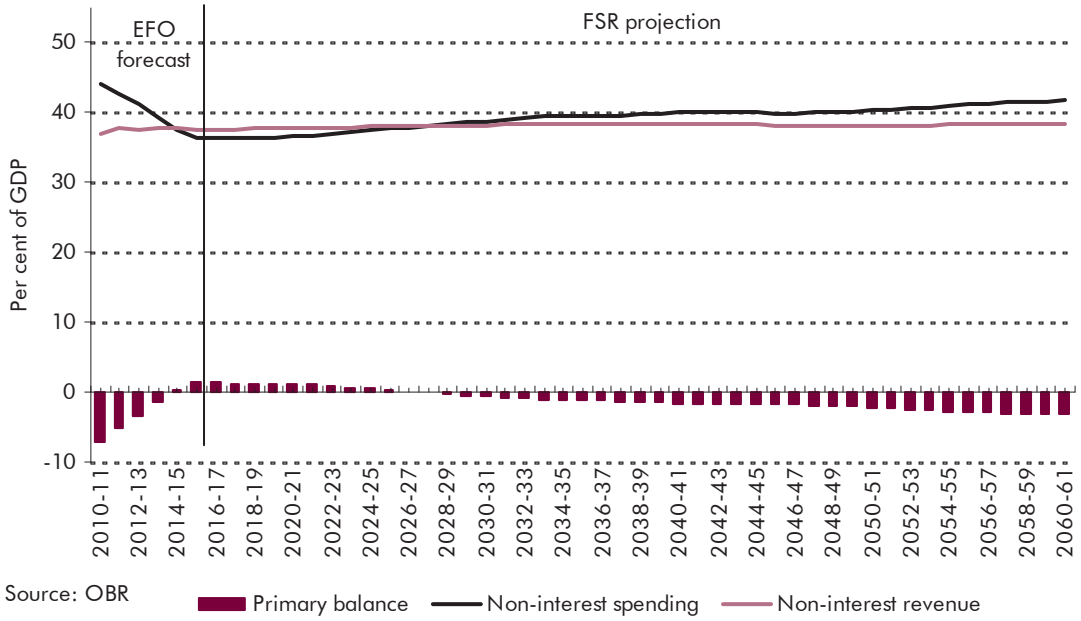
3.52 In our more detailed analysis of tax revenue sustainability in Chapter 4 we consider non-demographic factors that might affect the size of particular revenue streams over the long term. In essence we look at particular revenue streams and ask whether there is a good argument – other than demographics – for assuming that the tax base will rise by a rate other than the growth rate of nominal GDP over the long run. This is not intended to be a comprehensive estimate and so we do not include it in our central projections. It is useful in addressing whether non-demographic trends mean that future governments are likely to need to find replacement streams of revenue, even leaving aside the need to finance the future spending pressures that we identify.

The implications for the public finances

The central projection

3.53 Our central projections show public sector revenues increasing as a share of GDP beyond our medium-term forecast horizon, but not as quickly as public spending. As a result, the primary budget balance (the difference between non-interest or 'primary' revenues and spending) is projected to move from a surplus of 1.3 per cent of GDP in 2015-16 to a deficit of 3.2 per cent of GDP in 2060-61 – a deterioration of 4.5 percent of GDP, equivalent to £66bn in today's terms (Chart 3.7). In effect, we project that over five decades these primarily demographic pressures would reverse more than half of the structural improvement in the public finances that we are expecting to see over the next five years as a result of the fiscal consolidation.

Chart 3.7: Revenue, spending and the primary balance



3.54 In order to see how this projected deterioration in the primary balance would feed through into public sector net debt and other balance sheet measures, we also need to take into account future financial and other transactions.[6] These affect public sector net debt even though they do not affect the current balance or public sector net borrowing.

3.55 For the majority of financial transactions we assume that there is a net effect of zero over the projection period. One exception is the increase in public sector net debt that will arise from the arrangements for student financial support announced in December 2010. As we explain in more detail in Box 3.2, these are projected to increase net debt by a maximum of 4.3 percent of GDP (£63bn in today's terms) around the early 2030s, falling to 3.3 percent of GDP (£49bn) by 2060-61.

3.56 With a projection of financial transactions we can then produce projections of public sector net debt and public sector interest payments. To calculate debt

[6] In Chapter 2, we outlined the provisions detailed in the Whole of Government Accounts (WGA), within Table 2.3. From the underlying information it would be possible to construct a flow of cash payments related to these provisions across our projection horizon. However, the cash flow for provisions will be included within departmental spending when realised, so we assume that this is funded from within the 'other spending' category that we hold flat as a share of GDP.

interest payments in the long-term we project future gilt rates using yield curve projections to 2020 provided by the Debt Management Office. The rate is then held constant at the level of 5.1 per cent after 2020. As Table 3.6 shows, in our central projection, public sector net interest payments rise from 2.8 per cent of GDP in 2015-16 to 4.5 per cent of GDP in 2060-61.

Table 3.6: Central projection

	Per cent of GDP						
	EFO Forecast		FSR projection				
	2010-11	2015-16	2020-21	2030-31	2040-41	2050-51	2060-61
Primary spending	44.2	36.3	36.6	38.8	40.0	40.4	41.7
Primary revenue	37.0	37.6	37.9	38.2	38.4	38.2	38.5
Primary balance	-7.1	1.3	1.2	-0.6	-1.6	-2.2	-3.2
Net interest	2.8	2.8	2.9	2.6	2.8	3.4	4.5
Total Managed Expenditure	47.1	39.9	40.4	42.2	43.7	44.6	47.0
Public Sector Current Receipts	37.2	38.4	38.7	39.0	39.3	39.0	39.3
Public sector net borrowing	9.9	1.5	1.7	3.2	4.4	5.6	7.7
Public sector net debt	60.3	69.1	63	61	70	83	107

Box 3.2: Student loans

This box looks at the impact on public sector net debt of the current student finance support system in England for full-time students. This is based on Department of Business, Innovation and Skills (BIS) projections for loans and repayments out to 2060, based on a number of stylised assumptions and the OBR's long-term economic assumptions.

Over recent years successive governments have increased the fees that students can be charged for higher education, so shifting the funding of the system from direct grants to loans to students. Student loans are classified as a financial transaction so they are not included in net borrowing. But they are included in the government's cash requirement in any year and add to the stock of government debt.

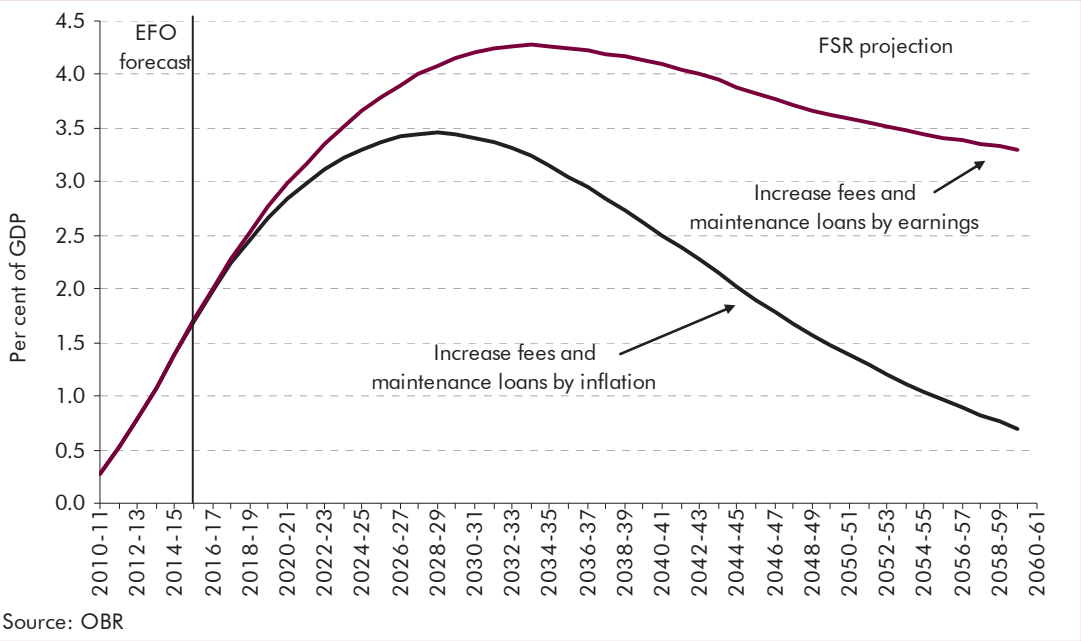
Our analysis shows that this increase in debt is expected to peak in the 2030s and then decline as loan repayments rise relative to the value of new loans. BIS calculate that the design of the student loan system is such that around 30 per cent (in net present value terms) of the overall cost to the government of issuing and financing the loans will not be repaid over the maximum 30 year repayment period.

There are three key assumptions needed to make these projections: the average tuition fee loan, the take-up rate of the loans and student numbers. Currently, the reaction of both universities and prospective students to the recent reforms is particularly uncertain:

- student numbers: are assumed to be flat at their current level. Because of a decline in the student age population over the next decade, this implies a rise in the higher education participation rate. The extent to which higher tuition fees discourage students from attending university remains the key uncertainty. There is currently excess demand for places, but if there was a big effect on participation from higher fees, it is possible that universities would need to reconsider fee levels to maintain demand;
- the average tuition fee loan: we have kept the assumption used in the March forecast of an average tuition fee of £7,500 in 2012-13. Since March, many universities have announced their intention to charge a headline rate of £9,000. However, they still need to have access agreements approved by the Office of Fair Access (OFFA) to charge above £6,000. Also it is not clear by how much fee waivers and bursaries will reduce the headline figure, and whether students will take out the maximum loan available to them. We will revise the average tuition fee estimate on the basis of additional information which will become available later in the year; and
- the loan take-up rate: around 90 per cent of students are assumed to take up loans, a slight rise from the current level. Higher fee rates would suggest that more students will need a loan, but the introduction of a real interest rate on the loan could discourage take-up.

The Government has not set a long term policy for the uprating of the tuition fee cap and maintenance loans and grants from 2013-14. The medium-term forecast assumes these are uprated by inflation from 2013-14 to 2015-16. In our long-term projection we make the assumption that the cap is uprated by earnings growth from 2016-17. If we assumed that the cap was raised by inflation over the long term, then university income would steadily diminish relative to the size of the economy.

Chart A: Addition to public sector net debt due to student loans



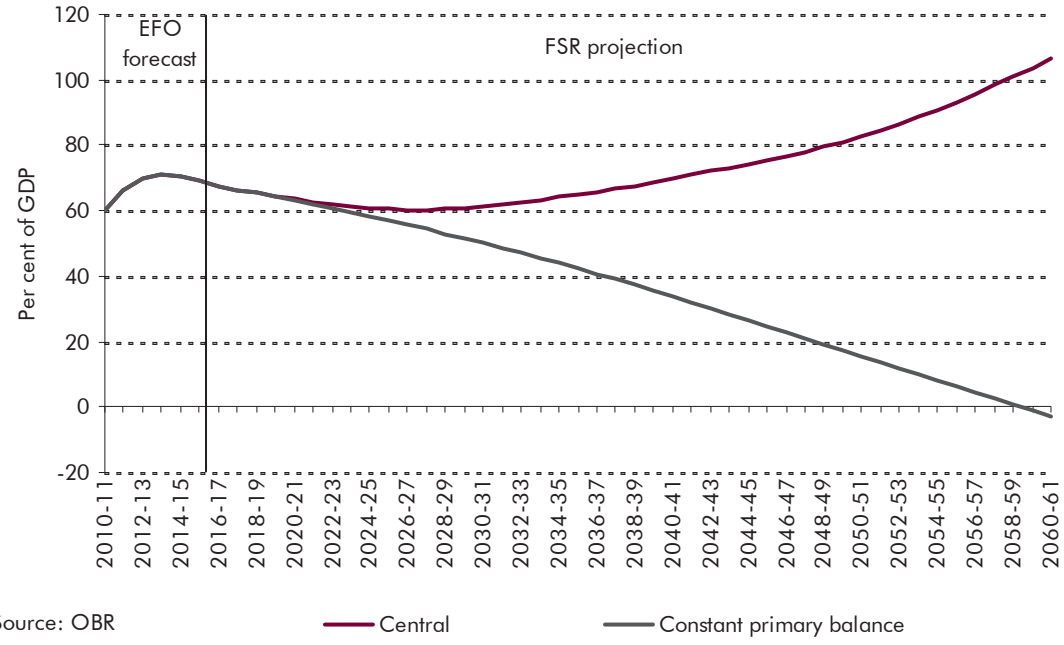
Source: OBR

Chart A looks at the impact on public sector net debt with the cap uprated by both earnings and prices. With loans being issued upfront, but repaid over a prolonged period, net debt as a proportion of GDP rises in the initial years of the projection. With tuition fees rising by inflation each year, the impact on net debt from student loans peaks in around 2030 at 3.4 per cent of GDP (£50bn in today's terms) and then falls away. With tuition fees rising by earnings, the higher value of loans being issued means that the impact would peak at 4.3 per cent of GDP (£63bn in today's terms). Assuming an average fee loan of £8,000, rather than £7,500, would raise the peak impact on net debt by only around 0.2 per cent of GDP (£3bn in today's terms).

Over the longer term, the impact of the reform on net debt would diminish as more repayments come in. By the end of our projection horizon in 2060-61, the net addition to public sector net debt with our central assumption of earnings uprating is 3.3 per cent of GDP (£49bn in today's terms). With fees and loans linked to inflation it would be 0.7 per cent of GDP (£10bn in today's terms).

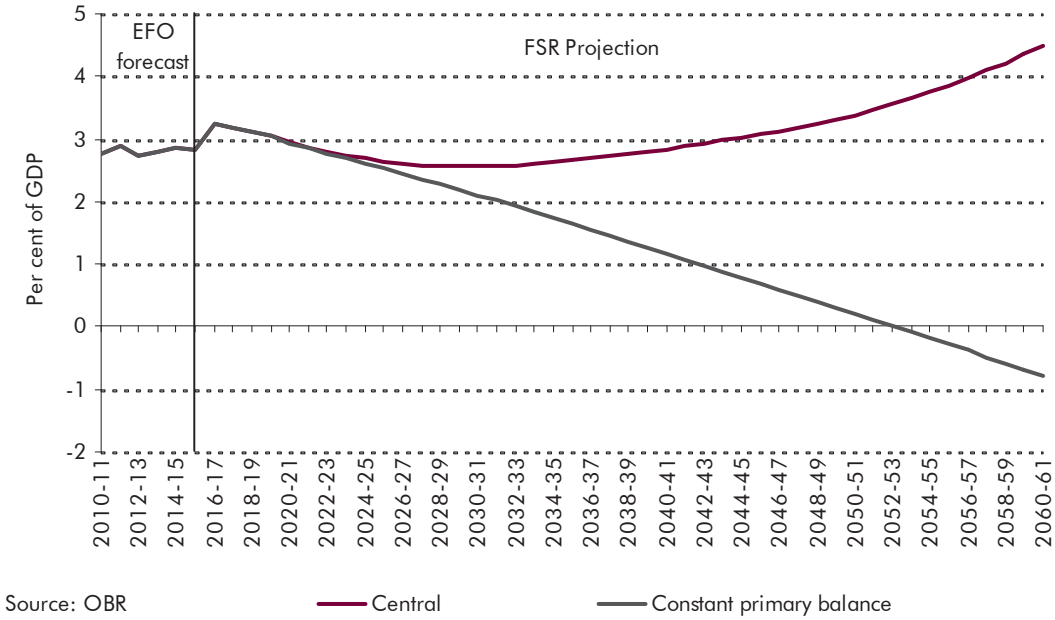
3.57 Charts 3.8 and 3.9 show the paths of public sector net debt and public sector net interest respectively as a share of GDP in our central projection, comparing them to the paths if the primary balance was to remain constant beyond 2015-16.

Chart 3.8: Central projection of public sector net debt



Source: OBR

Chart 3.9: Central projection of net interest payments



Source: OBR

3.58 It is clear that the longer-term spending pressures, if unaddressed, would put the public finances on an unsustainable path in our central projection. Public sector net debt would reach 107 per cent of GDP and be rising at the end of the projections. We shall quantify this unsustainability more formally in Chapter 5. As we have observed on numerous occasions, there are huge uncertainties around projections over this time horizon and we now examine how sensitive they are to some of the key assumptions we have made.

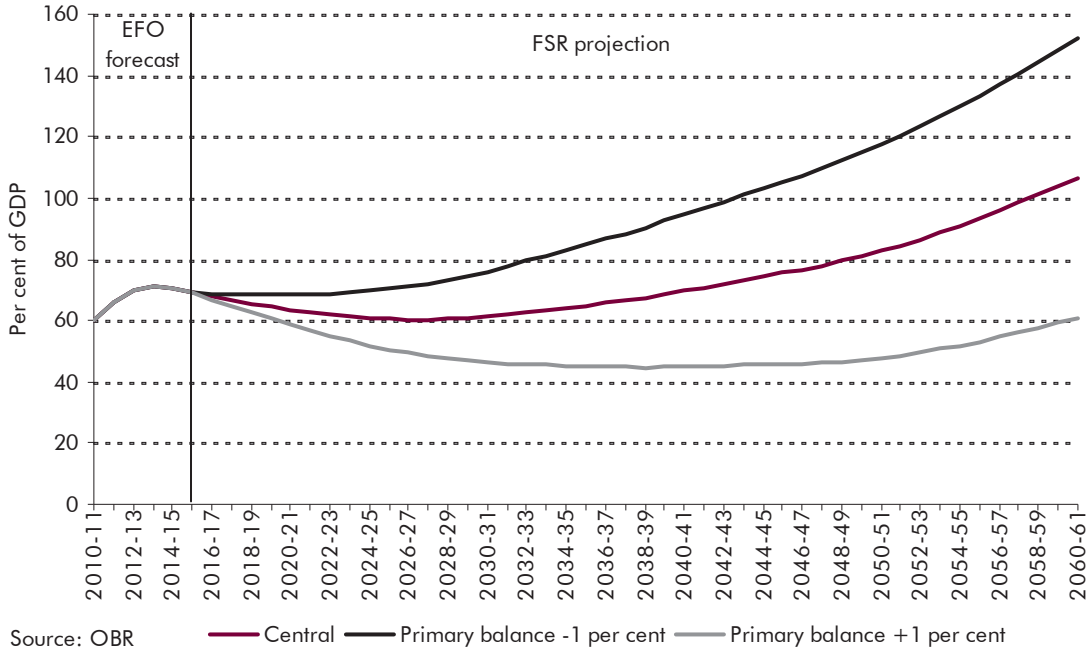
Sensitivity analysis

3.59 This section analyses the sensitivity of our analysis to the medium-term fiscal position and to our key demographic and economic assumptions. We also consider the impact of alternative scenarios for health spending, and Box 3.3 considers the impact of including off-balance sheet PFI liabilities in our central projection.

Sensitivity to the medium-term fiscal position

3.60 The structural health of the public finances at the end of our medium-term forecast horizon is an important determinant of the path of our long-term projections. The forecast in the March *Economic and fiscal outlook* for 2015-16 is the starting point for our long-term projections. The structural difference between spending and revenue at that point is locked into the long-term projections, given that we assume that the economy is operating at its long-term trend shortly after that point. Chart 3.10 shows that if the structural primary balance in 2015-16 was worse by 1 per cent of GDP than in our March forecast, then by the end of the period net debt would increase to around 150 per cent of GDP rather than around 107 per cent in our central projections. A structural gap in 2015-16 which is 1 per cent of GDP better than in our March forecast would keep debt on a relatively sustainable path.

Chart 3.10: Sensitivity of public sector net debt projections to the structural primary balance in 2015-16



Source: OBR

Sensitivity to demographic and economic assumptions

3.61 Table 3.2 outlined the alternative population assumptions produced by the ONS. The sensitivity of our results to these assumptions, and to productivity growth of 1.5 per cent or 2.5 per cent, can be seen in Table 3.7, which shows the differences in spending and revenue compared to our central projection. Charts 3.11 and 3.12 show the impact of these changes on public sector net debt.

3.62 The main demographic scenarios that we focus on are for the high migration, young age structure and old age structure. Old age structure uses the same long-term net migration that we use in our central projection, but is combined with higher life expectancy and lower fertility. This means the population does not grow as quickly overall, and the concentration of those older than working age increases. In this scenario lower fertility also reduces education costs in the middle of the projections, lowering public sector net debt relative to the central case, before costs associated with ageing become larger and debt increases faster.

3.63 We look at 'high migration' – where inflow rates are closer to those we have seen in recent years – to highlight the impact of our choice of long-term migration assumption on the projections. Young age structure combines a high migration assumption with lower life expectancy and higher fertility to yield a larger working-age population. However, the increase in the amount of children adds to

education costs, resulting in slightly higher spending up to 2040-41 and thus higher public sector net debt compared to the high migration scenario alone.

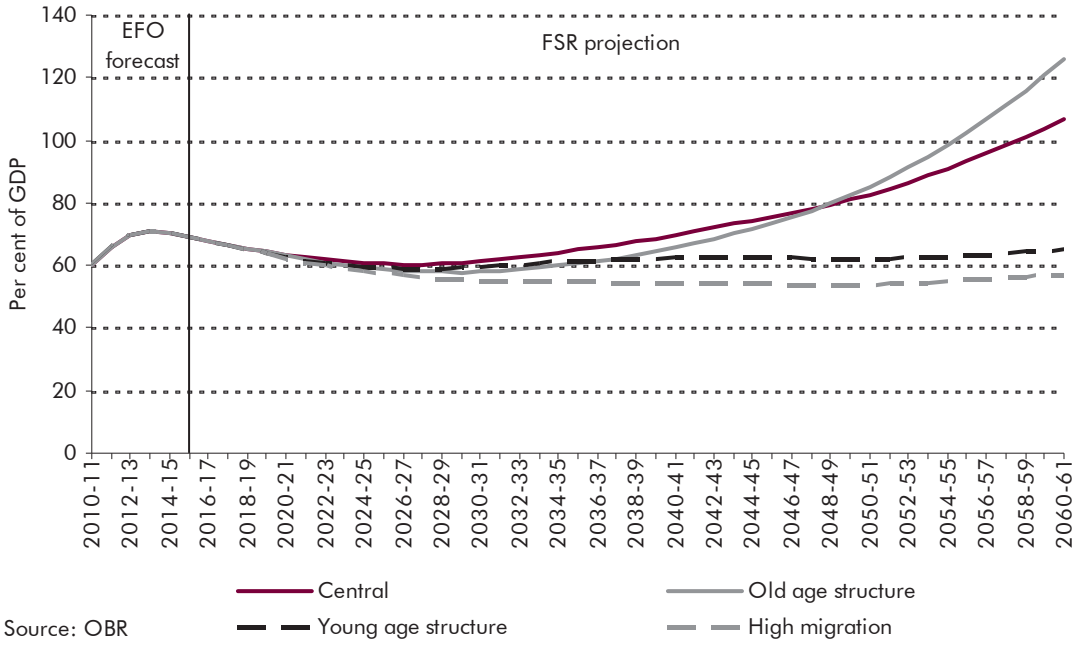
3.64 Inward migrants are assumed in the ONS projections to be more concentrated in working age than the population in general. So higher migration would tend to increase GDP and not add much to age-related spending pressures. Higher migration therefore reduces the pressure on the public finances over our 50 year horizon. However, it should be borne in mind that when the migrants retire from the workforce they will push up spending more than they increase revenues. So higher migration could be seen as delaying the fiscal challenges of an ageing population rather than a way of avoiding them.

3.65 The productivity scenarios highlight the impact of our assumptions about the uprating of taxes and benefits. We assume all items of revenue are uprated in line with earnings in the long-term. Earnings are linked to productivity so revenue is unchanged as a share of GDP in both scenarios. However, as some spending items, such as the State Second Pension, are uprated with prices, these fall as a proportion of spending in the higher productivity scenario. So the higher productivity scenario reduces long-term fiscal pressures while the lower productivity scenario increases them.

Table 3.7: Spending and revenue in demographic and economic scenarios

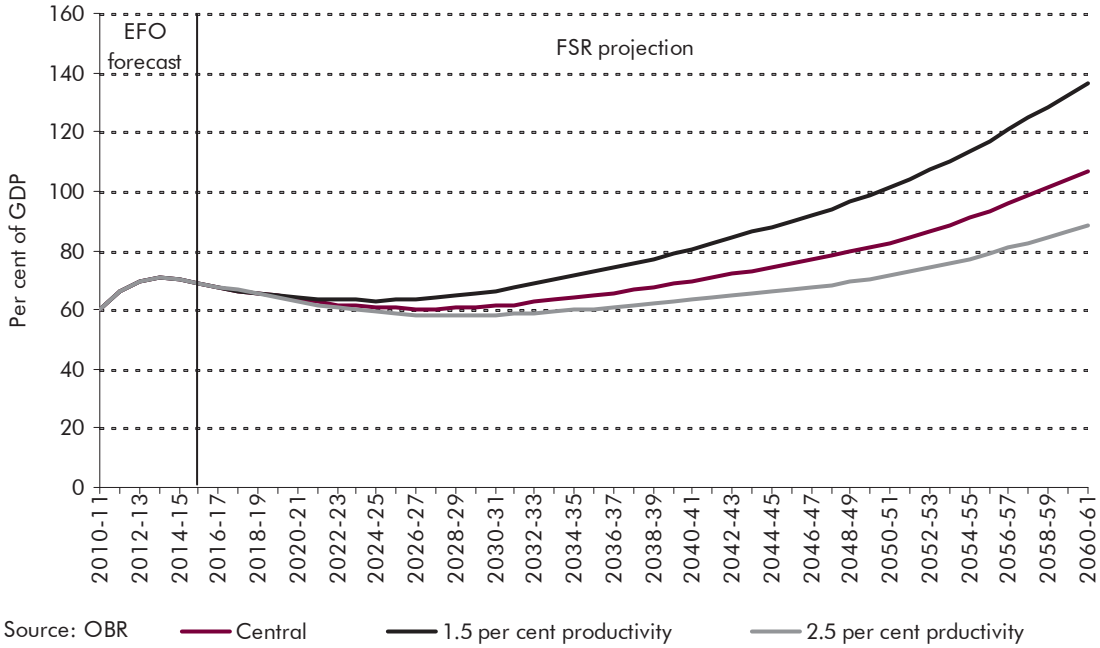
	Difference from central projection, per cent of GDP						
	EFO forecast		FSR projection				
	2010-11	2015-16	2020-21	2030-31	2040-41	2050-51	2060-61
Old age structure							
Total managed expenditure	0.0	0.0	-0.1	-0.4	0.4	1.7	3.8
Public sector current receipts	0.0	0.0	0.0	0.2	0.5	0.7	1.0
Young age structure							
Total managed expenditure	0.0	0.0	0.0	-0.2	-1.5	-3.1	-5.0
Public sector current receipts	0.0	0.0	0.0	-0.1	-0.6	-0.7	-0.9
High migration							
Total managed expenditure	0.0	0.0	-0.1	-0.7	-1.9	-3.1	-4.8
Public sector current receipts	0.0	0.0	0.0	0.0	-0.2	-0.2	-0.2
1.5 per cent productivity							
Total managed expenditure	0.0	0.0	0.1	0.4	0.8	1.3	2.1
Public sector current receipts	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.5 per cent productivity							
Total managed expenditure	0.0	0.0	0.1	-0.2	-0.4	-0.8	-1.3
Public sector current receipts	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Chart 3.11: Public sector net debt for demographic variants



Source: OBR

Chart 3.12: Public sector net debt for productivity variants



Source: OBR

Sensitivity to alternative health spending scenarios

3.66 Spending on health makes the largest single contribution to the increase in age-related spending in our central projection. Given its importance, we show two alternative scenarios using different assumptions about health spending. Further details are provided in Annex D of our accompanying online document.

3.67 The first scenario considers the impact of slower productivity growth in health care. Health care provision is relatively labour intensive and we might therefore expect productivity growth to be slower in this sector than in the economy as a whole, yet wages are likely to need to keep pace with those in the rest of the economy. In this case, if governments were to wish to keep the output of health care growing as quickly as output in the rest of the economy, they will have to spend a growing share of GDP in order to do so.

3.68 If productivity growth in the health sector was 1 percentage point lower than assumed whole economy productivity growth, then real health spending per person would need to increase by 3 per cent each year to increase health output by 2 per cent per year, in line with real earnings growth. Interpreting unchanged policy towards health spending in this way would see health spending as a share of GDP in 2060-61 rise by just over 5 percentage points relative to our central projection and would imply a significantly higher path for public sector net debt over the projection period (Chart 3.13). Such projections are more in line with the projections of health spending made for the US by the Congressional Budget Office (CBO).[7]

3.69 This analysis emphasises the importance of productivity growth in the health sector – and the response of future governments to it – for the outlook for fiscal sustainability.

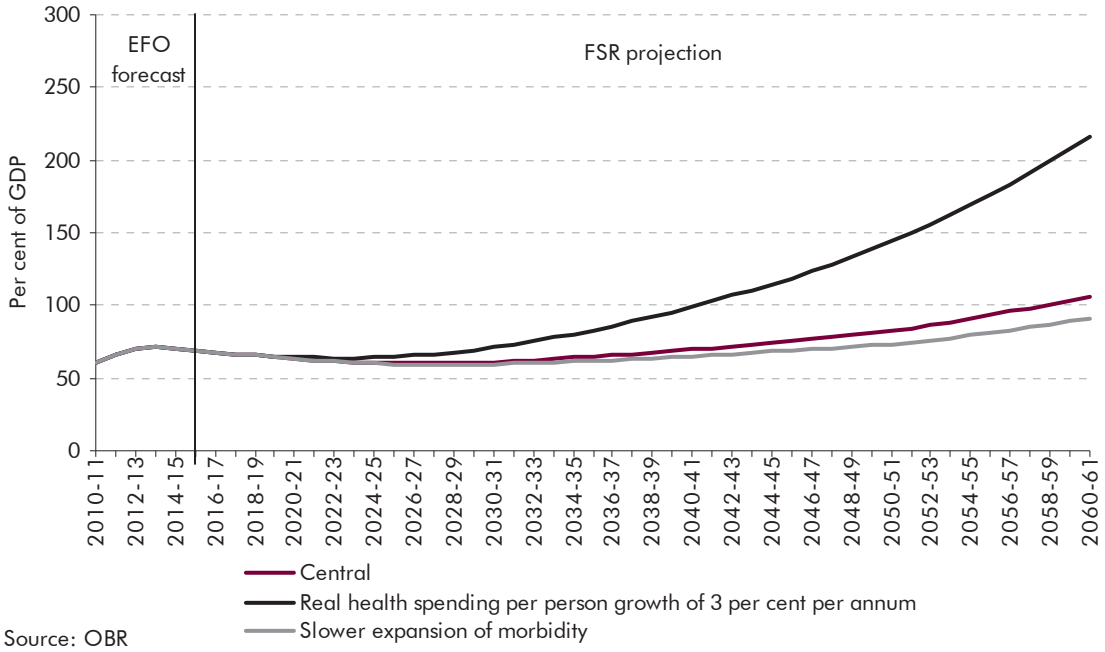
3.70 We also look at a scenario around changes in morbidity – the length of time spent in ill health. In our central projections we model health care costs associated with the final year of life, but otherwise assume a constant health status for a person of a specific age and gender. Implicitly this assumes that projected increases in life expectancy will be spent in poor health – an expansion of morbidity. An alternative assumption is that increases in life expectancy are composed of some increase in healthier years. If the total number of years in relative ill-health per person declines by one year for every 10 years, then this would reduce the health spending to GDP ratio by just over half a percentage

[7] CBO (2011)

point by 2060-61 relative to our central projection. This would reduce projected public sector net debt (Chart 3.13).

3.71 When considering these influences, and how they might affect our central projection, we must also acknowledge that there are likely to be many other effects that cannot be accounted for accurately. For example, changes to the variables that affect health may influence labour market participation and productivity. This could lead to higher GDP and income, and may in turn influence other items of revenue or spending, such as VAT or spending on education.[8] These interdependencies are a further source of uncertainty.

Chart 3.13: Public sector net debt in health spending scenarios



Source: OBR

[8] Eich (2008) discusses important interdependencies that may be missed in bottom-up analysis.

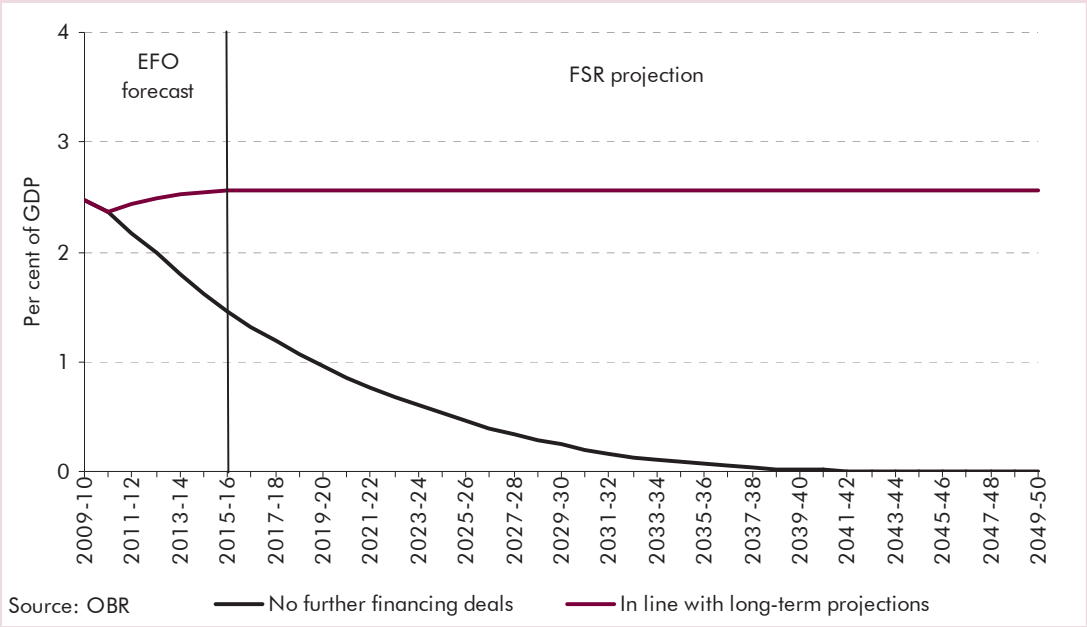
Box 3.3: What if all PFI deals were brought on balance sheet?

The running costs relating to existing PFI contracts are included within agreed departmental spending envelopes. As relatively fixed long-term obligations, these have the potential to reduce the flexibility for other spending in the future. If no further deals were signed, annual payments would peak over the current Spending Review period, and then remain at broadly similar levels over the following 10 years, before gradually tailing off. These payments constitute less than 3 per cent of resource DEL over the Spending Review period. Our central long term projections assume that these expenditures will remain constant as a share of GDP from 2015-16, and that they will continue to be met within spending envelopes. This assumption is consistent with a policy of continuing to sign PFI contracts where they represent value for money.

As discussed in Box 2.2, the net present value of existing capital liabilities for on-balance sheet PFI contracts is added to net debt. But the majority of PFI assets are currently held off the public sector balance sheet in the National Accounts. Chart B illustrates the impact on our net debt projections if all capital liabilities relating to PFI contracts were included. At March 2010, these additional elements totalled a little under £35bn, or around 2.5 per cent of GDP.

The first profile is consistent with the assumption in our projections that PFI expenditures are constant as a share of GDP. In this case, the impact is constant over the projection period – and would increase net debt in our central and variant projections by around 2.5 per cent of GDP in each year. The second assumes no further lease contracts are signed so the direct impact on net debt trends towards zero over time as the liability is paid off.

Chart B: PFI payments in future under different scenarios



Feedback from the public finances to the economy

3.72 In the analysis presented above, we have implicitly assumed that the long-term performance of the economy would be the same under a wide variety of scenarios for the outlook for the public finances. Running significant fiscal deficits may be a very sensible strategy when private demand is unusually depressed, but if significant exogenously[9] generated deficits persist over the longer term this can could have a number of negative consequences for the economy. If an exogenous increase in the fiscal deficit, for example due to spending pressures, reduces national saving, raises interest rates and 'crowds out' investment, this would lead to lower levels of output and a reduction in living standards. Higher levels of debt can also restrict policymakers' ability to respond to future economic difficulties.

3.73 In this section we use simple correlations to illustrate the possible long-term feedbacks between the fiscal position and the performance of the economy. Bear in mind that the short to medium run effects of current fiscal policy are captured in the five year forecasts presented in our March 2011 *Economic and fiscal outlook*. The longer-term projections in this report use the end of that forecast horizon as a starting point, and over this long run horizon economic activity is assumed always to be in line with the economy's productive potential.

3.74 Attempting to make some allowance for these effects is challenging. The potential size and timing of these effects is difficult to identify. The impact of an exogenous and persistent increase in the fiscal deficit will also depend crucially on why it has come about[10] and may depend on the initial level of debt and the size of the deficit. This section focuses on the impact of persistently high government borrowing due to increased spending pressures.

3.75 The size of the effect on output illustrated in this section is relatively small. This is due to the fact that the central projection is for a relatively gradual decline in the primary balance. A sharper decline in the primary balance would have a bigger impact on output.

[9] An exogenous increase can be thought as a discretionary change in fiscal policy i.e. it is the result of a movements in taxes or spending that is not related to the level of economic activity. It is distinct from endogenous movements in fiscal deficits which are the result of movements in the economy e.g. the automatic stabilisers.

[10] Other types of exogenous fiscal movements might lead to different responses. For example a positive technological shock would increase output boosting investment and consumption and could result in a new equilibrium with a higher current account deficit and a lower fiscal deficit.

Crowding out illustration

3.76 In an open economy like the UK, domestic investment must be financed either by national savings or by a flow of funds from abroad (a current account deficit). It can be helpful to think about this in terms of the accounting identity that national savings, the sum of private and public savings, and the current account must always equal investment.[11]

Private saving - Fiscal deficit - Current Account = Investment

3.77 Movements in one component of this identity must therefore be matched by some combination of movements in the other components. The crowding out effect of a higher fiscal deficit, caused for example by increased spending pressures, is likely to be partly offset by private saving and/or the current account. Higher demand for funds raises interest rates, attracting foreign capital and private savings. In addition households might increase saving today anticipating the need for higher taxes and/or spending cuts in the future.

3.78 Historical correlations suggest that a £1 increase in the fiscal deficit is associated with an increase in private saving of around 80p and a widening of the current account of 1p.[12] Assuming, for the purposes of illustration, that these correlations held true in the future then in the event that the deficit evolved as in our central projection, the capital stock would be around 4 per cent smaller and the level of real GDP around 1 per cent lower by 2060-61 than our central projections assume.

Interest rate response

3.79 If funds from the private and external sectors do not rise sufficiently to offset a fall in public savings, this would lead to an increase in interest rates (which is part of the reason for the crowding out of investment). Persistent fiscal deficits and higher levels of public debt could also increase the risk premium demanded by investors, further pushing up interest rates and the cost of debt interest.

3.80 A recent IMF study suggested that an increase in the fiscal deficit of 1 per cent of GDP might push up yields by 20 basis points over the medium term.[13] Similarly,

[11] National saving is the sum of public and private saving. Public savings is the fiscal balance.

[12] These are correlations and not causal relationships covering a wide range of economic conditions and many changes in fiscal policy. Nevertheless the numbers have some support in more rigorous studies, see for example: Rohn (2010), Brittle (2010), Bussiere et.al (2004), Feyrer and Shambaugh (2009), Ferrucci and Miralles (2007), De Mello et.al (2004), De Serres and Pelgrin (2003), Loayza et.al (2000) and Haque et.al (1999).

[13] Baldacci and Kumar (2010)

the US Congressional Budget Office concluded that "*recent studies have tended to fall in a narrow range: suggesting that a sustained increase in the federal deficit amounting to 1 per cent of GDP raises interest rates by roughly 20 to 60 basis points*".[14]

3.81 Using a simple illustrative rule of thumb that a 1 per cent increase in the fiscal deficit raises interest rates by 20 to 30 basis points, the path of deficits in our central projection would increase the debt to GDP ratio by 2 to 3 per cent of GDP in 2060-61 (this includes the impact of crowding out).

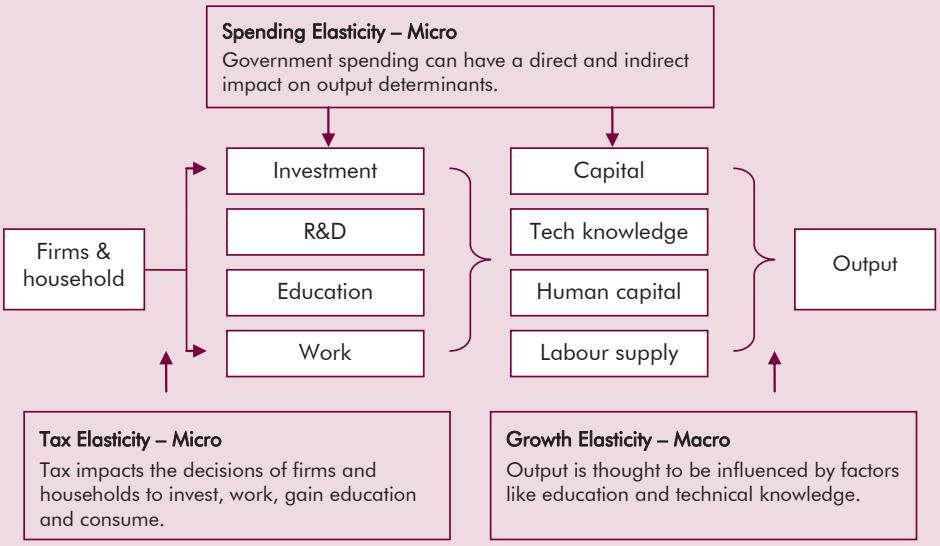
3.82 The fiscal mix can also affect output in the long term. This is discussed in Box 3.4 below.

[14] CBO (2005).

Box 3.4: The fiscal mix and output

Microeconomic theory suggests that taxes can affect the choices made by households and firms by altering the prices of goods, services and activities. Growth theory suggests that some of those choices can affect output. As a result the level of tax can have an indirect effect on output as illustrated in Figure A. Different types of public spending can also impact output, either directly, such as expenditure on infrastructure, or indirectly, such as through transfer payments which influence the decisions of households and firms. This suggests the fiscal mix can matter for output.

Figure A: The relationship between tax, government spending and output



Empirical evidence on this is mixed, especially on whether tax and spending have a growth or a level effect on output.[a] A recent OECD paper (Arnold et.al, 2007) found evidence that the tax mix matters for the level of output and found corporate taxes to be most harmful, followed by personal income taxes and consumption taxes.[b] A similar ranking was found in Gemmell and Kneller (2009) and Gordon and Lee (2005). Other papers have found no link between tax and the long-run growth rate (see Koester and Kormendi (1989) and Mendoza et.al (1997)). Poot and Nijkam (2003) conducted a meta-analysis and found limited evidence for a positive impact of fiscal policy on long-term growth but some evidence that spending on education and infrastructure had a positive impact. Canning and Pedroni (2004) also found infrastructure investment to have a positive impact on long-run growth in a cross country panel study.

[a] A level effect is when a level change in an output determinant leads to a change in the level of output leading to temporary output growth. A growth effect is when a level change in an output determinant has a permanent or long run impact on the level of output growth. Endogenous growth theory assumes that some factors, like investment and education, can permanently impact output growth. Neoclassical growth theory assumes that a level change in an output determinant can only have a temporary growth impact.

Conclusion

3.83 The long-term projections in this chapter are highly uncertain and the results we present here should be seen as broad brush illustrations rather than precise forecasts. We have illustrated some of the uncertainties through sensitivity analyses – by varying key assumptions regarding demographic trends, whole economy and health sector productivity growth, and the health of the public finances at the end of our medium-term forecast horizon.

3.84 However, these uncertainties should not be used to disguise the fact that in most of these scenarios the public finances are projected to come under pressure over the longer term, primarily as a result of an ageing population. Under our definition of unchanged policy, the Government would end up having to spend more as a share of national income on age-related items such as pensions and health care. But the same demographic trends would leave government revenues roughly stable as a share of national income. Productivity growth in the health sector – and the way in which governments choose to respond to it – will also be a key factor in the future sustainability of the public finances.

3.85 In the absence of offsetting tax increases or spending cuts, the pressures we have identified would eventually increase the budget deficit sufficiently to put public sector net debt on an unsustainable upward trajectory. It is likely that such a path would lead to lower long-term economic growth and higher interest rates, exacerbating the fiscal problem. The UK, it should be said, is far from unique in facing such pressures.

3.86 The analysis in this chapter does not provide us with a clear indication of the size or timing of the policy adjustment that would be needed to put the public finances back on a sustainable path in the face of these pressures. For that we need to look at some more formal indicators of fiscal sustainability, which is the subject of Chapter 5.

3.87 Before that in Chapter 4 we look more closely at the sustainability of tax revenues. The analysis in the central projections in this chapter only considered the impact of demographic pressures on government revenues. In the next chapter we consider wider non-demographic trends that are likely to reduce revenue from sources such as transport taxes and oil and gas revenues as a share of national income over the next 30 years.

4 The sustainability of tax revenues

Introduction

4.1 The long-term projections for revenues in Chapter 3 assume a constant ratio of tax revenue to GDP, except for changes driven by demography. This is an approach which is consistent with most international examples of sustainability analysis. In practice, as we saw in Chapter 3, the impact of demographic trends on revenues is projected to be relatively small, leading to an increase in the tax to GDP ratio of around one percentage point over the next 50 years.

4.2 This chapter looks in more detail at the wider non-demographic trends that could affect the sustainability of the tax base over time. These include technological change, resource depletion, behavioural change and globalisation. In essence, this analysis considers whether there is a good argument for assuming that a specific revenue stream will rise by a rate other than the growth rate of nominal GDP over the long run.

4.3 We first summarise the main non-demographic factors which could affect the tax base over the next 20 years. We then look in more depth at a number of specific tax streams – income tax, transport taxes, environmental taxes, oil and gas receipts and tobacco duties.

Non-demographic drivers of tax revenue

4.4 One factor affecting revenue streams is **technology**. An example that we consider in more detail in the next section of this chapter is increased car fuel efficiency. Technical improvements in engine design and greater use of hybrid or fully electric cars will affect receipts from fuel duty, vehicle excise duty (VED) and company car tax. Our analysis considers the potential impact of this on receipts to 2030.

4.5 Technological developments are also likely to affect other revenue streams. Advances in technology have helped drive down the price of many consumer durables. If this were to continue in the future it could reduce VAT revenues, given that consumer durables are generally subject to the standard rate of VAT. The increasing provision of goods and services through the internet is also likely to put downward pressure on VAT receipts, as it makes collection more difficult.

4.6 **Resource depletion** will continue to affect UK oil and gas revenues. Oil and gas production peaked in 1999 and has fallen by around a half since then. A projection of UK oil and gas revenues out to 2040 based on a stylised 5 per cent fall in production per annum is outlined later in the chapter.

4.7 Revenue streams could also be affected by **behavioural change**. For example, tobacco receipts have been affected by the long-run trend decline in smoking. This in part reflects policies such as health promotion and the smoking ban in enclosed workplaces, but also the impact on demand from high duty rates. A projection for tobacco revenues out to 2030 based on a continuation of a 2 per cent per annum decline in duty paid consumption is analysed later in the chapter.

4.8 Some transport and environmental taxes are explicitly designed to try to encourage behavioural change, in particular to reduce greenhouse gas emissions. VED and company car tax are banded in relation to fuel efficiency, while measures such as the carbon price floor and the renewables obligation are designed to encourage low-carbon power generation. If these measures successfully influence behaviour, these revenue streams would be eroded. This chapter includes an analysis of the carbon price floor measure out to 2030.

4.9 **Globalisation** could affect labour taxes, corporation tax and VAT. A combination of increased specialisation within the world economy and advances in technology has increased the premium on skills. The share of the pre-tax income from the top 5 per cent of UK income taxpayers rose by 3 percentage points between 1999-2000 and 2007-08. Given the progressivity of the income tax system, this has boosted receipts. Later in this chapter we consider the potential impact on receipts if there was to be a further rise in income inequality or if the recent rise in inequality was to be reversed. Increased globalisation could also increase the mobility of highly skilled labour. Depending on whether this leads to an inflow or outflow of labour, the impact on revenues could be either positive or negative.

4.10 Corporation tax could be affected by the increasing mobility of capital. This could affect receipts via decisions by multinationals on where to locate and where to book profits. Highly mobile capital provides greater scope for profit shifting, where companies arrange their transactions so that their taxable profits arise in low tax jurisdictions, while the activities generating these profits remain in higher tax jurisdictions.

4.11 Finally, globalisation could also affect consumption patterns and hence VAT receipts. Increasing exports from the emerging economies have put downward pressure on the relative price of traded goods, particularly manufactured products. More recently, increased demand from these economies has put considerable upward pressure on prices of commodities such as oil and food. The overall effect of these trends is likely to have put downward pressure on VAT

receipts. With food mainly zero-rated while many traded goods such as clothing and consumer durables are subject to the standard rate of VAT, the proportion of spending subject to the standard rate of VAT has fallen.

4.12 The overall future effect of globalisation on the tax to GDP ratio is ambiguous, depending on the extent to which any continued increase in the premium on skills and its impact on labour taxes, offsets the potentially negative impact on corporate taxes and VAT.

4.13 The sustainability of the tax base also depends on the **compliance** of taxpayers. On unchanged policy, taxpayers are over time likely to find loopholes to avoid tax which would erode the tax base. However, many of these would be closed by policy action. VAT compliance in particular years has been affected by specific factors such as Missing Trader Intra-Community (MTIC) fraud and a rise in VAT debts during the economic downturn. However, the overall tax gap (the difference between tax collected and tax that should be collected) has been broadly flat in recent years.[1]

4.14 The **structure of the tax system** and its interaction with long-run trends in household income could also affect the sustainability of tax receipts. As highlighted in Chapter 3, this is most evident in the impact of 'fiscal drag' on income tax revenues if income tax allowances and thresholds are assumed to be uprated with inflation in line with medium-term Government policy. Annex C in the accompanying online document looks in more detail at the impact that fiscal drag would have on our projections.

4.15 A similar fiscal drag effect will also be evident on receipts from stamp duty land tax over time. With house prices rising in the long-term, more and more house purchasers would move into a higher tax band and pay the higher rate on the total value of the property, if thresholds were left unchanged.

4.16 The **structure of the economy** can affect tax sustainability in a variety of ways: the sectoral split by industry, trends in the labour and capital shares in the economy, the share of consumer spending in the economy and the split between full-time and part-time work. Box 4.1 looks at how the sectoral composition of the economy and the financial sector in particular can have implications for government revenue.

4.17 Our March forecasts out to 2015-16 assumed a fall in the labour share of national income, given that wage growth is expected to be subdued. Labour is subject to a higher effective tax rate than capital, so this decline in the labour

[1] HMRC (2010).

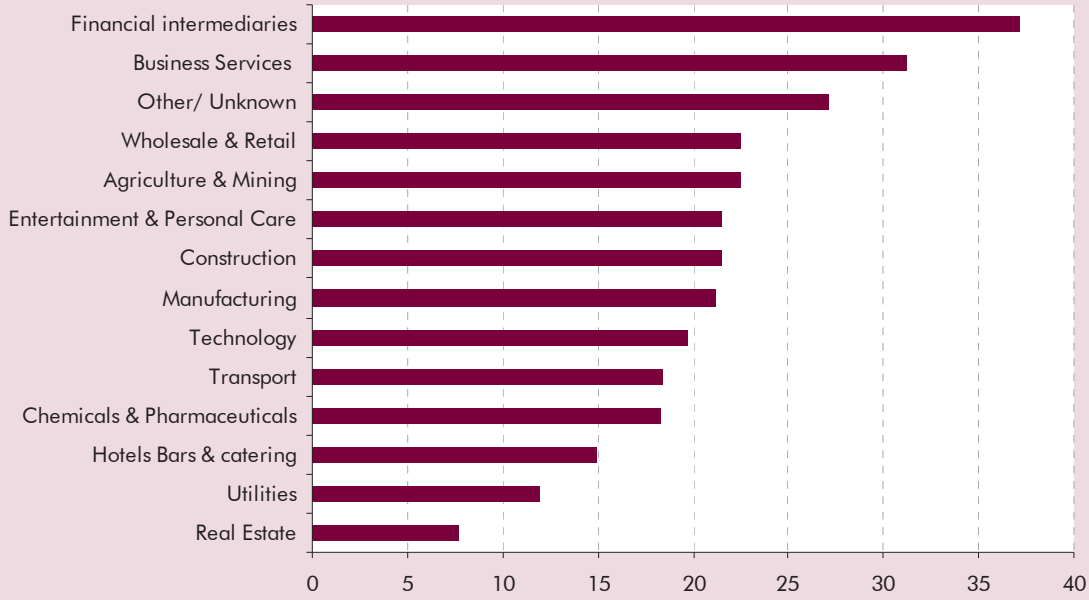
share constrains receipts. Beyond 2015-16, our long-term projections implicitly assume a constant labour share, so the reduction in recent years is locked into the projection.

4.18 The March forecast also assumed that deleveraging by consumers would mean that growth in real consumer spending would lag overall growth. The decline in the share of consumer spending in the economy has an effect on VAT receipts. Combined with the impact from a contracting government sector, VAT receipts are expected to fall by 0.4 per cent of GDP between 2011-12 and 2015-16. As with the labour share, the projections in this report then effectively lock this in by assuming a constant share of consumer spending in the economy over the long run.

Box 4.1: Tax revenues from the financial sector

The sectoral composition of the economy matters for the public finances since the tax burden varies between sectors, depending on factors such as productivity and profitability. The sectoral landscape of the UK economy has changed markedly in the last 30 years. The share of manufacturing in total output has fallen while business services and the real estate sectors have experienced sharp growth.[a] The financial sector's share of GVA doubled from 2000 to 2008.

Chart A: Effective tax burden by sector, income and corporate tax, as a share of GVA[b]



Source: ONS, HMRC

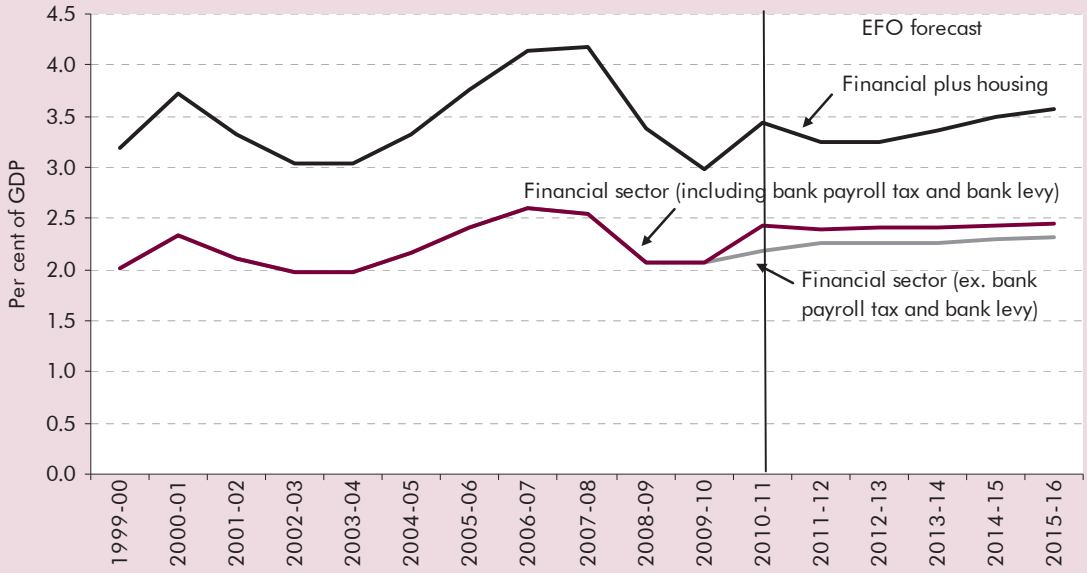
Chart A shows that in 2007-08 the effective tax burden from corporate and income tax, as a share of GVA, was the highest for financial intermediaries (although measuring financial sector GVA is not straightforward). This partly reflects relatively high profits in the sector compared to its contribution to GVA. In 2007-08 gross trading profits in banking, finance and insurance accounted for around 21 per cent of total profits.[c]

The financial crisis then led to revenues from this sector and the related housing sector falling sharply, as shown in Chart B. This was one of the primary drivers of the severe deterioration in the UK public finances in recent years, exposing the risks to sustainability of reliance on revenue from these sectors.

The long-term projections in this report do not make any assumptions on future sectoral trends. They therefore implicitly assume that the sectoral contribution to tax receipts in 2015-16, at the end of our latest medium-term forecast, holds throughout the projection period. As the chart shows, our latest medium-term forecast is for the share of receipts from the financial and housing sectors to rise from its trough in

2009-10, but not to return to the peak levels seen in 2007-08. Looking at the taxes paid by the financial sector such as PAYE, NICs and corporation tax, these remain below their pre-recession peak as a share of GDP through the forecast period. This remains the case if the bank levy is included. This is effectively locked in for the long-term so that our projections do not rely on further increases in revenue from the sector as a share of national income.

Chart B: Financial and housing sector receipts[d]



Source: ONS, HMRC, OBR

More generally, if in the future the economy were to experience another sectoral shift, such as that seen over the past 30 years, it would potentially have important implications for tax revenue. However this is very difficult to predict. And its implications for tax revenue would depend on a range of factors such as sectoral productivity and profits.

a A part of the move from manufacturing to business services can be linked to increasing outsourcing of services in manufacturing. See for example Abramovsky and Griffith (2007).

b This is calculated using figures from 2007-08 on tax receipts and 2007 for GVA. The sector classification differs somewhat from the SIC and the breakdown of tax receipts does not fully match the breakdown for GVA especially for real estate, technology and transport. This is likely to overstate the burden on financial intermediaries and understate that on real estate. Therefore Chart A should only be seen as providing an indicative measure of the tax burden.

c See http://www.hmrc.gov.uk/stats/corporate_tax/table11-4.pdf

d Financial sector receipts include PAYE, NICs and corporation tax paid by the sector, bank levy and bank payroll tax. The financial plus housing line also includes capital gains tax, inheritance tax and stamp duty. Beyond 2010-11 the PAYE component is a stylised extrapolation rather than a detailed forecast. Stuck VAT in the financial sector and insurance premium tax are not included.

Income tax and national insurance contributions

4.19 Income tax and NICs account for around 45 per cent of total public sector current receipts. A variety of non-demographic factors could affect income tax and NICs receipts as a proportion of GDP, including assumptions on fiscal drag (covered in Annex C of our accompanying online document), the income distribution, the labour share in the economy and the incidence of part-time working in the economy. This section looks at the effect of changes in the income distribution on income tax and NICs receipts.

4.20 A progressive tax system means that the average rate of tax will increase as a result of changes that shift income towards the top end of the income distribution. So if the recent trend of increasing income inequality were to continue in the future it would potentially drive an increase in personal tax receipts. Conversely, a reversal of income inequality would lead to a fall in revenues. This section provides some illustrative examples of the potential size of these effects.

4.21 Table 4.1 demonstrates how changes in the UK income distribution affect income tax and NICs for different percentile groups in HMRCs latest Survey of Personal Incomes.

Table 4.1: Shares of total income and tax liabilities for percentile groups (Income taxpayers only)

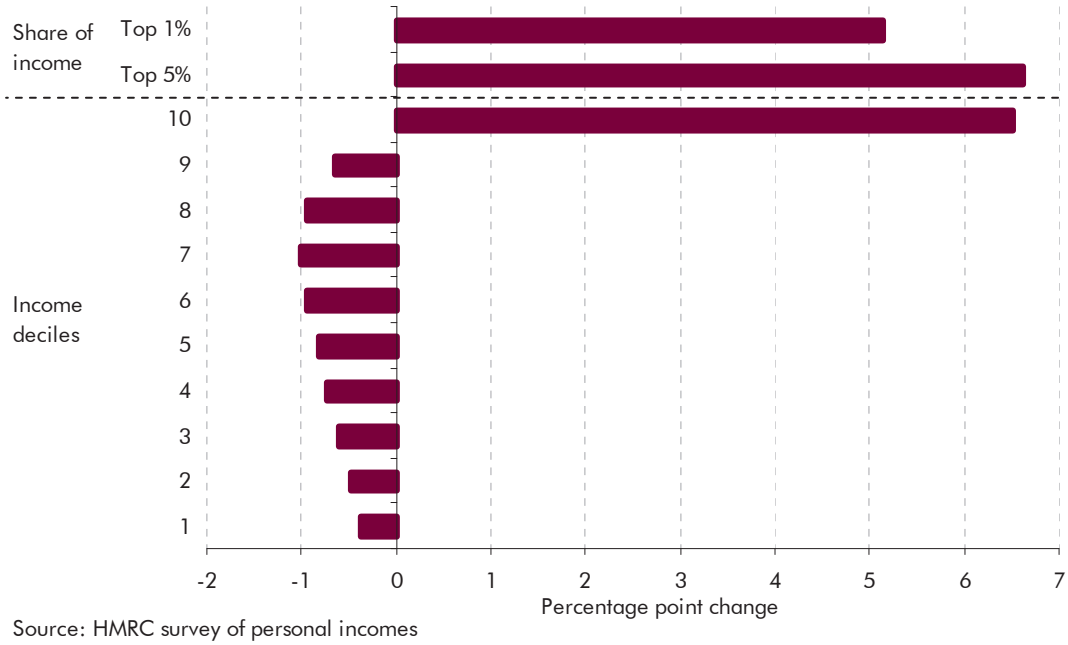
	Percentile group					
	Bottom 50%	Top 50%	Top 25%	Top 10%	Top 5%	Top 1%
1999-2000						
Income	23.8	76.2	53.4	32.9	23.3	11.0
Income tax	11.6	88.4	69.5	50.3	39.6	21.3
NICs	19.6	80.4	54.0	29.4	19.0	7.6
Income Tax + NICs	14.6	85.4	63.8	42.6	32.0	16.3
2007-2008						
Income	22.1	77.9	56.1	36.0	26.4	13.4
Income tax	10.4	89.6	72.2	54.3	43.4	24.4
NICs	16.3	83.7	58.2	34.0	22.9	10.2
Income Tax + NICs	12.5	87.5	67.1	46.9	36.0	19.2
Change						
Income	-1.7	1.7	2.7	3.1	3.1	2.4
Income tax	-1.2	1.2	2.7	4.1	3.9	3.0
NICs	-3.4	3.4	4.2	4.6	4.0	2.6
Income Tax + NICs	-2.0	2.0	3.3	4.4	4.0	3.0

Source: Survey of personal incomes

4.22 In 2007-08, income taxpayers in the top half of the income distribution (pre-tax incomes exceeding £18,500) accounted for 77.9 per cent of total income and 89.6 per cent of total income tax liabilities. Moving up the scale, these shares

were 36.0 per cent and 54.3 per cent respectively for the top 10 per cent (covering the majority of higher rate tax payers) and no less than 13.4 per cent and 24.4 per cent respectively for the top 1 per cent (roughly equivalent to those with incomes above today's £150,000 threshold for the 50p tax band). Including NICs in the analysis lowers these respective proportions somewhat due to the lower 2 per cent rate above the upper earnings/profits limits for employees and the self-employed, but nonetheless the distribution of personal tax liabilities remains highly positively skewed.

Chart 4.1: Changes in the share of total income by decile, 1993-94 to 2007-08



Source: HMRC survey of personal incomes

4.23 Chart 4.1 shows that growing income inequality over the past two decades has primarily been driven by growth in the income shares of the top 5 per cent and the top 1 per cent of the income distribution. Table 4.1 and Chart 4.1 show that the share of the pre-tax income of the top 5 per cent of income taxpayers in 2007-08 was 3 percentage points higher than in 1999-00 and over 6 percentage points higher than in 1993-94.

4.24 The data used to construct these charts is taken from HMRC's Survey of Personal Incomes and is only available to 2007-08. However, HMRC have provide projections of shares up to 2011-12 using their Personal Tax Model. This suggests that the share of pre-tax income of the top five per cent may have fallen back by 1.1 percentage points over the last four years.

4.25 High income earners are more likely to derive higher shares of their incomes from self-employment and investments relative to the rest of the taxpaying distribution where income is more concentrated in employment and pensions. The economic downturn and lower asset prices have reduced savings and dividend income more sharply than employment income, and so is likely to have affected the top end of the income distribution relatively more. With savings and dividend income expected to rebound as the recovery gathers momentum, this is likely to reverse some of the recent fall in the share.

4.26 HMRC's Personal Tax Model can be used to simulate the effects of changes in the distribution of income on income tax and NICs liabilities beyond the current forecast period. This is achieved by using the projected 2015-16 distribution as a baseline and measuring how income tax and NICs liabilities change when the share of income accounted for by the top 5 per cent of the distribution changes by plus or minus one, two and three percentage points.[2] The results are recorded in Table 4.2.

4.27 A 1 percentage point increase in the share of income of the top 5 per cent of income taxpayers involves a transfer of £11.6 billion of income to the richest group. As a result, income tax liabilities increase by around £2.4 billion (around 0.1 per cent of GDP) implying that the difference in marginal tax rates between the top 5 per cent and the remaining 95 per cent is around 20 percentage points.

Table 4.2: Illustrative impacts of the change in taxpayer income distribution, 2015-16

	Percentage point change in the share of income of the top 5% income taxpayers					
	+1	+2	+3	-1	-2	-3
Change in receipts (£ billions)						
Income tax and NICs	1.7	3.4	5.2	-1.5	-3.0	-4.5
Income tax	2.4	4.8	7.3	-2.2	-4.4	-6.6
NICs	-0.7	-1.4	-2.1	0.7	1.4	2.1

4.28 For larger income shifts the liabilities increase slightly more than proportionately, suggesting a further widening in the gap between the respective marginal tax rates of the top five per cent and remaining 95 per cent groups. Simulations showing the impact of a reduction in the income share of the top 5 per cent have the opposite effects. Total income tax liabilities fall and the marginal tax rates of the top 5 per cent and bottom 95 per cent groups move closer together.

[2] Changes in the total income shares of the top 5% are engineered through uniform scaling of all of the income components assessable to income tax.

4.29 For NICs, a 1 percentage point increase in the income share of the top 5 per cent of taxpayers reduces overall liabilities by some £700 million. The main contribution is from employee NICs where the difference in additional and main rate charges is -10 percentage points. However, while the impact of distributional changes on NICs liabilities works in the opposite direction they only partly offset the impact on income tax liabilities.

Transport taxes

4.30 This section looks at the potential path for fuel duty and vehicle excise duty (VED) revenues out to 2030, in particular, the impact from expected improvements in fuel efficiency and the greater use of plug-in hybrids or fully electric vehicles. We also consider the outlook for revenues from air passenger duty.

4.31 The fuel efficiency of cars has been improving throughout the last decade, with average new car CO_2 emissions falling by around 20 per cent. This reflects improvements in engine technology, government policy to incentivise the take-up of more efficient cars (e.g. the restructuring of the VED regime), a shift towards diesel cars which are currently more efficient and more recently the impact from the car scrappage scheme (which had the effect of accelerating the replacement of old 'gas guzzlers' by more efficient cars).

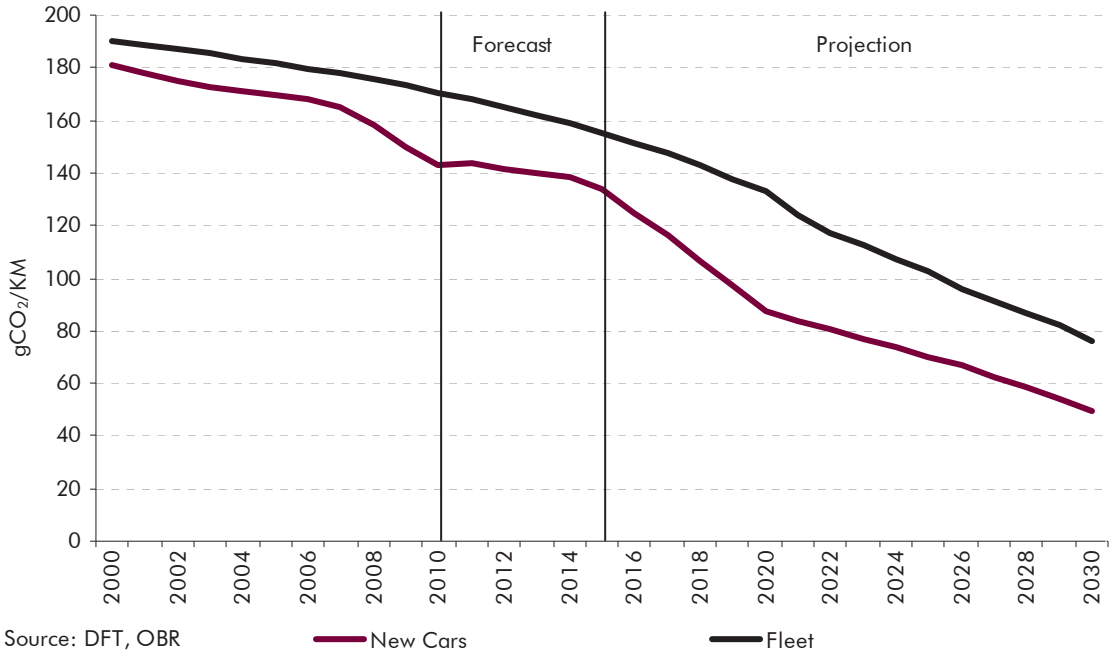
4.32 The overall consumption of fuel, which determines the revenue received from fuel duty, will depend on the extent to which any increase in mileage offsets improved fuel efficiency. Duty-paid road fuel consumption was broadly flat during much of the last decade, but Chart 4.3 shows a drop in each of the last three years as falling mileage was combined with improved fuel efficiency.

4.33 The Government has a stated aim of improving fuel efficiency further. From an average of 144 gCO_2/km for new cars in 2010, EU regulation is in place to deliver 130 gCO_2/km by 2015 and a target of 95 gCO_2/km by 2020. The Government has not said anything about the path of new car emissions after the EU 2020 target. For these projections, we have used the Committee on Climate Change (CCC) recommendation of a target of 50 gCO_2/km for 2030.[3]

4.34 Meeting these targets would not only require further improvements in engine technology, it would require the use of plug-in hybrids or fully electric cars to become much more widespread. Alternatively fuelled vehicles in 2010 made up just 1.1 per cent of the total new car market but have been growing rapidly. The CCC assume that its 2030 target would require around 30 per cent of the car fleet to be plug-in hybrids or fully electric.

[3] Committee on Climate Change (2010).

Chart 4.2: Fuel efficiency for cars



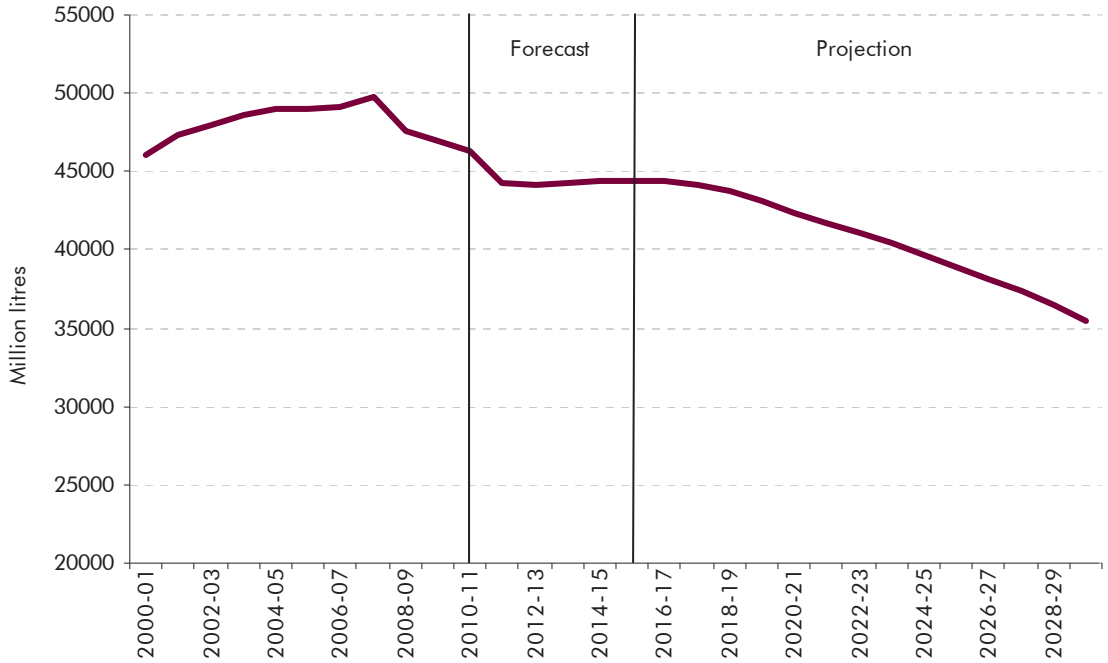
Source: DFT, OBR

Fuel duty

4.35 Fuel duty is charged on a pence per litre basis, so will be affected by the duty rate and the demand for fuel. In this section we show projections of fuel duty revenues out to 2030 on the basis of the following assumptions:

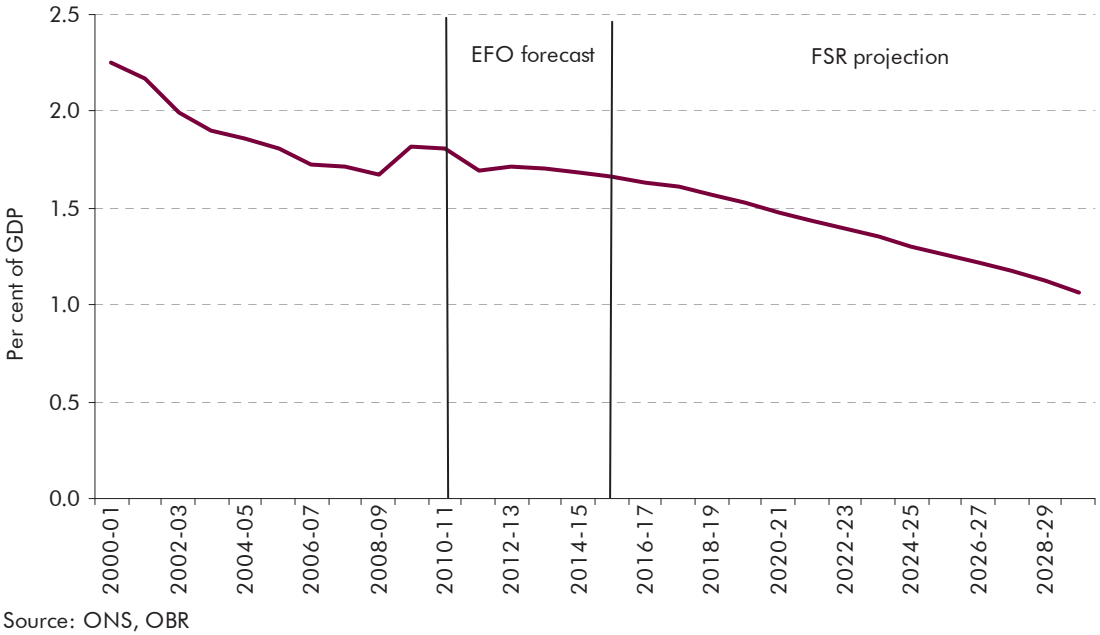
- the projection out to 2015-16 is in line with our March forecast;
- revalorisation of fuel duty each year in line with RPI inflation (assumed to be 3.2 per cent per annum in the long-run);
- fuel efficiency of new cars meets the EU 2015 and 2020 targets and meets the CCC's 2030 target; and
- oil prices rise by around 2.7 per cent a year.

Chart 4.3: Fuel consumption



Source: HMRC, OBR

Chart 4.4: Fuel duty receipts



Source: ONS, OBR

4.36 On the basis of these assumptions, Chart 4.3 shows that the demand for fuel would decline by up to 20 per cent, with the fall most evident between 2020 and

2030 when improvements in fuel efficiency are expected to more than offset modest increases in mileage. Chart 4.4 shows that as a share of GDP, fuel duty falls from 1.8 per cent in 2010 to around 1.0 per cent in 2030. If the stock of electric cars continued to rise beyond 2030 as the CCC envisages, fuel duty would come under further pressure.

Vehicle excise duty

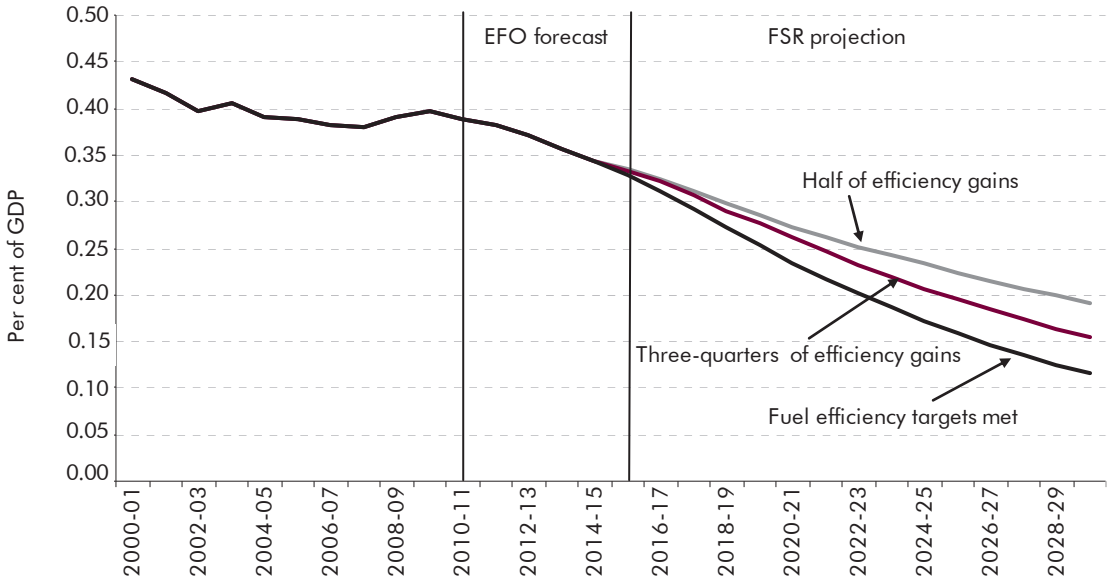
4.37 VED is applied in thirteen graduated bands depending on the level of carbon emissions, with more polluting vehicles taxed more heavily. In April 2010, first year rates were introduced with the stated aim of sending an additional signal to the buyer about the environmental impact at the point of purchase. Vehicles up to 100 gCO_2/km are exempt from VED, while vehicles up to 130 gCO_2/km are exempt from the first year rate.

4.38 Our projection for VED revenues to 2030 is calculated by projecting the stock of vehicles in each band multiplied by the appropriate duty rates, on the basis of the following assumptions:

- the projection to 2015-16 is in line with our March forecast;
- unchanged emissions bands, with VED rates for each band uprated in line with RPI inflation every year;
- fuel efficiency of new cars meets the EU 2015 and 2020 targets and meets the CCC's 2030 target; and
- the stock of cars is based on historical scrappage rates while the projection for new sales is based on a regression with GDP.

4.39 The March forecast for VED revenues up to 2015-16 assumes that receipts are already flattening off in nominal terms and falling as a proportion of GDP. Our long-term projections suggest this decline will persist. On the basis of current policy, VED receipts are projected to fall from 0.4 per cent of GDP in 2010-11 to around 0.1 per cent of GDP in 2029-30. As old cars are replaced by new more efficient ones, more of the vehicle stock moves into lower emissions bands each year. By 2030, with an average new car efficiency of 50 gCO_2/km, around 85 per cent of new cars would be exempt from VED under the current emissions bands. However, with an average life of a car around 14 years, only 40 per cent of the overall car stock would be exempt. Beyond 2030, with unchanged emissions bands, VED would fall off to very low levels as older cars with emissions levels above the exempt level dropped out of the car stock.

Chart 4.5: VED receipts



Source: ONS, OBR

4.40 Chart 4.5 emphasises that it is the fuel efficiency assumptions that are driving this projection. If fuel efficiency gains were just half of our assumption, then the decline in VED as a proportion of GDP would be around 0.2 percentage points of GDP rather than 0.3 percentage points in the twenty years to 2030.

Air passenger duty

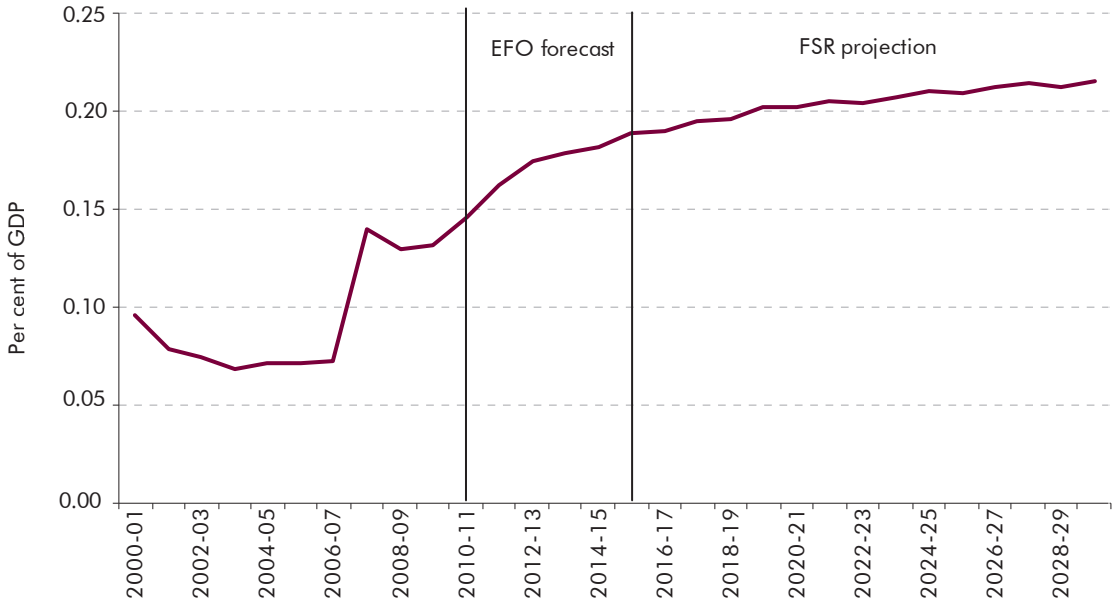
4.41 Air passenger duty (APD) is a duty chargeable per passenger flying from UK airports to domestic and international destinations. There are four duty rate bands, each split into economy and standard class. Air passenger duty has risen from £1 billion in 2000-01 to £2.2 billion in 2010-11, reflecting changes to duty rates and structures as well as strong increases in passenger numbers prior to the economic downturn.

4.42 Our long-term projection for APD is calculated by multiplying passenger numbers in each chargeable band by the appropriate duty rate. The projection out to 2030 assumes:

- revenues to 2015-16 are in line with our March forecast;
- duty rate bands remain unchanged, with the APD chargeable to each band uprated in line with inflation each year; and

- growth in passenger numbers beyond 2015 is constrained to grow broadly in line with DfT projections.

Chart 4.6: Air passenger duty



Source: ONS, OBR

4.43 Air passenger duty is expected to rise as a percentage of GDP to 2015-16, mainly due to the recovery in passenger numbers after a 13 per cent cumulative drop between 2008-09 and 2010-11. Thereafter, our projections suggest APD receipts would rise slightly faster than GDP, reflecting RPI indexation of 3.2 per cent per year in the long-run and 2.3 per cent annual average growth in passenger numbers. Passenger growth in these projections is substantially slower than the average annual 6 per cent growth recorded in the twelve years prior to the economic downturn, although this was partly fuelled by the robust growth in low-cost operators which is unlikely to be repeated.

Environmental taxes

4.44 The UK has a number of environmental taxes such as the aggregates levy and the landfill tax which are designed to deal with particular environmental challenges. However, this section looks at the tax levers being used by the government to help meet its target of reducing greenhouse emissions by a minimum of 34 per cent from 1990 levels by 2020. A 2050 target of an 80 per cent reduction from 1990 levels was included in the Climate Change Act.

4.45 This section looks at a projection out to 2030 of EU Emissions Trading Scheme (ETS) auction receipts and the climate change levy, including the impact from the

introduction of a carbon price floor from 2013-14, as announced in Budget 2011. These measures aim to both boost the carbon price and provide greater certainty about the price. This is intended to improve the incentives for the development of low carbon power generation:

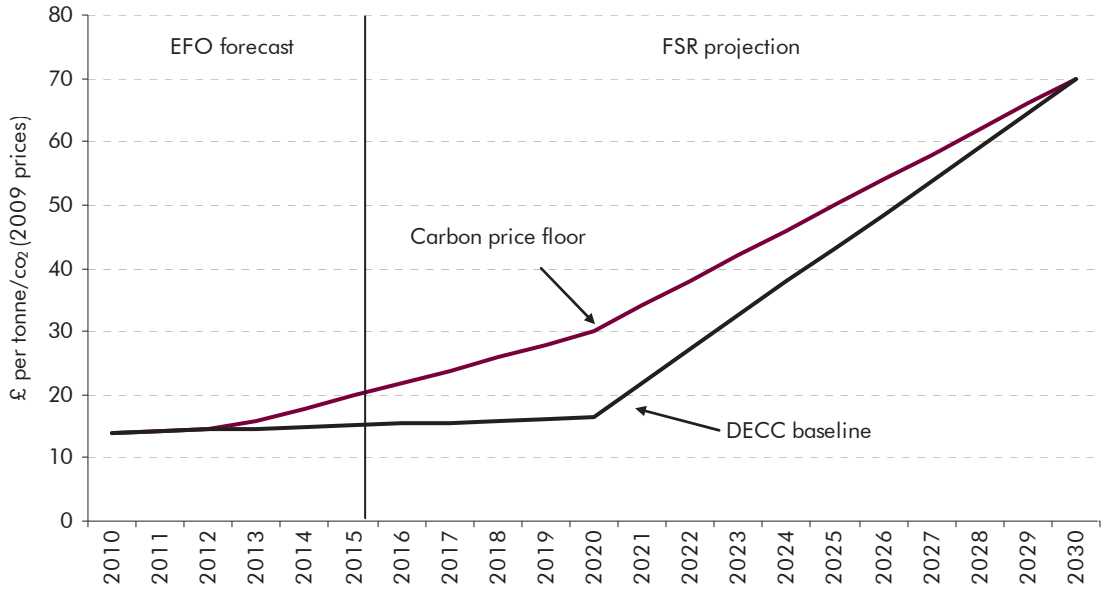
- the climate change levy is a levy on energy delivered to non-domestic users. The carbon price floor (CPF) is an extension of the climate change levy and is levied on fossil fuel power generation. The tax rate for the CPF is set as the differential between the baseline carbon price and the target carbon price; and

- EU ETS is a cap and trade scheme which covers around half of the EU's carbon dioxide emissions. Emission limits are set for all installations covered by the scheme. Each installation is allocated allowances equal to that cap. Installations may meet the cap by either reducing emissions below the cap and selling the surplus, or letting their emissions remain higher than the cap and buying allowances in order to meet the cap. Phase III of EU ETS which starts in 2013 will auction a higher proportion of these allowances. Auction receipts will reflect the carbon price multiplied by the quantity of allowances. The cap will tighten over time to put downward pressure on emissions.

4.46 Chart 4.7 shows the carbon price profile out to 2030. This uses the announced target of a carbon price of £30 per tonne/CO_2 in 2009 prices in 2020. The projection assumes £70 per tonne/CO_2 in 2009 prices in 2030. This is the Government's current estimated carbon price consistent with global action to limit the increase in temperature to 2° Celsius. This estimate is subject to the progress of international negotiations and may be revised as the science of climate change develops. The baseline carbon price is based on market prices to 2015-16 and then uses DECC projections.

4.47 On the basis of these carbon price projections, the sum of receipts from the climate change levy (including the CPF) and EU ETS auction receipts are expected to rise by around 0.3 per cent of GDP between 2010-11 and 2029-30. On these projections of the carbon price, receipts from the CPF would peak in 2020-21 when the difference between the baseline and target prices is expected to be at its largest and then fall back. EU ETS auction receipts would rise with the baseline carbon price. This is expected to more than offset the reduction in allowances as the cap is tightened.

Chart 4.7: Carbon Price Profile



Source: HMRC

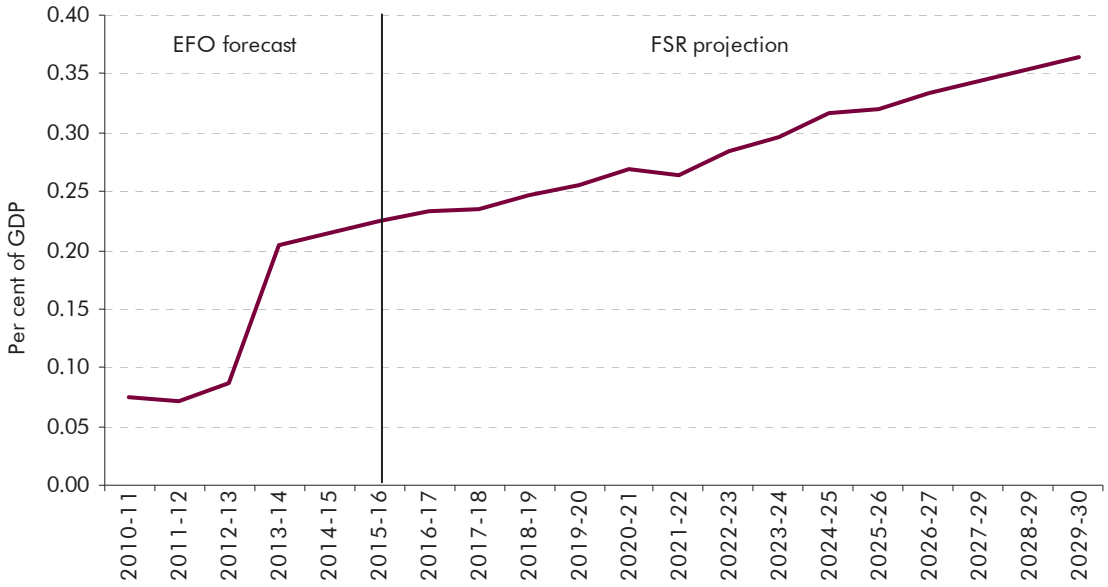
4.48 The projection of total receipts from EU ETS and the climate change levy is likely to be more reliable than the breakdown between the two revenue streams, although there remains considerable uncertainty about the number of allowances auctioned beyond 2013. If carbon prices prove to be lower than assumed in the baseline carbon price projections, receipts from the CPF would be higher but EU ETS auction receipts would be lower. A higher than expected carbon price would have the opposite effect on the two revenue streams.

4.49 Our tax forecast in March also included a number of other policies designed to improve incentives to reduce greenhouse gases. These included receipts from DECC levy-funded spending policies such as the Renewables Obligation, Feed-in Tariffs and the Warm Homes Discount and receipts from the Carbon Reduction Commitment. These are included in the environmental levies line in the current receipts table in the March *Economic and fiscal outlook*. They are expected to rise from £0.6 billion in 2010-11 to £3.9 billion in 2015-16. We have not produced projections beyond 2015-16 because of uncertainties about policy, but the upward trend is likely to persist until at least 2020 and potentially beyond.

4.50 The Renewables Obligation (RO) is the largest of these policies and is designed to help meet the Renewable Energy Directive's target that 15 per cent of UK's energy should come from renewable sources by 2020. The RO obligates energy suppliers to purchase a certain amount of renewables, for which they have to pay a premium price. The ONS classify this as an imputed tax (on energy suppliers)

and spend in the National Accounts on the basis that these transactions would not have taken place in the absence of government intervention.

Chart 4.8: Climate change levy and EU ETS receipts



Source: ONS, OBR

4.51 With a rise in electricity generation from renewables, the March forecast assumed that receipts from the RO would rise from £0.5 billion in 2010-11 to £2 billion in 2015-16. A revision in ONS methodology on the RO is expected prior to the Autumn forecast. On this revised methodology, RO receipts would be expected to rise from £1.2 billion to £4.7 billion over the same period. Beyond 2015-16, the replacement of the RO with a new support mechanism for low carbon power generation as part of the Electricity Market Reform project makes the level of support uncertain. However support for existing projects under the RO will last for up to twenty years.

UK oil and gas revenues

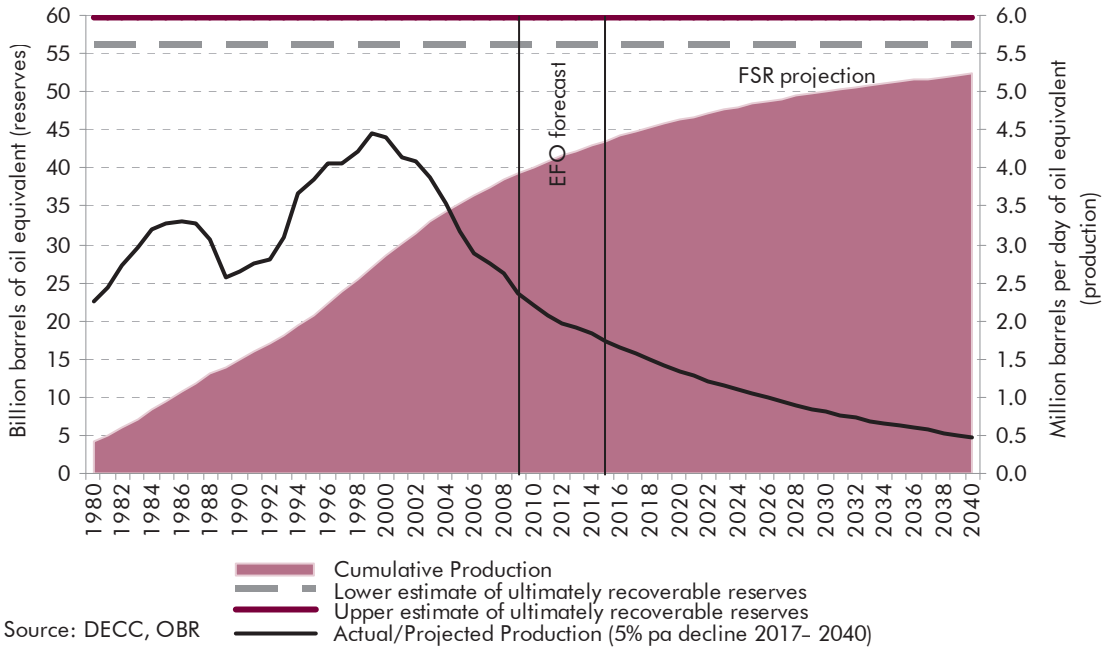
4.52 This section looks at the impact on UK oil and gas revenues of a continued fall in production. UK oil and gas production peaked in 1999 and has since fallen by around a half. A stylised projection out to 2040 in which oil and gas production falls by 5 per cent per annum is outlined below. A drop of 5 per cent per annum is slightly slower than the trend decline since 1999 but is in line with DECC's central projection over the period to 2016.

4.53 The fiscal regime for profits from the production of oil and gas in the UK and the UK Continental Shelf comprises three taxes. First, ring fence corporation tax

(RFCT) is charged at 30 per cent. A 'ring fence' prevents taxable profits from UK oil and gas production from being reduced by losses from other activities. Second, a supplementary charge of 32 per cent on top of RFCT. Third, petroleum revenue tax (PRT) which applies only to fields that received development consent before 16 March 1993. After various allowances, profits are taxed at 50 per cent, but PRT is deductible when calculating RFCT and the supplementary charge.

4.54 Oil and gas production to 2010 was around 40 billion barrels of oil equivalent (boe). A 5 per cent per annum fall in production would raise total production to over 50 billion boe by 2040, which is about 5 billion boe below the DECC central estimate of ultimately recoverable reserves. Chart 4.9 plots UK oil and gas reserves against cumulative production.

Chart 4.9: UK oil and gas reserves and production



Source: DECC, OBR

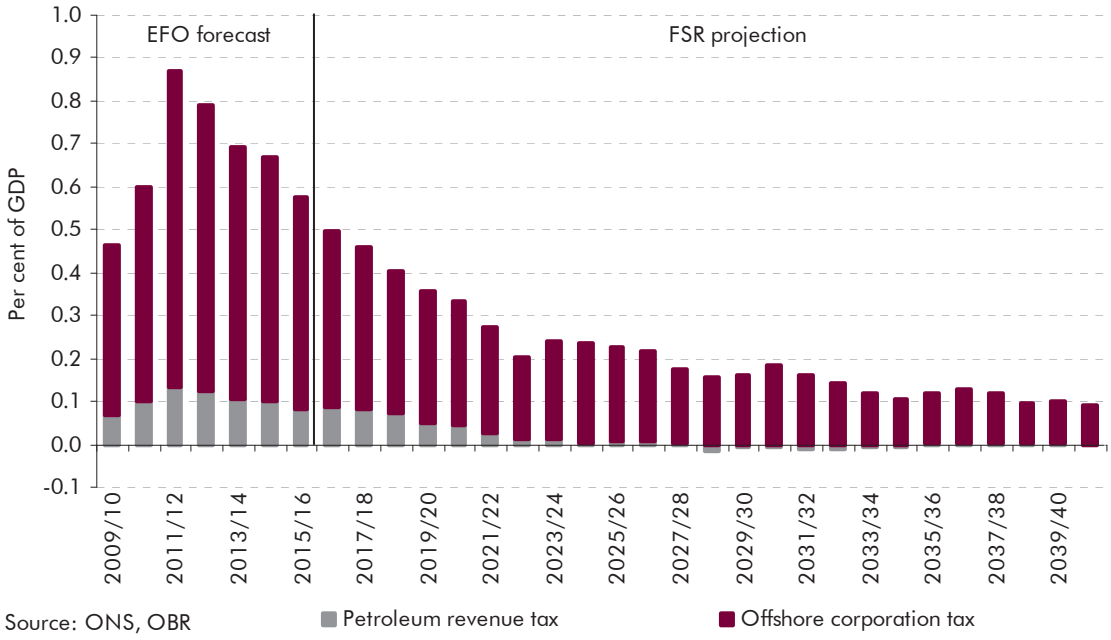
4.55 The delivery of such a production path would require a continuing high level of investment in both exploration and development. Investment decisions will be made in light of potential rates of return which will be affected by the expected future level of oil and gas prices relative to expected future costs and the tax regime.

4.56 The projection uses HMRC's oil and gas revenues forecasting model which is based on field-level data provided by operators. The data has been augmented to allow for extra production from new incremental projects in existing fields, development of technical reserves and new exploration in order to meet the stylised production profile. Judgemental estimates for total operating and capital

expenditure and for exploration and appraisal costs have also been made. The other key assumptions are:

- the projection out to 2015-16 is in line with the March forecast;
- the oil price in 2015 is assumed to be $107 a barrel as assumed in the March forecast. Thereafter, oil prices are assumed to rise by 2.7 per cent per annum, so oil prices would rise in line with price rises in the economy as a whole. In nominal terms, oil prices would be $158 a barrel by 2030 and $206 a barrel in 2040;
- gas prices also rise by 2.7 per cent per annum after 2015; and
- decommissioning expenditure is as reported by operators.

Chart 4.10: UK oil and gas revenues



Source: ONS, OBR

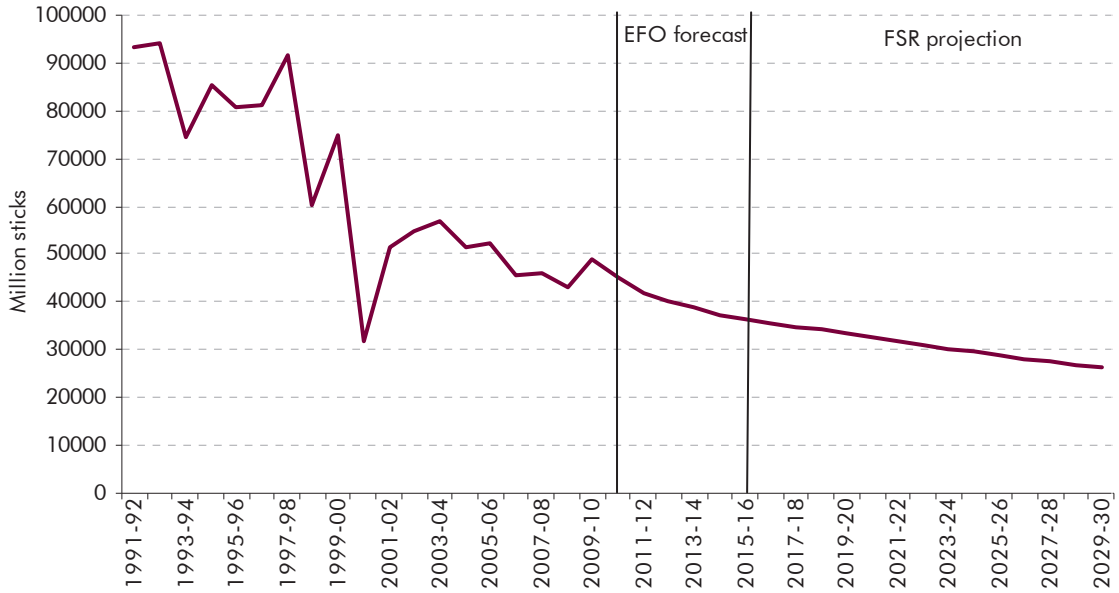
4.57 On these assumptions, Chart 4.10 shows that UK oil and gas revenues are expected to fall from a peak of 0.9 per cent of GDP in 2011-12 to 0.6 per cent in 2015-16 and then to between 0.1 and 0.2 per cent of GDP from 2028 onwards. In these projections many fields would cease production in the 2020s. At this point companies would receive tax relief for decommissioning expenditure. This is the main reason why PRT, which only applies to older fields, turns negative at the end of that decade.

4.58 The key sensitivity for this projection is the path for oil and gas prices. The large swings in oil and gas prices over the past decade have made UK oil and gas revenues the most volatile of the main tax streams. UK oil and gas revenues have varied between 0.4 per cent of GDP and 0.9 per cent of GDP between 2000 and 2010. Higher oil and gas prices than expected would boost profits, although if they were associated with strong cost pressures as in the mid-2000s, the gain in receipts would be dampened. In contrast, persistently low oil or gas prices would not only reduce profits but also discourage investment and accelerate the decommissioning of fields. In such a scenario, the drop off in production and hence receipts is likely to be steeper than envisaged here.

Tobacco duties

4.59 This section looks at the impact on tobacco receipts from the long-run decline in smoking. The percentage of adults smoking has fallen from around 45 per cent in the mid-1970s to 30 per cent at the start of the 1990s and to 21 per cent in 2009-10.[4] The reduction reflects health promotion campaigns, the decline in the social acceptability of smoking, high duty rates (with duty averaging over three-quarters of the packet price) and more recently the smoking ban in enclosed workplaces.

Chart 4.11: Cigarette clearances



Source: HMRC, OBR

[4] ONS (2011)

4.60 Chart 4.11 shows the recent decline in duty-paid cigarette clearances and our projection out to 2030. Recent trends mirror the decline in smoking in the population. The volatility in the late 1990's reflected forestalling (when manufacturers stockpile duty paid cigarettes, in advance of an anticipated increase in excise duty or their own price increase) and a sharp rise in the illicit market share which was subsequently countered by policy action. Abstracting from this volatility, the long-run trend decline in duty-paid clearances has been broadly 2 per cent per annum.

4.61 The projection of tobacco revenues out to 2030 uses HMRC's tobacco receipts forecasting model. The projection assumes that:

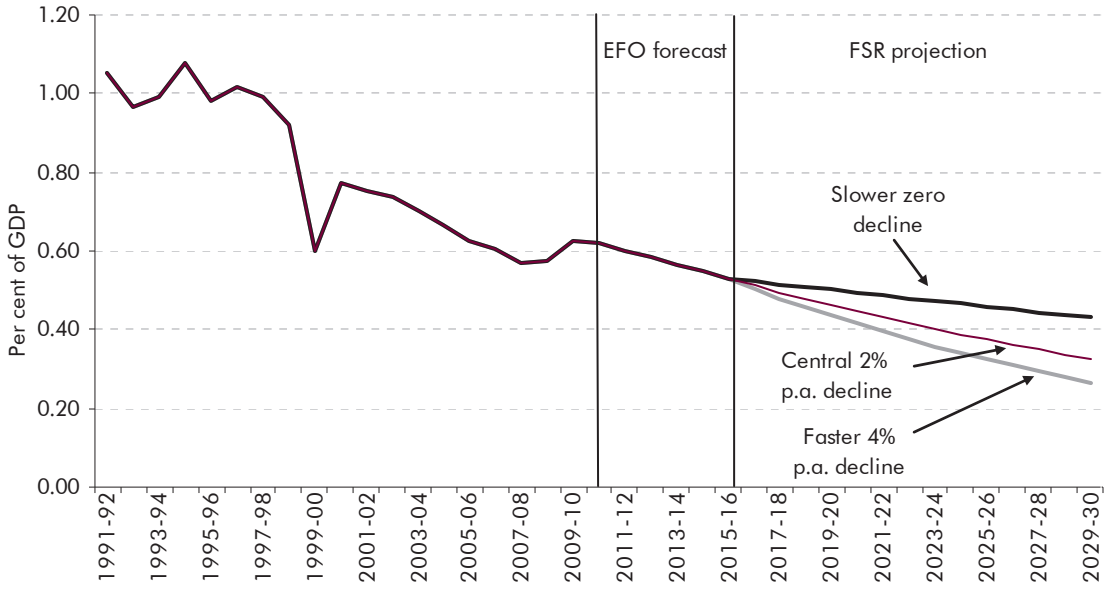
- revenues to 2015-16 are in line with the March forecast;
- duty rates are uprated by RPI inflation each year, once the tobacco duty escalator finishes in 2014-15; and
- duty paid clearances of cigarettes fall by around two per cent per annum from 2016-17, in line with the underlying historical trend. Clearances of hand-rolling tobacco are assumed to be flat from that time.

4.62 On the basis of these assumptions, tobacco receipts are projected to drop from 0.6 per cent of GDP in 2010-11 to just over 0.3 per cent of GDP by 2029-30.

4.63 A 2 per cent per annum decline in duty-paid clearances of cigarettes would be in line with the historical trend, but Chart 4.12 looks at the sensitivity of the projection to alternative assumptions on clearances. The continued drop in the smoking prevalence in the under 25 age group suggests further falls can be expected and the Government set out its ambition to reduce smoking prevalence among adults from 21 per cent to 18½ per cent by the end of 2015 in the Tobacco Control Plan for England published in March 2011. To this end, a display ban will be implemented in large shops in England and Scotland from April 2012 and for all other shops from April 2015. The Government is also consulting on options to reduce the promotional impact of tobacco packaging, including the option of plain packaging.

4.64 There are clear uncertainties around this projection. The projection implicitly assumes no change in the market share of illicit tobacco or from cross border shopping. The illicit market share has fallen in recent years and HMRC launched a revised tobacco strategy in April to put further downward pressure on the share, although it remains a risk. The HMRC publication on *Measuring Tax Gaps 2010* suggested mid-point estimates for the illicit market share of 11 per cent for cigarettes and 49 per cent for hand-rolling tobacco in 2008-09.

Chart 4.12: Tobacco receipts



Source: ONS, OBR

Conclusion

4.65 The analysis in this chapter suggests that non-demographic factors could lower the tax to GDP ratio for these specific tax streams by up to 2 percentage points over the next 20 years, equivalent to £29 billion or £1,130 per household in today's money:

- fuel duties are projected to fall from 1.8 per cent of GDP in 2010-11 to around 1 per cent of GDP in 2029-30;
- VED receipts are projected to drop from 0.4 per cent of GDP in 2010-11 to around 0.1 per cent of GDP in 2029-30;
- UK oil and gas revenues are projected to decline from a peak of 0.9 per cent of GDP in 2011-12 to between 0.1 per cent and 0.2 per cent of GDP by 2029-30;
- tobacco duties are projected to fall from 0.6 per cent of GDP to just over 0.3 per cent of GDP in 2029-30; and
- receipts from the climate change levy, the carbon price floor and EU ETS auction receipts are expected to rise from under 0.1 per cent of GDP in 2010-11 to over 0.3 per cent of GDP by 2029-30.

4.66 Our analysis of income tax and NICs shows that the average tax rate would increase if income shifts towards the top end of the income distribution. So if the recent trend of increasing income inequality were to continue in the future it would potentially drive an increase in personal tax receipts. Conversely, a reversal of income inequality would lead to a fall in revenues.

4.67 This is not a comprehensive analysis of the effect on taxes from non-demographic factors and we have not included the estimates above in our central projection. Our intention is to cover other revenue streams in future reports.

4.68 Other things being equal, a lower tax to GDP ratio for the specific tax streams set out above would increase the deficit and push up public sector net debt. But clearly it is a different kind of threat to sustainability than those considered in the previous chapter. Taxpayers would in effect be receiving a tax cut that the government had not announced and it could offset this without leaving them worse off in aggregate.

4.69 That said, our analysis does suggest that governments are likely to need to find replacement streams of revenue in the future if they wish to maintain or increase the ratio of tax to GDP. But this is an opportunity as well as a challenge, as the response could be structured in such a way as to make the overall tax system more efficient. Recommendations regarding the appropriate structure of the tax system lie outside our remit. Recent external recommendations include those of the Mirrlees Review, undertaken by the Institute for Fiscal Studies.

4.70 The need to find replacement revenues has been a policy challenge for governments in the past. Tax streams such as oil and gas revenues and excise duties have generally been in decline as a share of GDP since the mid-1980s. For example, oil and gas revenues peaked at around 3 per cent of GDP in the mid-1980s but have averaged only around 0.6 per cent of GDP in the last decade. Offsetting this, VAT and capital taxes now raise more than they used to, reflecting a combination of trends in the tax bases and deliberate policy action.

5 Summary indicators of fiscal sustainability

Introduction

5.1 In Chapter 3 we set out illustrative long-term projections for UK public spending and revenues, and the implications that these would have for the health of the public finances. In our central projection, under our assumptions for unchanged policies, public sector net debt and debt interest would eventually rise continuously as a share of GDP, thanks largely to the prospective ageing of the population.

5.2 This trajectory would clearly be unsustainable, but it would also probably be common to most industrial countries. In this chapter we discuss two widely used indicators that define the concept of sustainability more rigorously and quantify the scale of tax increases and/or spending cuts that might eventually be required to move the public finances back onto a sustainable path.

Indicators of sustainability

The inter-temporal budget gap

5.3 Most definitions of fiscal sustainability are built on the concept of solvency – the ability of the government to meet its future obligations. In formal terms this solvency condition can be given by the government's inter-temporal budget constraint.[1] Satisfying this condition requires the government to raise enough revenue to cover all its non-interest spending and also to service and eventually pay off its outstanding debt over an infinite time horizon. This requirement is normally expressed in stock rather than flow terms, namely that the present value of government receipts should be equal to or greater than the sum of its existing debt plus the present value of all its future spending.

5.4 In the event that a government is not on course to satisfy the inter-temporal budget constraint, the 'inter-temporal budget gap' is a measure of the immediate

[1] For derivation of the inter-temporal budget constraint see European Commission (2009).

and permanent change in the primary balance (i.e. in revenue less non-interest spending) necessary to put it back on course.

5.5 The primary balance required to satisfy the inter-temporal budget constraint depends crucially on the size of the gap between the real interest rate that the government has to pay on its debt and the long-run growth rate of the economy. The higher the interest rate, the quicker debts will accumulate; the higher the growth rate, the easier it is to service and pay them off. If the interest rate exceeds the economic growth rate (as it is normally assumed to do) then in the long run the government will need to raise more in revenue than it spends on things other than debt interest (i.e. to run a primary budget surplus) in order to service and pay off the debt. The greater the amount by which the interest rate exceeds the growth rate, the bigger the primary surplus required.

5.6 In our central projections we assume that the long-run real interest rate is 2.4 per cent and that the long-term growth rate of the economy is 2.2 per cent, which implies that only small permanent primary surpluses are required to stabilise debt. As the inter-temporal budget gap is calculated from revenue and spending flows over an infinite time horizon, we have to make some assumption about their behaviour beyond our 50 year projection horizon – for simplicity we hold them constant as proportions of GDP after 2060-61.

5.7 On this basis, the UK's inter-temporal budget gap is currently equal to a little over 3 per cent of GDP. In other words, under our central projections the government would need to increase taxes and/or cut spending permanently by a little over 3 per cent of GDP (around £45 billion in today's terms) from 2016-17 onwards to satisfy the inter-temporal budget constraint with an immediate and permanent adjustment. It should be emphasised that this would be an additional tightening after and on top of the fiscal consolidation programme that is already in train for the rest of this parliament.

5.8 The European Commission regularly calculates the inter-temporal budget gap for EU member countries, referring to it as its 'S2 indicator'. The Commission's most recent estimate for the UK was 12.4 percent of GDP in 2009[2], well above the EU average of 6.5 per cent of GDP. This figure is much larger than those we have calculated above, in part because our calculation includes the effect of the near-term consolidation. The EU figure was calculated before the current Government's consolidation plan was set out. The EU figure is also calculated with reference to the general government gross debt ratio used in the Maastricht criteria rather than the public sector net debt ratio that we focus on. The Commission's next estimates are due in 2012.

[2] European Commission (2009).

5.9 The inter-temporal budget constraint has the advantage of theoretical rigour, but it also has limitations. For example, it assumes that governments will eventually wish to eliminate their debts entirely, which relatively few have expressed a desire to do. Revenue and spending projections over 50 years are uncertain enough; projections over an infinite horizon are clearly far more so. It might be thought insufficiently constraining, as rather than being met through an immediate and permanent adjustment, it could allow governments to run large fiscal deficits for extended periods provided there are sufficiently large fiscal surpluses at some point in the potentially far distant future. It does not seem realistic to assume that any government could credibly commit itself and its successors to such a path of long-deferred virtue. Tolerating persistent deficits in the medium term also risks incurring a loss of market confidence and the negative economic consequences discussed in Chapter 3. As a result, alternative criteria are usually used to judge sustainability, the most common being the 'fiscal gap'.

Fiscal gaps

5.10 Rather than looking over an infinite horizon, as the inter-temporal budget gap does, fiscal gaps are judged over a pre-determined finite horizon. The fiscal gap is the immediate and permanent change in the primary balance needed to achieve a certain, pre-determined debt to GDP ratio in a specified target year.

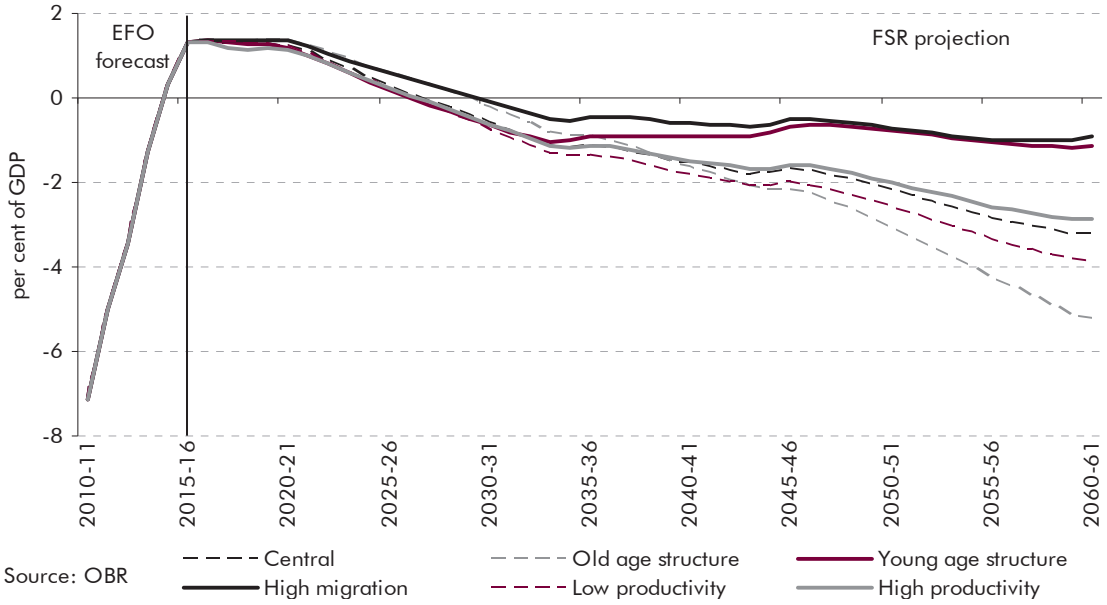
5.11 One of the main strengths of fiscal gaps is that they are intuitive and can be interpreted easily in the context of some policy rules, such as the Maastricht debt criterion. But there is no consensus regarding the level of the optimal debt ratio and how quickly one should aim to return to it if the public finances are pushed off course. It is also important to remember that while a fiscal gap of zero implies that the public finances are sustainable for a given debt target and timetable, this does not necessarily mean that current fiscal policy is optimal.

5.12 The focus on a particular target year means that the path of the primary balance beyond this point is ignored. In the absence of a policy rule that dictates the choice of target year, the aim is normally to pick a date just far enough into the future to capture the most significant (typically demographic) future influences on the public finances, but not so far into the future that the projections are subject to any greater uncertainty than necessary.

5.13 Table 5.1 shows fiscal gap calculations for the primary balances shown in Chart 5.1 and with a target date at the end of our projection horizon in 2060-61. As with the inter-temporal budget gap calculation, the primary balance necessary to stabilise debt as a share of GDP depends crucially on the difference between the real interest rate and the long-term economic growth rate. We therefore show the gaps not only for our central assumption that the long-run real interest rate exceeds the economic growth rate by 0.2 percentage points, but also under

alternative assumptions where the interest rate is 1 percentage point higher or lower relative to the long-term economic growth rate.

Chart 5.1: Primary balances for variant assumptions



Source: OBR

Table 5.1: Fiscal gap estimates

	Adjustment in primary balance to reach debt to GDP ratio in 2060, per cent of GDP	
Debt in 2060:	**40**	**70**
Central projection	1.5	0.8
Interest rate 1 per cent higher	1.8	1.2
Interest rate 1 per cent lower	1.2	0.4
Gradual progress[1]	0.5	0.3
Low productivity	1.9	1.3
High productivity	1.2	0.3
High migration	0.4	-0.3
Old age structure	1.8	1.2
Young age structure	0.6	-0.1
Increased health spending[2]	3.9	3.2
Slower expansion of morbidity	1.1	0.5

[1]Adjustment required each decade.

[2]Real health spending per person growth of 3 per cent per annum.

5.14 The table shows that for the government to target debt at its pre-crisis level of around 40 per cent of GDP in 2060-61, it would require a permanent increase in taxes or cuts in spending of 1.5 per cent of GDP (£22 billion in today's terms) in 2016-17 or a series of tax increases or spending cuts worth an additional 0.5 per cent of GDP (£7 billion) each decade.

5.15 The necessary adjustment would be larger if the long-term interest rate was to exceed the economic growth rate by more than we assume in our central scenario, or if productivity growth were slower, or the age structure older than in our central projection. By far the biggest adjustment would be required in the scenario where we assume that 'unchanged policy' is consistent with real health spending per capita growing at 3 per cent per year rather than the 2 per cent assumed in our central projection. In this case the required adjustment would be between two and three times bigger – a one-off 3.9 per cent of GDP from 2016-17, or 1.4 per cent of GDP each decade.

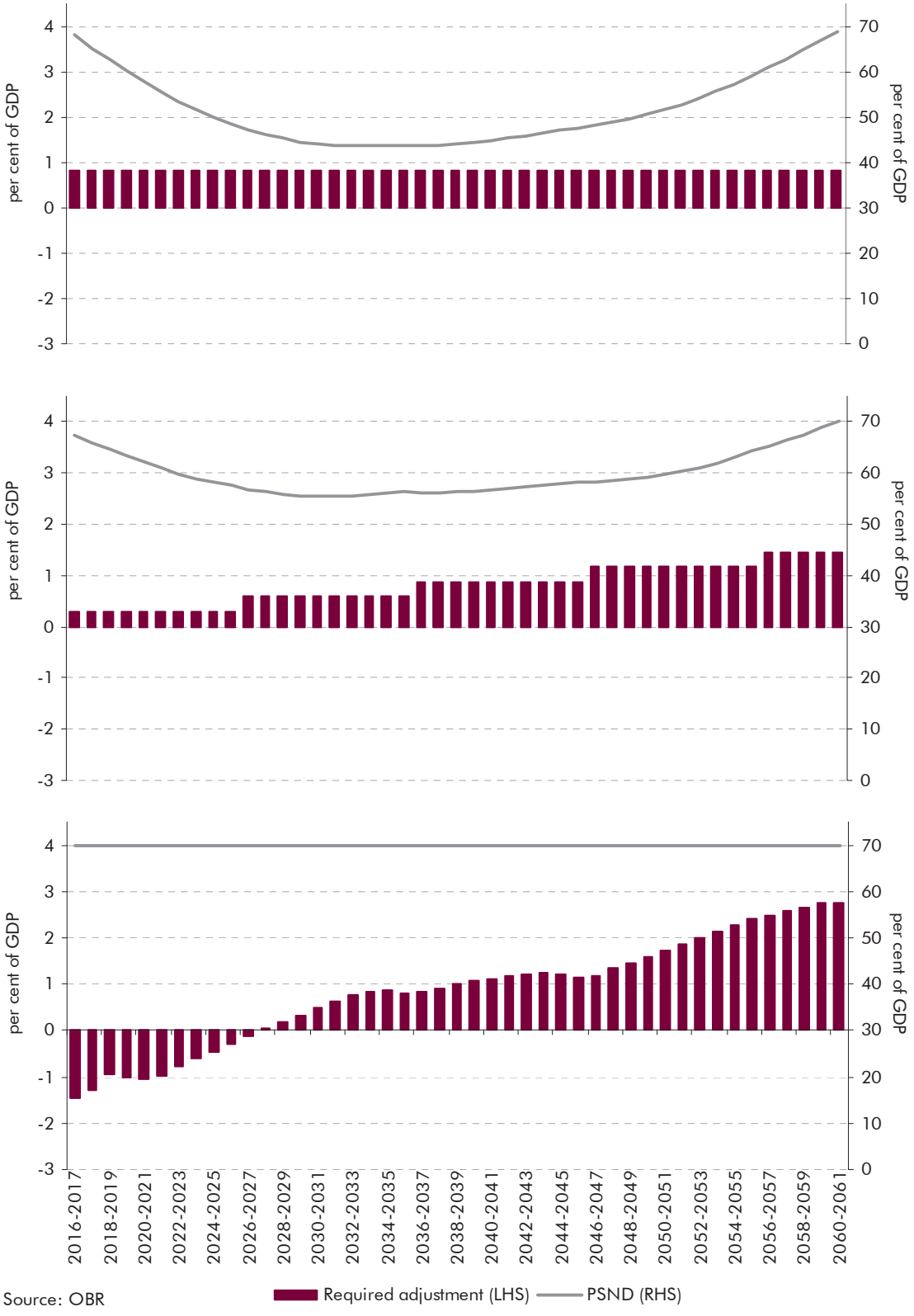
5.16 As before, the European Commission also calculates fiscal gap measures for EU members. Its 'S1 indicator' is the change in the primary balance required to stabilise the gross general government debt at the Maastricht ceiling of 60 per cent of GDP in 2050 assuming that tax revenues are constant as a share of GDP. The Commission's 2009 estimate put the S1 indicator at 8.8 per cent of GDP for the UK, well above the EU average of 3.3 per cent of GDP. As with the inter-temporal budget gap, this figure is much larger than those we have presented here, in part because we are looking at the adjustment required above and beyond the current consolidation plan in place for the current parliament.

5.17 The decision on how quickly to close the fiscal gap will affect how the debt ratio moves in the period preceding the target date. Chart 5.2 illustrates the impact of three differently timed policy responses if the goal was to target a debt ratio of 70 per cent of GDP in 2060-61, in other words roughly the level at which we forecast it to peak in 2013-14 in our March *Economic and fiscal outlook*.

5.18 The chart shows that a one-and-for-all policy tightening of 0.8 per cent of GDP in 2016-17 would bring debt down to a little under 45 per cent of GDP in the 2030s before rising back to 70 per cent in 2060-61. Tightening policy by 0.3 per cent of GDP a decade would see it fall only to 55 per cent of GDP before rising again. Governments could also adjust the tightening year by year to hold the debt ratio stable at 70 percent – this would actually allow a significant policy loosening in the early years, but would require a much bigger tightening later. It is far from clear that this path of adjustment would be seen as credible or economically desirable.

5.19 The differences highlight the fact that even if you know where you want the debt ratio to end up, you do not necessarily want to keep it at that level all the time. In the run-up to the recent financial crisis several countries were endeavouring to 'pre-fund' the costs of an ageing population by tightening fiscal policy sufficiently to bring their debt to GDP ratios considerably lower. The intention was that when the costs of ageing materialised they could allow the debt ratio to rise again rather than having to impose much bigger spending cuts and tax increases.

Chart 5.2: Alternative adjustments to our central projection for the primary balance and the implied debt to GDP ratios



Source: OBR

5.20 The choice of time profile has implications for how the burden of the adjustment is spread across the generations. We discuss the issue of intergenerational fairness, which is absent in these types of fiscal gap calculations, in Box 5.1.

Box 5.1: Intergenerational fairness

Solvency is not the only criterion that can be taken into account when assessing fiscal sustainability. For example, if the inter-temporal budget gap is equal to zero, this does not mean that the burden will be distributed equally across time or that it will move with spending. Future tax rises to pay off previously incurred debt will meet the solvency condition, but may not be considered intergenerationally fair.

A policy of delayed action would make future generations relatively worse off than current generations. This concern can be addressed using 'generational accounts'. These show the net discounted life-time contribution that people are expected to make to the public finances as a function of their age.

By combining these accounts for all existing generations it is then possible to calculate the account of all future generations that would satisfy a solvency condition. If the account for future generations is larger than that of current newborns this indicates that, on this definition, future generations are being treated unfairly. It is then possible to calculate the intergenerational budget gap, which represents the tax or spending change needed to close this generational imbalance.

The National Institute of Economic and Social Research (NIESR), supported by the ONS, recently published updated generational accounts for the UK.[a] The table below sets out their calculations of the total net present value of future fiscal contributions of persons of various ages.

Table A: NIESR generational accounts

Generational account in 2008 prices (£ thousands)											
Age	0	5	10	15	20	25	30	35	40	45	50
Total	68.4	79.2	106.9	143.2	157.7	124.5	67.6	29.8	-11.9	-58.6	-105
Age	55	60	65	70	75	80	85	90	95	Future Generations	
Total	-155.1	-198.9	-223.1	-206.9	-177.7	-143.4	-114.6	-86	-57.7		159.7

On the basis of NIESR's figures, a current new-born baby would make an average net discounted contribution to the Exchequer of £68,400 over its life-time, whilst future generations would have to contribute £159,700 (discounted to 2008 but growing at 2 per cent per year).

[a] McCarthy, Sefton and Weale (2011)

Conclusion

5.21 Our central projections, and several of the variants we calculated in Chapter 3, show that on current policy we would eventually expect to see public sector net debt on a continuously rising trajectory as a share of GDP. This would clearly be unsustainable. We would see a similar picture for most industrial countries, as the fiscal challenges of an ageing population are common to many. As the International Monetary Fund argued in their Fiscal Monitor in April: *"Although substantial fiscal consolidation remains in the pipeline, adjustment will need to be stepped up in most advanced economies, especially to offset the impact of age-related spending… From an even longer-term perspective, spending on pensions – and especially, health care – constitutes a key challenge to fiscal sustainability."*

5.22 In this chapter we have examined the scale and timing of potential policy responses that could return the UK's public finances to a sustainable position, given different definitions of what a sustainable position might be. The Government has no long-term target for the debt to GDP ratio and indeed there is no consensus as regards an optimal ratio or how quickly one should try to return to it when the public finances are blown off course. So the targets and paths that we have set out here should be regarded as purely illustrative, rather than recommendations. As we have demonstrated, even if you do have a target for a particular debt ratio in a particular year, you still have many options in deciding the timing of the response and the behaviour of debt in the meantime.

5.23 Clearly it would be unrealistic for any government to set out a fiscal strategy for 50 years and have anyone expect that it would be in a position to implement it all. The main lesson of our analysis is that future governments are likely to have to undertake some additional fiscal tightening beyond the current parliament in order to address the fiscal costs of an ageing population.

5.24 Our report should not be taken to imply that the consolidation already in the pipeline for the next four years should be made even bigger. That said, policymakers and would-be policymakers should certainly think carefully about the long-term consequences of any policies they introduce in the short term. And they should give thought too to the difficult choices that will confront this country once the challenge of the current consolidation has passed.

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