



National Audit Office

# Audit of Assumptions for Budget 2009

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This report has been prepared for presentation to the House of Commons under Sections 156 and 157 of the Finance Act 1998.

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**Comptroller and Auditor General**  
**National Audit Office**

**20 April 2009**

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# REPORT

## Statement of Responsibilities

**1** Sections 156 and 157 of the Finance Act 1998 provide for me to examine and report on conventions and assumptions underlying the Treasury's fiscal projections that are submitted to me by the Treasury for examination.

**2** The Chancellor of the Exchequer has asked me to audit two new assumptions:

- to assess if the 2008 Pre-Budget Report assumption for the trend rate of growth, allowing for a downward adjustment to the trend output level of around 4 per cent, for the post 2006 period, together with the further downward adjustment at Budget 2009 to the trend output level of around 1 per cent, is reasonable and cautious; and
- to examine whether the approach used by the Treasury to produce estimates of the fiscal aggregates adjusted for the effects of the economic cycle is reasonable.

**3** At the time of the March 2000 Budget, the Chancellor asked me to carry out a three year rolling review of the assumptions I have audited previously. This is to provide a check both that the assumptions remain reasonable and cautious, and to see whether they have indeed resulted in reasonable and cautious projections in the period since they were last audited. The remit is:

- To ensure that the key audited assumptions underpinning projections of the public finances remain valid, the Comptroller and Auditor General shall examine each audited assumption three years after its most recent audit:

- to review whether the assumption has resulted in reasonable and cautious projections of the elements of the public finances projections it relates to since it was first audited; and
- to check that it remains a reasonable and cautious assumption to use in future projections of the public finances.

**4** The rolling review on this occasion covers assumptions for the trend growth rate of output, privatisation proceeds and short term interest rates, last examined in full for Budget 2006.<sup>1</sup> The rolling review assessment of the trend growth rate in this report incorporates a review of the working population component of the trend growth rate, which I examined for the 2006 Pre-Budget Report.<sup>2</sup> I have combined the rolling review assessment of trend growth with that for the new assumption above for trend growth after 2006. The review of the methodology for projecting interest rates takes account of previously announced adjustments made by the Treasury during the later part of the rolling review period, to avoid erratic forecasts resulting from volatility in money markets.<sup>3</sup>

**5** My Budget 2006 rolling review also covered an assumption for the impact of a direct tax compliance package. I noted at the time that no additional revenue impact from the compliance package was to be assumed beyond 2005-06. The activities undertaken as part of the package were subsumed within wider HM Revenue and Customs work to improve taxpayer compliance, and no separate estimate for the yield of the package were made after Budget 2006.<sup>4</sup> The assumption is not therefore covered in this rolling review.

<sup>1</sup> *Audit of Assumptions for Budget 2006*, HC 937, Session 2005-06.

<sup>2</sup> Paragraphs 27-40, *Audit of Assumptions for the 2006 Pre-Budget Report*, HC 125, Session 2006-07.

<sup>3</sup> See *Audit of Assumptions for the 2008 Pre-Budget Report*, HC 1150, Session 2007-08, paragraph 3.

<sup>4</sup> *Audit of Assumptions for Budget 2006*, HC 937, Session 2005-06, paragraph 52.

**6** The Budget 2006 rolling review also included an assumption for forecasting tobacco duty revenues. Because of problems in obtaining reliable estimates of the illicit market share of the tobacco market for 2004-05 and 2005-06, it proved impossible for me to conclude then whether the assumption was reasonable and cautious,<sup>5</sup> and HMRC undertook further work, which I subsequently audited for Budget 2007.<sup>6</sup> The rolling review for the tobacco revenue assumption is therefore due for Budget 2010 rather than now.

**7** The Chancellor has advised me that none of the other assumptions examined in my previous reports on Budget and Pre-Budget Report assumptions has been changed. As before, the Treasury remains responsible for making projections of future public expenditure and revenue on the basis of the audited and other assumptions.

## Basis of Report

**8** For all assumptions, I have considered evidence from relevant papers and discussions with officials in the Treasury. In addition, I have reviewed the published work of a number of external organisations and held discussions with the bodies listed in Appendix 1. The work I carried out to review the revision introduced at Budget 2009 to the trend growth rate assumption was at that time market sensitive, because of its impact on projections of the public finances. As such, while I was able to draw on the discussions I held up to the time of the Budget 2009 announcement with external organisations and other experts as part of my review of previously announced changes to trend, I was not able to directly engage with them on this further element of the work, which I might otherwise have done.

## Report

### The trend growth rate of output

#### Trend growth over the rolling review period

**9** The trend level of output, defined by the Treasury in terms of UK non-oil Gross Value Added, GVA, is the output path along which the economy can grow on a sustained basis, without putting upward or downward pressure on inflation. The Treasury's estimates of the output gap, and an assessment of the economy's momentum informs judgement on the path of the economy back towards its trend level. As such, the Treasury's trend output projection provides a medium term anchor for its economic forecasts. Once the economy is judged to have returned to trend, growth is held at its trend rate.

**10** The Treasury's projections of trend growth are decomposed into four components: growth in productivity (measured by output per hour); growth in average hours worked; growth in the employment rate; and growth in the adult (16 and over) population.<sup>7</sup> This methodology does not explicitly decompose trend productivity growth into total factor productivity growth and capital deepening (increased capital per hour worked). These effects are subsumed within the labour productivity component.

**11** The period of the rolling review covers the three years since Budget 2006 up to Budget 2009. The Treasury has made three changes over this period to its assumption for the path of trend output. The first, at the time of the 2006 Pre-Budget Report, arose from new evidence on the contribution of net migration to working age population growth. Although slower growth of the population of working age was expected due to the retirement of post-War baby boom women reaching retirement age, this effect was expected to be offset by higher net inward migration. Faster growth of the working population fed through to a higher trend growth rate.<sup>8</sup> In consequence, the Treasury's 'neutral' estimate of trend output growth from the end of 2006 was increased from 2½ to 2¾ per cent per year. The rate used for making the fiscal projections, a ¼ per cent less than the neutral rate on the grounds of caution, increased from 2¼ to 2½ per cent.

<sup>5</sup> *Audit of Assumptions for Budget 2006*, HC 937, Session 2005-06, paragraph 72.

<sup>6</sup> *Audit of Assumptions for Budget 2007*, HC 393, Session 2006-07, paragraphs 47-64.

<sup>7</sup> The Treasury made small offsetting adjustments to the trend growth components at the time of the 2007 Pre-Budget Report, within an unchanged projection for overall trend growth, to align them with the decomposition of trend growth over the past (as estimated on the basis of the data available at the time). The projection for underlying trend productivity growth was increased, while the trend employment rate and trend average hours projections were reduced. Further details are given on pages 142-144 of the 2007 Pre-Budget Report. The '16 and over' age basis for adult population was introduced by the Treasury at Budget 2008, in place of a definition based on age '16 to State Pension Age', to make its trend growth framework more fully representative of the changing structure of employment and proposed revisions to the State Pension age. Offsetting effects on population and employment rate growth left the overall trend growth rate unchanged. Further details are set out in Box B6 of the Budget 2008 Report.

<sup>8</sup> See paragraphs 28-40, *Audit of Assumptions for the 2006 Pre-Budget Report*, HC 125, Session 2006-07.

**12** The upward revision to the trend growth rate was based on the Treasury's assumption that net inward migration would be 190,000 a year. This compares with Office for National Statistics estimated outturns of 191,000 for 2006 and 237,000 in 2007.<sup>9</sup> These figures indicate that the Treasury's assumption for net inward migration at the time of the 2006 Pre-Budget Report was cautious for these two years. Data for outturn net migration in 2008 will not be published until Autumn 2009.

**13** The second change to the Treasury's assumption for the path of trend output in the rolling review period was made at the time of the 2008 Pre-Budget Report.<sup>10</sup> At Budget 2008 the Treasury recognised that the stresses in financial markets that had emerged could potentially represent risks to trend output, and because of the uncertainties kept the assumption under review.<sup>11</sup> The stresses dramatically intensified in September and October 2008, and in the light of the emerging evidence on the systemic impact of the financial crisis, the Treasury assumed for the 2008 Pre-Budget Report that the shock to the economy would result in a permanent loss of output of around 4 per cent.

**14** The Treasury adjusted its assumed path for trend output at the 2008 Pre-Budget Report by phasing in this loss of output between 2007Q3 and 2009Q3 – a period consistent with the 2008 Pre-Budget Report assumption that credit conditions would remain tight in 2008, and ease slowly through 2009 before stabilising in 2010. Trend growth was assumed to revert by late 2009 to 2½ per cent per year, for the purposes of making the fiscal projections, and to 2¾ per cent per year in the Treasury's neutral view, used for making economic forecasts. The 2008 Pre-Budget assumption implied a 4 per cent reduction in the trend level of output by the end of the Treasury's projection period.

**15** A further change, made for Budget 2009, is a downward adjustment of around 1 per cent to the level of trend output, in addition to the downward adjustment of 4 per cent made at the 2008 Pre-Budget Report. The Treasury's total downward adjustment of around 5 per cent has been phased in over the three years from 2007Q3 to 2010Q3, a period that remains broadly consistent with its assumption about the state of credit conditions over the next few years that underpins its forecast more generally. The adjustment period is slightly longer than that assumed at the 2008 Pre-Budget Report, consistent with the Treasury's judgement that the effects of the financial market shock on economic activity have intensified.

**16** **Figure 1** illustrates the adjustments made by the Treasury at the 2008 Pre-Budget Report and at Budget 2009. The assumed path for trend output at the 2008 Pre-Budget Report is arithmetically equivalent to assuming an average annual rate of trend growth of 1.3 per cent from the end of 2006 to 2008Q4. The assumed path for trend output at Budget 2009 is arithmetically equivalent to 1.4 per cent over the same period.

**17** One test of the validity of the assumptions that have been adopted by the Treasury is a comparison with external estimates of the trend growth rate over the rolling review period. **Figure 2** shows the most recent external estimates of trend growth rates, though these estimates are subject to considerable uncertainty.

**18** **Figure 2** shows that the Treasury's estimate of the trend growth rate used for projecting the public finances of 2½ per cent for the period 2002 to 2006 at Budget 2006 was very similar to the most recently produced external average for 2006 of 2.5 per cent.

**19** At the time of my audit for the 2006 Pre-Budget Report, the trend growth rate assumption of 2½ per cent applying to projections of the public finances appeared reasonable and cautious, in the light of the information available then and on the basis that it was below the then range of external forecasts of the long term growth rate.<sup>12</sup> I stressed the uncertainties in such estimates. The 2½ per cent assumption was matched by external estimates of trend growth for 2006, as shown in **Figure 2**, and was therefore reasonable. The most recent external estimates of trend growth show that the Treasury's 2½ per cent assumption, used for projections between the 2006 Pre-Budget Report and Budget 2008, is higher than the average of latest external estimates for 2007 and 2008 (2.3 and 2.0 per cent respectively). The assumption proved with hindsight not to be cautious against later external estimates of trend growth rates. The most recent estimates have been made with much fuller knowledge of the impact of the financial crisis, however, whereas those made by the Treasury up to the 2008 Pre-Budget Report were not.

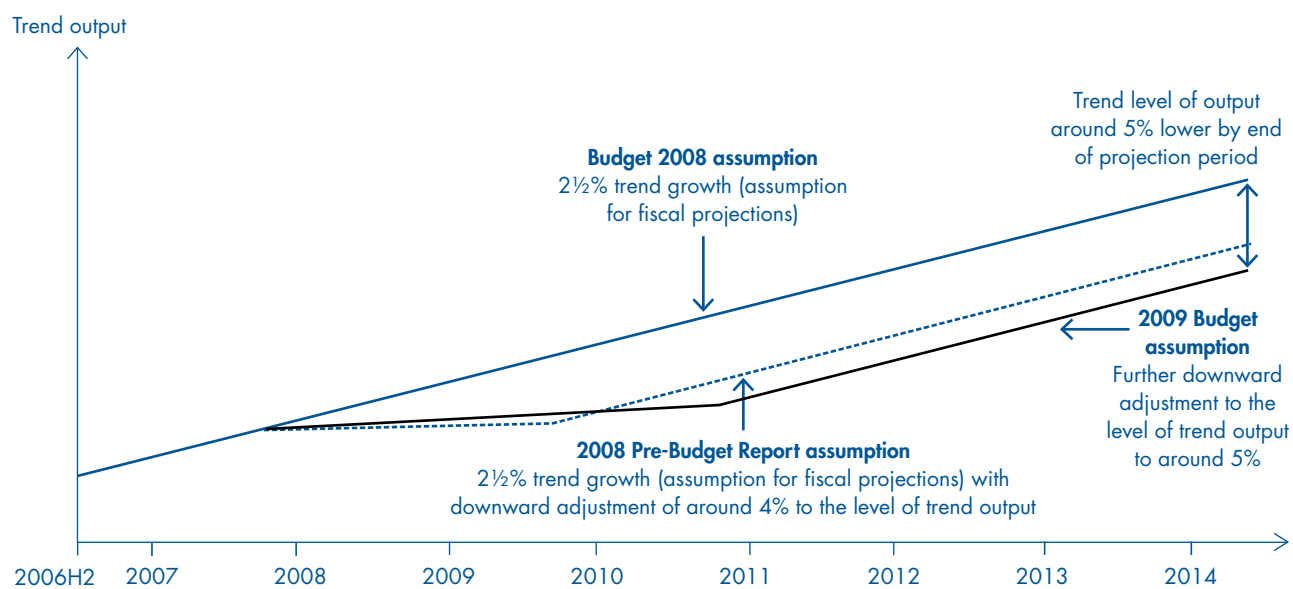
<sup>9</sup> *News Release, Office for National Statistics, 19 November 2008, <http://www.statistics.gov.uk/pdfdir/tim1108.pdf>.*

<sup>10</sup> See paragraph 4, *Audit of Assumptions for the 2008 Pre-Budget Report*, HC 1150, Session 2007-08. I did not audit this change at the time, but expected to be asked to do so for Budget 2009.

<sup>11</sup> See paragraph B.100 of the Budget Report 2008.

<sup>12</sup> Paragraph 47, *Audit of Assumptions for the 2006 Pre-Budget Report*, HC125, Session 2006-07.

## 1 The Treasury's 2008 Pre-Budget Report adjustment to the path of trend output



Source: HM Treasury

## 2 Most recent external estimates of the UK trend growth rate, 2006-2008

Organisation	2006	2007	2008	2006-2008 <sup>5</sup>
	%	%	%	%
European Commission <sup>1</sup>	2.2	2.0	1.5	1.9
International Monetary Fund (IMF) <sup>2</sup>	2.7	2.5	2.3	2.5
OECD <sup>3</sup>	2.4	2.2	1.8	2.1
Oxford Economics <sup>4</sup>	2.7	2.5	2.5	2.6
<b>Highest</b>	<b>2.7</b>	<b>2.5</b>	<b>2.5</b>	<b>2.6</b>
<b>Lowest</b>	<b>2.2</b>	<b>2.0</b>	<b>1.5</b>	<b>1.9</b>
<b>Average</b>	<b>2.5</b>	<b>2.3</b>	<b>2.0</b>	<b>2.3</b>

Source: National Audit Office

### NOTES

- 1 Estimates based on the European Commission Services' interim forecast, published 19 January 2009.
- 2 World Economic Outlook – Update January 2009, IMF, January 2009.
- 3 Supplied to the National Audit Office by OECD.
- 4 Estimates supplied to the National Audit Office by Oxford Economics.
- 5 Average annual trend growth rate over the period 2006 to 2008. All averages in the Figure are rounded to one decimal place.

**20** The Treasury's 2008 Pre-Budget Report adoption of an assumption for trend growth of 1.3 per cent between 2006H2 and 2008, allowing for the severity of shocks to the economy as judged at that time, is considerably lower than the most recent external average of 2.3 per cent over the same period, which also takes into account economic shocks. On the basis of a comparison with the external estimates in Figure 2, which might not be fully representative of external opinion, the adjusted trend growth assumption adopted at the 2008 Pre-Budget Report looks cautious for the forecast made then within the rolling review. On the same basis, the Treasury's Budget 2009 assumed trend growth path between 2006H2 and 2008, arithmetically equivalent to 1.4 per cent per year, is also well below the most recent external average of 2.3 per cent and is a cautious view.

### The Treasury's assumption for trend growth looking forward

**21** The economic downturn will reduce UK output in the short term, but there are also good theoretical reasons to expect there to be an impact on the sustainable medium or longer term level of output or rate of growth as well. There are a number of possible impacts, including the following, the scale of which is uncertain.

**22** In the labour market, recession and associated rising unemployment may result in some workers permanently leaving employment and becoming economically inactive. This effect could arise if skill sets became inappropriate in the light of changes in the industrial structure of the economy. Lower labour market participation rates would reduce potential output directly and could lead to an increase in the level of the non-accelerating inflation rate of unemployment through reduced competitive pressures in labour markets. Labour productivity might also suffer through either or both a change in level or growth rate in the longer term if skills are eroded even when workers become re-employed. There is also a possibility that net inward migration could fall in a recession, and if new patterns of migration between countries became established in the longer term, the rate of increase of labour supply could fall for this reason as well.

**23** In the capital market, lower investment will reduce the rate at which technological change is embodied into production processes and possibly also limit the pace of innovation, with a downward impact on total factor productivity (a measure of the efficiency with which factors of production are combined). Such effects might occur in the form of a step change in productive potential rather than via a permanently lower rate of sustainable growth.

**24** In product markets, low profitability industries may be more at risk of closure in a recession than high profitability industries, and the effect of this could be to increase average productivity or its growth rate through an averaging effect, though the economy would be smaller. Moderation of commodity prices in a recession would tend to offset cyclical contractionary effects, limiting the extent of any changes in the economy, arising from changing industrial structure or scale, which could be persistent in the medium or longer term. It is possible that a deeper economic downturn will have more persistent effects on economic activity. The extent to which this is so will, however, depend on a range of factors, including the degree to which resources can be flexibly reallocated across the economy.

**25** A permanently higher level of risk aversion or more restrictive regulation in the financial sector would limit the supply of credit through a cost of capital effect. This might act to reduce the variability of actual output around the trend rate, though it could result in a step reduction in investment levels or total factor productivity, a one off loss to output or a reduction in the long term growth rate through reduced capital deepening.

**26** The Treasury set out a range of channels by which recent economic shocks could conceivably affect the path of trend output at the time of the 2008 Pre-Budget Report.<sup>13</sup> Though a variety of effects are possible that could affect the rate of trend growth, the Treasury judged that a number of the channels it identified were conceptually most likely to involve an adjustment to the trend level of productivity (and therefore trend output) by bringing about an adjustment in the capital stock and/or total factor productivity. This is a judgement that cannot be verified until the path of the economy over a number of years into the future is known.

**27** The Treasury assumed at the 2008 Pre-Budget Report that the adjustment to trend output resulting from lower capital stock and lower total factor productivity would take the form of a phased reduction in the level of productivity (as capital deepening and total factor productivity are subsumed in the labour productivity component in the Treasury's trend growth framework). The phased reduction in the trend *level* of output, between 2007Q3 and 2009Q3, as illustrated in Figure 1, implied a temporary reduction in the trend growth *rate* over this period. The Treasury assumed that the trend rate of growth would then revert to 2½ per cent per year, for the purposes of making the fiscal projections. The projection of trend output at the 2008 Pre-Budget Report was assumed to result in a permanent reduction of around

<sup>13</sup> See paragraphs A57-58 and Box A4 of the 2008 Pre-Budget Report.

4 per cent at the end of the medium term, compared to the level of output resulting from a rate of growth of 2½ per cent per year maintained from 2006H2, the assumed start point of the current economic cycle.

**28** The figure of a 4 per cent permanent loss of output adopted by the Treasury lay within the range of external estimates of the impact of the shocks to credit and energy markets on medium term potential output. In judging the appropriate size of the trend output adjustment, the Treasury took into account a range of factors, including the implications for the profile of the corresponding output gap<sup>14</sup> and available external estimates of the impact of the shock on potential output.

**29** In particular, a number of indicators of capacity utilisation and recruitment difficulties monitored at the time of the 2008 Pre-Budget Report by the Treasury suggested a significantly smaller output gap in the second half of 2008 than would have been implied had the Treasury maintained the Budget 2008 neutral trend growth assumption of 2¾ per cent. Indicators, for example, of capacity utilisation and recruitment difficulties produced by the Confederation of British Industry and the British Chambers of Commerce were close to their long term averages in 2008Q3, suggesting that output was relatively close to trend.

**30** The downward adjustment of 4 per cent to the level of trend output implied an output gap of close to zero in 2008Q3, in line with evidence from the cyclical indicators. In the absence of such an adjustment, the results of a mechanical calculation of the output gap in 2008Q3 would have fallen to -2 per cent, which would have been significantly at odds with the cyclical indicators.

**31** The adjustment of 4 per cent was also within the range of estimates cited in external analysis. Estimates produced in 2008 by the OECD<sup>15</sup> of the impact of a possible increase in the cost of capital on trend output ranged from 2 per cent up to 6 per cent depending on the assumptions used, and were in line with subsequent estimates made by the European Commission.<sup>16</sup> Estimates produced by the National Institute of Economic and Social Research<sup>17</sup> suggest that a sustained increase in risk premia of 200 basis points, around that seen in financial markets in 2008 up to September, would reduce output by slightly under 2 per cent, as a result of an increase in the user cost of capital.

**32** Since the 2008 Pre-Budget Report, the impact of the global shock to financial markets has intensified further and the downturn has been steeper than the Treasury had expected at that time. The Treasury has continued to consider the extent to which a deeper economic downturn than expected could have more persistent effects on economic activity, and judges that the effects of the financial market shock on trend productivity are likely to have intensified relative to the assessment set out in the 2008 Pre-Budget Report. The Treasury has therefore judged it appropriate to make a further downward adjustment of around 0.5 per cent to the level of trend productivity in addition to the downward adjustment of around 4 per cent assumed at the 2008 Pre-Budget Report. The total downward adjustment to trend productivity of 4.5 per cent has been phased in over the three years from mid-2007 and mid-2010, a period that remains broadly consistent with the credit conditions assumption that underpins the forecast more generally, but slightly longer than the two year adjustment assumed for the 2008 Pre-Budget Report, consistent with the judgement that the effects of the financial market shock on economic activity have intensified.

**33** There is also a possibility that the trend population level will adjust downwards as a result of a weaker short-term outlook for net migration. Accordingly, the Treasury has adjusted down the trend level of the 16+ population by around 0.5 per cent over the three years between mid 2007 and mid 2010. This adjustment brings the Treasury's net inward migration assumption for this period broadly into line with the average level of net migration underpinning the Office for National Statistics' 2006-based low migration variant population projection.

**34** Taken together, the Treasury's Budget 2009 projections for trend productivity and trend population components imply a downward adjustment to the trend level of output of around 5 per cent between mid 2007 and mid 2010. This downward adjustment is among the larger external estimates of the impact of the financial shock on trend output that are currently available. It implies an arithmetic trend growth rate for making projections of the public finances of 1.7 per cent between 2006 and 2013.

<sup>14</sup> The output gap is a measure of the position of the economy within the cycle and there are a number of approaches to measuring it.

See paragraphs 16-39, *Audit of Assumptions for the 2008 Pre-Budget Report*, HC 1150, Session 2007-08 for further details of output gap estimates.

<sup>15</sup> The implications of supply-side uncertainties for economic policy, OECD Economic Outlook No.83, June 2008.

<sup>16</sup> *Economic Forecast*, European Commission, Autumn 2008.

<sup>17</sup> Barrell R., Kirby S., *The Budgetary Implications of Global Shocks to Cycles and Trends in Output*, Economics and Social Research Institute Budget Outlook, October 2008, Dublin. The National Institute subsequently took account of adjustment in the financial sector, which might reduce sustainable output by a further 1 to 2 per cent or more over the longer term, National Institute of Economic and Social Research, Review, January 2009.

### Comparisons of the Treasury's assumption with external estimates of future growth rates

**35** External estimates of the trend growth rate are given in **Figure 3**, showing the most recent, for the period end 2006 to 2013. End 2006 is an approximation to 2006H2, the date judged by the Treasury to be the start of the current economic cycle, this being the point from which the Treasury projects trend output forward. The year 2013 is the last full year in the Treasury's fiscal forecast.

**36** The Treasury's trend growth rate assumption introduced at the 2008 Pre-Budget Report is arithmetically equivalent to 1.9 per cent per year for the period 2006H2 to 2013. The Treasury figure of 1.9 per cent over the period is close to but slightly above the average of the most recent estimates of external organisations of 1.8 per cent, shown in **Figure 3**. The Treasury's 2008 Pre-Budget trend growth rate assumption therefore appears on current information to have been reasonable within the latitude arising from the uncertainties in making estimates of trend growth. External forecasts represent central estimates rather than cautious ones, however, so there was no longer a clear margin for caution in the 2008 Pre-Budget Trend growth rate assumption up to 2013, taking the most recent average forecast as a comparator.<sup>18</sup>

**37** Consistent with this judgement and taking account of the factors above, the Treasury's revised trend growth rate assumption for Budget 2009 is below all but one of the publicly-available external estimates as illustrated in **Fig 3**, and therefore the revised assumption is cautious on the basis of this comparison. The Budget 2009 assumption implies an arithmetic average growth rate from 2006H2 to 2013 of 1.7 per cent per year, compared with the most recent external average estimate of 1.8 per cent. On this basis the assumption is therefore reasonable, as well as containing an element of caution. This conclusion is consistent with the information available to me up to publication of my report.

**38** A measure of the effect of over-estimating the trend growth rate for the purposes of the fiscal projections is given by a sensitivity calculation for the public finances. The Treasury estimates that raising the underlying growth rate by a ¼ percentage point a year would lead to higher tax revenues of about £1 billion in the first full year. This is equivalent to about a quarter of one per cent of total public sector receipts.

<sup>18</sup> The IMF's estimate of trend growth is due to be updated shortly after publication of this report. While the new IMF estimates were not finalised at the time of publication, I was informed by the IMF that its revised figures were likely to be below those shown in **Figure 3**. This would further reduce the degree of caution measured by comparison to the average of external forecasts.

### 3 Most recent external estimates of the UK trend rate of growth (per cent, per annum) end 2006 to 2013

Organisation	Most recent estimates
	Annual average trend growth rate, per cent per year, over the period <sup>3</sup>
International Monetary Fund (IMF) <sup>1</sup>	2.0
ITEM Club <sup>1</sup>	1.4
Morgan Stanley <sup>1</sup>	2.0
National Institute of Economic and Social Research (NIESR) <sup>1</sup>	1.9
OECD <sup>2</sup>	1.8
Oxford Economics <sup>1</sup>	1.9
Highest	2.0
Lowest	1.4
Average <sup>3</sup>	1.8

#### SOURCES AND NOTES

- 1 Estimates provided to the National Audit Office by the IMF, ITEM Club, Morgan Stanley, NIESR and Oxford Economics.
- 2 OECD, based on the profile implied by its methodology.
- 3 The average is based on averaging the different estimates of the index of potential output in 2013 and expressing the change from the base index of 100 as an annual average compound growth rate. Averages are rounded to one decimal place.

### The Treasury's approach to producing estimates of the public finances adjusted for the effects of the economic cycle

**39** Public sector borrowing and the budget balance (receipts less current expenditure) tend to fluctuate with the economic cycle, reflecting the working of 'automatic stabilisers'. Government spending will tend to rise in a recession, for instance, because expenditure on unemployment related benefits will increase, while tax revenues decrease. In the absence of any discretionary change to fiscal policy, these effects act automatically to offset movements in the level of demand in the economy.

**40** The Treasury makes estimates of the public finances adjusted for the effects of the economic cycle, to provide a measure of the underlying position. The cyclically adjusted fiscal position provides an estimate of the level of the government's surplus or deficit that can be expected

to apply on average over the course of an economic cycle, in the absence of any discretionary policy changes. Cyclically adjusted fiscal aggregates play an important role in assessing the sustainability of the public finances.

**41** The Treasury has published cyclically adjusted estimates of the current budget balance and public sector net borrowing since the 1998 Pre-Budget Report, under provisions in the Code for Fiscal Stability,<sup>19</sup> the purpose of which is in part to help promote transparency in the operation of fiscal policy. As a step towards further transparency, I have been asked to audit for this report whether the approach used by the Treasury to produce estimates of the fiscal aggregates adjusted for the effects of the economic cycle is reasonable.

**42** The Treasury aims to introduce caution into the projections of the public finances through the assumptions I audit, but I have not been asked to audit separately how cautious the specific process of making cyclical adjustments to fiscal aggregates is of itself. Estimates of the cyclically adjusted public finances depend on assessments of where the economy is in the cycle, as measured by the size of the output gap, which I have not been asked to audit, and I have not therefore audited the estimates of the adjusted public finances themselves.

**43** The extent to which the position in the economic cycle influences the public finances cannot be directly observed or measured precisely. The Treasury's approach is to use a ready-reckoner, derived by combining a range of information. An important element of the methodology is statistical estimates of the relationships between receipts and spending, as a proportion of GDP, and the output gap. To produce statistical estimates the Treasury removes the effects of discretionary fiscal policy changes on aggregate government spending and receipts, as far as it is possible to do so, and then uses regression analysis to establish statistical relationships with the output gap and other variables. Other information used in formulating the ready-reckoner includes prior expectations based on theory, allowances for structural changes in tax and spending systems that might not be fully picked up in the regression analysis, and estimates from previous analyses.<sup>20</sup>

**44** The Treasury's methodology, which involves directly adjusting the fiscal aggregates for the estimated effects of the cycle, can be described as a top down approach, though it also incorporates an investigation of the effect of the cycle on individual tax and spending elements. The top down approach is in contrast to a bottom up methodology,

that builds up an estimate of the effect of the economic cycle on the fiscal aggregates by combining effects estimated for each individual revenue and spending item.

### The Treasury's receipts ready-reckoner

**45** Cyclical adjustment coefficients for tax receipts need to measure the effect of the economic cycle on tax receipts free of the effect of discretionary policy decisions, for example, on tax rates or allowances. To do so, the Treasury has calculated such 'policy constant' data series for both individual tax areas and for aggregate tax receipts. The individual tax areas cover income tax, non-oil corporation tax, excise motor tax, and other excise tax and VAT receipts. These taxes accounted for 57 per cent of aggregate receipts in 2007-08.

**46** The adjusted receipts series is based on the tax regime in place in 1989-90. Normalising the adjusted receipts series on the tax regime in place in a different year should not have any material effect on the results, unless changes in the tax rules affect the cyclical properties of the individual taxes, for example if the cyclical behaviour of corporate tax receipts was materially different when the marginal rate is say 30 per cent rather than 20 per cent. The Treasury has no evidence to suggest that this is the case within the range of discretionary changes in the sample period used for its statistical analysis.

**47** The Treasury has removed the discretionary or policy change elements from receipts using information from tax costings published in successive Budget and Pre-Budget Reports. The resulting series provide annual data for 1979-80 to 2006-07, the period for which there is sufficiently detailed information on past changes to the tax system to construct the data series. While based on detailed work, it is not possible to guarantee that the resultant series is a perfectly accurate measure. One limitation that remains is that receipts data cannot be adjusted to reflect differences in timing of receipts, arising for instance from changes to the detailed tax rules. The regressions use annual rather than quarterly data, because changes to tax policy are typically made on a financial year basis.

<sup>19</sup> Paragraph 19e, *The Code for Fiscal Stability*, HM Treasury, November 1998.

<sup>20</sup> See *Public finances and the cycle*, Stephen Farrington, John McDonagh, Catherine Colebrook, Andrew Gurney, Treasury Working Paper No 5, 2008.

**48** The Treasury then uses the 1989-90 tax base adjusted aggregate receipts data series in an ordinary least squares regression on the output gap and trend GDP. Trend GDP was included in the regression as an explanatory variable, as this had proved significant in its previous 2003 analysis.<sup>21</sup> It may also be a proxy to allow for a progressive tax system, which is not fully indexed as real incomes increase over time.

**49** The regression results shown in **Figure 4** indicate a strong statistically significant relationship between aggregate receipts as a percentage of GDP and the output gap lagged one year. The positive sign on the lagged output gap indicates that, as actual output increases above trend in an upturn, receipts as a percentage of GDP increase. The size of the coefficient on the lagged output gap in the 2008 analysis remains numerically similar to the equivalent coefficient in the Treasury's 2003 analysis. The two coefficients are not statistically different in size. This finding provides assurance that the receipts relationship exhibits stability, at least in terms of the addition of data for a limited number of extra years. The contemporaneous output gap was excluded from the regression, as this was found to be statistically insignificant. This result implies that tax revenues adjust to changes in the output gap only after a year, which may not fully reflect the possibility of shorter term adjustments that could be expected to occur.

**50** There are a number of possible alternative specifications for the regression equation. The relationship between receipts and the output gap might not be linear over the full variation of the output gap and the availability of only annual data imposes limitations, for example, on testing particular lag structures. Although there are such

limitations, the Treasury has taken care to ensure that the fitted regressions have satisfactory properties, in particular with respect to autocorrelation.

**51** There might be a simultaneous relationship between spending, receipts and the output gap, since the funding of government spending depends on tax and other receipts, tax levels depend on spending decisions and the output gap is influenced by the automatic stabilisers. If this were the case, a structural equation model could provide a better representation of the processes, and this was advocated by some external organisations I consulted. The Treasury has investigated such relationships, but concluded that they were not significant enough to warrant further analysis.

**52** As with all approaches to estimation, it is possible to identify theoretical and practical difficulties. The Treasury's approach to regression analysis for cyclical adjustment of tax receipts seeks to take these difficulties into account. Overall, it is a conceptually reasonable approach, consistent with the expectation that tax receipts are likely to move with the cycle.

**53** To complement the top-down regression analysis, and to gain further insight into the cyclicity of tax receipts, the Treasury carries out a similar regression analysis to that reported above, for each of the five individual components of the aggregate tax receipts series, on a 1989-90 tax regime basis.<sup>22</sup> The responsiveness to the output gap could differ across the tax base, and individual component regressions, as are used as well in bottom up methodologies, can provide useful information into the relationship between the cycle and aggregate receipts.

**4** Ordinary least squares regression of aggregate tax receipts (as a per cent of GDP), on the output gap and trend GDP (figures in brackets denote t-statistics)

Aggregate receipts	Constant	Output gap	Output gap (-1)	Trend GDP	R <sup>2</sup>	Standard error	Durbin Watson
2008	19.87 (0.59)	–	0.18 (2.89)	0.08 (0.03)	0.91	0.42	1.93
2003	113.10 (5.82)	–	0.23 (2.56)	10.30 (7.05)	0.93	0.68	not available

Source: 2008 results HM Treasury (annual data, estimation period 1979-80 to 2006-07); 2003 results End of Year Fiscal Report, 2003, HM Treasury (annual data, estimation period 1971-72 to 2002-03).

<sup>21</sup> Annex A, *End of year fiscal report*, HM Treasury, December 2003.

<sup>22</sup> The components are income tax, non-oil corporation tax, excise motor tax, other excise tax and VAT receipts. For details, see pages 15 and 16, *Public finances and the cycle*, Stephen Farrington, John McDonagh, Catherine Colebrook, Andrew Gurney, Treasury Working Paper No 5, 2008.

**54** All the five tax component models estimated by the Treasury show positive coefficients on the output gap lagged one year, as in the aggregate regression, though they were statistically significant in only two cases (income and non-oil corporation tax, accounting for 35 per cent of total receipts in 2008-09). The results obtained were numerically similar to those obtained in the Treasury's 2003 analysis, and statistically were not significantly different.

**55** In the case of the income tax model, the statistically significant coefficient on the current output gap is negative rather than positive, suggesting counter-intuitively that income tax receipts rise if the output gap decreases, as in an economic downturn. One possible explanation is that income tax liability is assessed in arrears, and the impact of the cycle on receipts in cash terms may not be immediate. If so, and if GDP fell for example, the ratio of income tax receipts in cash terms to (a lower) GDP could increase rather than fall in the current year. Such effects may work through with time, and the statistically significant coefficient on the lagged output gap is positive in the Treasury's income tax regression results.

**56** The Treasury's receipts ready-reckoner is shown in **Figure 5**. The regression analysis for aggregate receipts did not find a relationship with the current output gap, but the Treasury judges that it is reasonable to allow for some contemporaneous effect, which seems likely *a priori*. For example, the introduction of quarterly instalment payments of corporation tax for large companies from 1999 led to more timely responsiveness of receipts to the cycle. Work by the OECD on lag structures for UK corporate and personal income tax comments that exact lag structures are not known, and they may vary significantly over time. On the basis of judgement,

however, the OECD assumes a two year adjustment period, with equal weight on the contemporaneous and lagged effect,<sup>23</sup> which provides further support to the Treasury's judgement on this point. The Treasury's receipts ready-reckoner therefore places a coefficient of 0.1 on the contemporaneous output gap, and a coefficient of 0.1 on the lagged output gap. This is broadly equivalent to bringing forward half the impact associated with the estimated regression coefficient of 0.18 on the lagged output gap, shown in Figure 4.

### The Treasury's spending ready-reckoner

**57** On the assumption that there is no significant change in overall public spending in cash terms over the cycle, other than from discretionary policy changes, the ratio of spending to GDP will be driven by changes in the denominator of the ratio, GDP. This is the 'denominator effect'. The measure of public expenditure used in the Treasury ready-reckoner is Total Managed Expenditure, TME. TME includes the current and capital expenditure of the public sector but not financial transactions such as government lending or buying of shares. It is the sum of Departmental Expenditure Limits, DEL, and Annually Managed Expenditure, AME. DEL is the expenditure limit within which a Department has responsibility for resource allocation, though some elements may be demand led. AME is spending included in Total Managed Expenditure which does not fall within DELs. Expenditure in AME is generally less predictable and controllable than expenditure in DEL, and so is potentially more sensitive to the cycle.

## 5 The Treasury's cyclically adjusted receipts ready-reckoner

$$\text{Cyclically adjusted receipts as a percentage of GDP} = \text{Actual public sector receipts as a percentage of GDP} - 0.1 \times \text{output gap in current fiscal year} - 0.1 \times \text{output gap in previous fiscal year}$$

Source: HM Treasury

### NOTE

The receipts ready-reckoner indicates that cyclically adjusted receipts as a percentage of GDP will be less than actual when the output gap and lagged output gap are positive, corresponding to an above trend period, with the output gap defined as actual output minus trend. Cyclically adjusted receipts as a percentage of GDP will be greater than actual in a downturn, when the output gap is negative.

23 Nathalie Girouard and Christophe André, *Measuring Cyclically-Adjusted Budget Balances for OECD Countries*, OECD Economics Department Working Paper No. 434, July 2005.

**58** Currently the ratio of TME to GDP is around 40 per cent, and the denominator effect assumption would imply that a one per cent increase in output relative to trend would reduce the share of TME as a percentage of GDP by 0.4 percentage points.<sup>24</sup> It might, however, be reasonable to expect a cyclical element to spending, for instance, through unemployment related social security payments.

**59** The Treasury has investigated this possibility through regression analysis for two elements of spending that it identifies as likely to be influenced by the economic cycle in cash terms: debt interest payments, and cyclical social security payments. The coefficient on the output gap in the debt interest regression was not statistically significant in either the Treasury's 2003 or 2008 analysis.<sup>25</sup> This may be because the effect of higher revenues in an upturn, for example, and hence reduced debt issuance, may be offset by higher interest rates also likely to apply in periods of growth above the long run trend (and vice versa).

**60** There are reasonable theoretical reasons to believe that the economic cycle will influence social security payments. For example, the output gap, with a degree of lag, would be expected to impact on unemployment and hence elements of social security benefit payments. The results of regressions of Cyclical Social Security, CSS, on the lagged output gap provide some limited statistical evidence that this element of spending is sensitive to the cycle. The Treasury investigated two measures of CSS in its 2008 analysis. Using a measure that consists of Income Support and Jobseeker's Allowance, the coefficient on the lagged output gap is significant, and has a value of just below -0.1.<sup>26</sup> This result is similar to the equivalent result in the 2003 analysis. Using a theoretically more accurate measure of CSS, comprising Unemployment Benefit, Jobseeker's Allowance, Income Support for the

unemployed, Housing Benefit and Council Tax Benefit (and earlier equivalents) shows no significant relationship with the lagged output gap.

**61** A further spending component of importance is tax credits, which the Treasury identified as potentially leading to a structural change in the relationship between TME and the economic cycle. Introduced in 2003, tax credits added a new sizeable component of spending to Annually Managed Expenditure within TME, which can be separated out, **Figure 6**. There are not as yet enough data to derive reliable quantitative estimates of the relationship between tax credits and the economic cycle, which in any case are complex.

**62** In addition to its analysis of spending components, the Treasury has investigated the relationship of expenditure overall, TME, to the cycle. Unlike for receipts, the Treasury has not been able to produce a data series of expenditure adjusted for discretionary policy changes. This is a more problematic exercise than for receipts, because the number and range of changes affecting expenditure over a long period of time are hard to separate out.

**63** **Figure 7** shows the regression results for TME. The Treasury controls for tax credits using a dummy variable, the influence of which is weak. The regression also includes a time trend, incorporated on the basis of visual inspection of the data, which show a downward trend from 1975. The current output gap is highly statistically significant, with a coefficient of -0.34. The lagged output gap was not included in the final regression, as it proved statistically insignificant. The size of the coefficient on the current output gap is close to the previous estimate made by the Treasury in its 2003 analysis, -0.32. It is also consistent with the denominator effect described

## 6 Expenditure on tax credits, introduced in 2003, £ billion

	2003-04	2004-05	2005-06	2006-07	2007-08
Working Tax Credit	4.5	5.2	4.8	4.8	4.7
– of which Childcare Tax Credit	0.6	0.7	0.9	1.3	1.4
Child Tax Credit	8.8	10.7	12.6	13.9	15.3
Total tax credits	13.3	15.9	17.3	18.7	20.0

Source: HM Treasury

### NOTE

Totals may be subject to rounding errors.

<sup>24</sup> For further details of the working of the denominator effect, see Box 2A, *Public finances and the cycle*, Stephen Farrington, John McDonagh, Catherine Colebrook, Andrew Gurney, Treasury Working Paper No 5, 2008.

<sup>25</sup> Paragraphs 2.27 and 2.28, *ibid*.

<sup>26</sup> It should be noted that Tables 2.B and 2.J in Farrington et al, showing the regression results for cyclical social security, indicate relationships with the current output gap, but are in fact with the *lagged* output gap.

above, which based on the current percentage of TME in GDP of around 40 per cent, implies that an increase of one percent in output relative to trend reduces the TME to GDP ratio by 0.4 per cent. The estimated coefficient of -0.34 is not statistically different from -0.4. The regression results for spending therefore suggest that the denominator effect is a reasonable basis for making cyclical adjustments to spending.

**64** The Treasury's spending ready-reckoner, shown in **Figure 8**, places a coefficient of 0.4 on the contemporaneous output gap. Although the lagged output gap was not a statistically significant variable in the regressions for TME, the Treasury includes a coefficient of 0.1 on the lagged output gap in its spending ready-reckoner, as it did in its 2003 analysis. In part, the Treasury's rationale is that one measure of Cyclical Social Security spending, CSS, is related to the lagged output gap, with a 0.1 regression coefficient, though this particular measure of CSS is a less comprehensive measure of two

alternatives tested. The other measure of CSS proved not to pass the test of statistical significance when related to the lagged output gap, as described above.

**65** The Treasury also judges that a lagged effect in addition to that from the current output gap should be allowed for on the grounds that the cycle would be expected to have some lagged impact on elements of spending in cash terms. For example, movements in output relative to trend could be expected to impact on unemployment and hence elements of social security benefit payments with a lag of more than one year. Econometric evidence provides some support for the Treasury's judgement, as there is a lag of three quarters between output and unemployment changes.<sup>27</sup>

### The Treasury's aggregate ready-reckoner

**66** To provide a convenient way for making cyclical adjustments to the fiscal aggregates, the Treasury combines the spending and receipts ready-reckoners into an aggregate cyclical adjustment ready-reckoner, **Figure 9 overleaf**.

## 7 Ordinary least squares regression for Total Managed Expenditure, TME, (as a per cent of GDP), on the output gap, (figures in brackets denote t-statistics)

TME	Constant	TME (-1)	TME (-2)	Output gap	Time Trend 66 <sup>2</sup>	Time Trend 75 <sup>2</sup>	Dummy 2002 <sup>1</sup>	R <sup>2</sup>	Standard error	Durbin's h-statistic
2008	30.11 (9.03)	0.79 (6.33)	-0.41 (-4.26)	-0.34 (-4.72)	-	-0.22 (-7.93)	1.02 (1.82)	0.97	0.76	2.45
2003	22.64 (6.08)	0.86 (5.32)	-0.43 (-3.47)	-0.32 (-3.27)	0.49 (3.44)	-0.67 (-3.95)	-	0.92	1.05	not available

Source: 2008 results HM Treasury (annual data, estimation period 1975-76 to 2006-07); 2003 results End of Year Fiscal Report, 2003, HM Treasury (annual data, estimation period 1966-67 to 2002-03)

### NOTE

- 'Dummy 2002' is a dummy variable on the years from 2002-03 to control for the effect of an increase in the underlying level of spending which included the introduction of New Tax Credits.
- Time trends starting in 1966 and 1975.

## 8 The Treasury's spending ready-reckoner

$$\text{Cyclically adjusted TME as a percentage of GDP} = \text{Actual TME as a percentage of GDP} + 0.4 \times \text{output gap in current fiscal year} + 0.1 \times \text{output gap in previous fiscal year}$$

Source: HM Treasury

### NOTE

The spending ready-reckoner indicates that cyclically adjusted spending as a percentage of GDP will be greater than the actual ratio when the output gap is positive, corresponding to an above trend period, (with the output gap defined as actual output minus trend). Cyclically adjusted spending as a percentage of GDP will be less than the actual ratio in a downturn, when the output gap is negative.

<sup>27</sup> This lag is applied in the Treasury's methodology to date the economic cycle, see paragraph 27 and Figure 3, *Audit of Assumptions for the 2008 Pre-Budget Report*, HC1150, Session 2007-08.

## 9 The Treasury's cyclical adjustment ready-reckoner

Cyclically adjusted fiscal aggregate as a percentage of GDP	Actual fiscal aggregate as a percentage of GDP	Output gap in current fiscal year	Output gap in previous fiscal year	Total effect over two years
a) Cyclically adjusted TME	Total Managed Expenditure	+0.4	+0.1	+0.5
b) Cyclically adjusted receipts	Public Sector current receipts	-0.1	-0.1	-0.2
Cyclically adjusted net borrowing <sup>1</sup>	Net Borrowing	+0.5	+0.2	+0.7 <sup>3</sup>
Cyclically adjusted current budget <sup>2</sup>	Current Budget	-0.5	-0.2	-0.7 <sup>3</sup>

Source: HM Treasury

### NOTES

- 1 Cyclically adjusted borrowing ready-reckoner given by expenditure line a) minus receipts line b).
- 2 Cyclically adjusted budget ready-reckoner given by receipts line b) minus expenditure line a). The current budget is the balance of current receipts and spending excluding capital items.
- 3 The ready-reckoners indicate that a one percentage point increase in the output gap is estimated to reduce the ratio of public sector net borrowing to GDP by 0.7 percentage points over two years, and increase the ratio of the current budget to GDP by 0.7 percentage points.

**67** The coefficients in the ready-reckoner incorporate judgements made by the Treasury and are subject to uncertainties. For this reason, the Treasury has been clear that the coefficients are approximate and simplified estimates of the true dynamic impact of the output gap on the public finances. The Treasury's view is that it is not possible to construct confidence intervals for their ready-reckoner that would provide a meaningful objective indication of this uncertainty. Although the ready-reckoners are based in part on regression results that could lend themselves to producing confidence intervals if used on their own, the statistical analysis is combined with the Treasury's judgement. It is possible, however, to set out uncertainties in a qualitative way, as relevant at the time of presenting the estimates of cyclically adjusted public finances, and this has been done by the Treasury.<sup>28</sup>

**68** External organisations I consulted stressed the uncertainty inherent in estimates of cyclical adjustment methodologies, and believed that such uncertainty should be explicitly addressed. Approaches include that of Barrell, Hurst and Mitchell of the National Institute of Economics and Social Research, who have carried out work for the European Commission, to estimate the uncertainty bounds for cyclical adjustment coefficients.<sup>29</sup> The OECD has published range estimates for the cyclical sensitivity of the fiscal balances.<sup>30</sup>

### Issues affecting the use of the Treasury's ready-reckoner

**69** One source of inherent uncertainty with the ready-reckoner approach is the need to use historical data over a number of past economic cycles in econometric work. This means that the ready-reckoners are based on the average impact of changes in the output gap on the public finances over previous cycles and as such will not reflect the extent to which the impact of the cyclical position on the public finances might differ from this average, in a given cycle.<sup>31</sup> In particular, the nature of the current economic cycle may be exceptional compared with past cycles.

**70** A further issue is that changing asset prices can have an important impact on the estimates of the adjusted fiscal aggregates, especially if asset prices are more variable in some cycles than others, or if there is a secular trend that influences the tax base of the economy, such as developments in the financial sector. Work by the OECD suggests the possibility of overconfidence about the permanence of tax receipts related to asset prices.<sup>32</sup> Other external organisations thought that failure to adequately capture asset price effects was a significant limitation of all current cyclical adjustment methodologies. The European Commission drew my attention to its view that strong corporate tax revenues

<sup>28</sup> For example, paragraph 2.72, *Budget 2008*.

<sup>29</sup> Barrell R., Hurst A.I., and Mitchell J. (2007), *Uncertainty Bounds for Cyclically Adjusted Budget Balances*, pp 187-206 in *Fiscal Indicators* ed M. Larch and L.N. Martins, European Commission, Brussels, (European Economy, Economic Papers, 297. December 2007), ISBN: 978-92-79-04650 ISSN: 1725-318 [http://ec.europa.eu/economy\\_finance/publications/publication\\_summary11371\\_en.htm](http://ec.europa.eu/economy_finance/publications/publication_summary11371_en.htm)

<sup>30</sup> Nathalie Girouard and Christophe André, *Measuring Cyclically-adjusted Budget Balances for OECD Countries*, OECD Economics Department Working Paper No. 434, July 2005.

<sup>31</sup> Paragraph 2.32, *End of Year Fiscal Report 2008*, HM Treasury.

<sup>32</sup> Nathalie Girouard and Robert Price, *Asset Price Cycles, "One-Off" Factors And Structural Budget Balances*, OECD Economics Department Working Paper No. 391, June 2004.

from financial sector activity could have led to an increase in the responsiveness of tax receipts to the economic cycle in 2006-07 and 2007-08, which led to adjustment coefficients that were misleadingly high for those years.

**71** Making allowance for asset price effects in particular is challenging, in the absence of a view of what equilibrium assets prices are. Treasury economists have carried out work to investigate the link between asset prices and fiscal aggregates.<sup>33</sup> In line with external practices, the Treasury's current methodology does not incorporate adjustments related to asset price movements. External organisations also pointed out that estimates of the underlying budget balance should take account of the impact of fiscal transactions that are of a one-off nature, such as those related to some of the government interventions in the financial sector.

### Alternative methodologies for estimating cyclically adjusted fiscal aggregates

**72** The Treasury's methodology is a top down approach, based on estimating overall relationships for total receipts and expenditure with the economic cycle, though the Treasury also includes investigation of individual tax and spending items, to inform its top down approach. Other organisations, such as the OECD,<sup>34</sup> EC,<sup>35</sup> the IMF<sup>36</sup> and the ECB,<sup>37</sup> use what can be described as a bottom up approach, based on examining the cyclical components of individual receipts and spending, which can then be summed to produce overall adjusted fiscal aggregates.

**73** Views among the external organisations I consulted varied and I found support for both the top down and bottom up approaches. Each has potential advantages and disadvantages. A top down methodology is relatively simple to apply, and the Treasury's econometric results show stability over time. They also cover all receipts and expenditure, which may be hard to achieve in a bottom up approach, given the number of individual tax and spending areas that need to be covered. A consistent approach over time provided by a fixed ready-reckoner approach adds transparency, even if it is subject to uncertainty.

**74** On the other hand, the top down approach may not offer the potential advantage of a disaggregated bottom up approach, in which structural or other effects can be allowed for on a tax by tax basis. For example, the ECB's disaggregated approach allows it to take into account compositional effects, resulting from sectoral changes in the economy and associated different marginal tax rates.<sup>38</sup> The sentiment among several external organisations I consulted was that the bottom up approach leads to a powerful understanding of the relationships between the taxes or expenditure items, the factors that determine revenue or spending, for example, company profits in the case of corporate taxation, and the economy. The Treasury acknowledges these benefits and includes analysis of several individual tax and spending items in its overall approach.

### Comparing the Treasury's ready-reckoner with other estimates

**75** **Figure 10 overleaf** presents coefficients or 'elasticities' for cyclical adjustment of the public finances produced by external organisations, alongside the Treasury's. Some of the external organisations base their elasticities on estimates made by the OECD. The IMF follows the Treasury's methodology for cyclical adjustment in reports on the UK made by its staff. It has also used revenue and expenditure elasticity estimates from the OECD to estimate the impact of automatic stabilisers on the fiscal balance.<sup>39</sup> The European Commission uses the OECD's estimates of budgetary elasticities to derive sensitivities of revenue and expenditure to the economic cycle, combining elasticities using the share of a tax or expenditure item in GDP as weights. The various estimates in Figure 10 are similar, and organisations consulted acknowledged this. The Treasury's ready-reckoner estimates are at the high end of the range.

### Privatisation proceeds

**76** The convention adopted for the July 1997 Budget, reviewed for Budgets 2000, 2003 and 2006,<sup>40</sup> was that for the purposes of projecting the public finances, only the proceeds of those sales that have already been announced will be included in the projections. 'Privatisation proceeds' are for these purposes defined as central government sales of businesses, either by flotation

33 The issues have been investigated in *Public finances and the cycle*, Stephen Farrington, John McDonagh, Catherine Colebrook, Andrew Gurney, Treasury Working Paper No 5, 2008.

34 Nathalie Girouard and Christophe André, *Measuring Cyclically-adjusted Budget Balances for OECD Countries*, OECD Economics Department Working Paper No. 434, July 2005.

35 *Public finances in EMU – 2002. European Economy Reports and Studies*, Directorate General for Economic and Financial Affairs, May 2002, Brussels.

36 International Monetary Fund, *Companion Paper – The State of Public Finances: Outlook and Medium-Term Policies*, March, 2009, Washington.

37 *Cyclically Adjusted Budget Balances: An Alternative Approach*, C Bouthevillain, C P Cour-Thimann, G van den Dool, P Hernandez De Cos, G Langenus, M Mohr, S Momigliano and M Tujula, European Central Bank Working Paper Series, No 77, 2001.

38 *Cyclically Adjusted Budget Balances: An alternative Approach*, C Bouthevillain, C P Cour-Thimann, G van den Dool, P Hernandez De Cos, G Langenus, M Mohr, S Momigliano and M Tujula, European Central Bank Working Paper Series, No 77, 2001.

39 International Monetary Fund, *Companion Paper – The State of Public Finances: Outlook and Medium-Term Policies*, March 6, 2009, Washington.

40 Paragraphs 7-10, *Audit of Assumptions for the July 1997 Budget Projections*, Cm 3693; paragraphs 21-23, *Audit of Assumptions for the March 2000 Budget*, HC348, Session 1999-00; paragraphs 9-13, *Audit of Assumptions for Budget 2003*, HC627, Session 2002-03; and paragraphs 22-28, *Audit of Assumptions for Budget 2006*, HC937, Session 2005-06.

**10** Comparison of external organisation and the Treasury's cyclical adjustment ready-reckoners

	Output Gap	Lagged Output Gap	Total effect
HM Treasury (also IMF)	0.5 <sup>1</sup>	0.2 <sup>5</sup>	0.7
OECD (also used in IMF 2009 <sup>6</sup> )	0.45 <sup>2</sup>	–	0.45
European Commission	0.42 <sup>3</sup>	–	0.42
ECB	0.65 <sup>4</sup>	–	0.65

Sources: *The Treasury* (2008)<sup>7</sup>; *Girouard and André* (2005)<sup>8</sup>; *Bouthevillain et al.* (2001)<sup>9</sup>; *IMF* (2009)<sup>10</sup>; *EC* (2006)<sup>11</sup>

## NOTES

- 1 Covering Total Managed Expenditure and aggregate tax receipts. Estimates are for 2008.
- 2 Covering the cyclical components of personal income tax; social security contributions; corporate income tax; indirect taxes and unemployment-related transfers. Estimates are for 2003.
- 3 Covering the cyclical components of personal income tax; social security contributions; corporate income tax; indirect taxes and unemployment-related transfers. Estimates are for 2006.
- 4 Covering cyclical components of direct taxes on households, direct taxes on companies; indirect taxes; social security contributions and unemployment-related expenditure. Estimates are for 1999.
- 5 Other external organisations do not explicitly allow for a lagged effect on output gap in their published figures, though the OECD does assume a two-year adjustment period in its framework for corporate and personal income tax, based on a mix of data and judgement.
- 6 *IMF Companion Paper – The State of Public Finances: Outlook and Medium-Term Policies*, March 2009, Washington.
- 7 *Public finances and the cycle*, Stephen Farrington, John McDonagh, Catherine Colebrook, Andrew Gurney, Treasury Working Paper No 5, 2008.
- 8 Nathalie Girouard and Christophe André, *Measuring Cyclically-adjusted Budget Balances for OECD Countries*, OECD Economics Department Working Paper No. 434, July 2005.
- 9 *Cyclically Adjusted Budget Balances: An alternative Approach*, C Bouthevillain, C P Cour-Thimann, G van den Dool, P Hernandez De Cos, G Langenus, M Mohr, S Momigliano and M Tujula, European Central Bank Working paper Series, No 77, 2001.
- 10 International Monetary Fund, *Companion Paper – The State of Public Finances: Outlook and Medium-Term Policies*, March 2009, Washington.
- 11 *Public finances in EMU – Number 3, 2006. European Economy Reports and Studies*, Directorate General for Economic and Financial Affairs, 2006, Brussels.

(including subsequent equity and debt sales) or by trade sale. Proceeds from sales by public corporations are not included in projections on the basis that such proceeds are not directly available to central government.

**77** As **Figure 11** sets out, over the rolling review period there were three sales of shares, one in QinetiQ and two in British Energy. **Figure 12** summarises the estimated profile of privatisation proceeds included in the fiscal projections at each Budget and Pre-Budget Report, PBR, over the rolling review period, and the profile as currently estimated. To be included in the fiscal projections, the sales have typically already been announced and the proceeds received. In the case of the sale of the remaining stake in British Energy to Electricité de France, the proceeds were first included in the fiscal projections in the 2008 Pre-Budget Report, after the sale had been announced subject to regulatory clearance in September 2008. The proceeds from the sale were received in January 2009.

**78** **Figure 13** shows the differences between the projected privatisation proceeds summarised in **Figure 12** and the actual (or latest estimated) outturn for the Budget 2009. The positive numbers in a given financial year mean that the outturn was greater than projected by that amount.

**79** All the divergences arose because actual privatisation proceeds were greater than the level included in fiscal projections. For example, the Treasury did not reflect any receipts in the fiscal projections from the sale of the British Energy shares before it was announced. When the sale occurred in May 2007, it raised £2.34 billion, which was then incorporated into the fiscal projections for the first time in the 2007 Pre-Budget Report.

**80** The £21 million difference from outturn in the 2008 Pre-Budget Report projection for 2008-09 in **Figure 13** is due to cash receipts from the sale of the Government's remaining shares in British Energy being greater than forecast. The projections for Budget 2009 include the actual proceeds of the sale of the remaining Government stake in British Energy to Electricité de France.

**11** Sales of businesses by central government over the rolling review period

Transaction	Date transaction announced	Detail	Method of sale	Net proceeds £ million	Date(s) proceeds received
British Energy	30 May 2007	Department of Trade and Industry sold approximately 18 per cent share holding.	Accelerated book-built offering	2,340	14 June 2007 (£1,000 million), 15 June (£670 million), 21 June (£670 million)
QinetiQ	9 September 2008	Ministry of Defence sold 18.9 per cent share holding.	Market placing	254	12 September 2008
British Energy	24 September 2008	Department for Business Enterprise and Regulatory Reform sold the remaining 36 per cent share holding to Electricité de France.	Trade sale	4,421	19 January 2009

Source: HM Treasury

**12** Profile of privatisation proceeds, £ millions, included in the fiscal projections over the rolling review period, and the profile currently estimated for the Budget 2009 fiscal projections

Financial year	Budget 2006	PBR06	Budget 2007	PBR07	Budget 2008	PBR08	Budget 2009
2006-07	0	0	0	0	0	0	0
2007-08	0	0	0	2,340	2,340	2,340	2,340
2008-09	0	0	0	0	0	4,655	4,676
2009-10	0	0	0	0	0	0	0
2010-11	0	0	0	0	0	0	0
2011-12	0	0	0	0	0	0	0

Source: HM Treasury

## NOTE

Figures may be subject to rounding errors.

**13** Differences between projected proceeds and outturn/latest estimates, £ millions

Financial year	Budget 2006	PBR06	Budget 2007	PBR07	Budget 2008	PBR08
2006-07	0	0	0	0	0	0
2007-08	2,340	2,340	2,340	0	0	0
2008-09	4,676	4,676	4,676	4,676	4,676	21
2009-10	0	0	0	0	0	0
2010-11	0	0	0	0	0	0
2011-12	0	0	0	0	0	0

Source: HM Treasury

**81** My rolling review report for Budget 2006 recommended that the Treasury put in place improved arrangements for monitoring the profile of privatisation receipts.<sup>41</sup> In response, the Treasury has developed its monitoring processes, and instituted improved arrangements for the regular sharing of information within government. By not including proceeds over the rolling review period until they can be estimated with certainty the Treasury incorporates caution into the projections of public finances, for example, from changes in market conditions or other factors which could affect the timing or profile of privatisation receipts.

### The methodology for projecting short term interest rates

**82** Assumptions for future interest rates are needed by the Treasury for projecting the cost of paying interest on central government debt, as well as for certain other elements of the fiscal projections, including some tax receipts. An increase in interest rates leads to higher central government net debt interest payments and to lower corporation tax receipts due to an increase in tax deductible interest payments made by corporations. This impact is offset by factors such as an increase in the taxable interest income earned by households and corporations.

**83** The audited convention is that for the purposes of projecting the public finances, 3 month forward interest rates will be based on market expectations. Historically, short term interest rates have had the greatest immediate impact on debt interest payments and drive all the relevant tax receipt projections. I last audited this convention for Budget 2006.<sup>42</sup> Since then, all forward interest rates used for the purposes of projecting the public finances have continued to be based on market expectations, but the approach to projecting short term rates has been adjusted to abstract from volatility in financial markets and data on implied forward rates has been taken from the Bank of England, rather than from Bloomberg as previously.

**84** The Treasury estimates that the net impact of a one percentage point increase in short term interest rates would lead to a deterioration in the public finances of about £350 million in the first full year. Over subsequent years, the positive impact from higher taxable interest income is estimated to rise, so that over the five year projection period it would roughly offset the negative impact of higher short term debt interest payments and tax deductible interest payments by corporations. The Treasury notes, however, that

these medium term estimates do not take account of second round effects from higher interest rates via lower economic growth, which would tend to worsen the fiscal position. The Treasury's view is therefore that the overall impact of higher interest rates on the public finances is negative.

### The rolling review period

**85** Over the rolling review period, the Treasury used its adopted methodology for projections of short term interest rates, based on market expectations. Implied forward interest rates are what the market expects short term interest rates to be over the Treasury forecast period. They are derived from the yield on interest rate swaps at different maturities.<sup>43</sup> Prior to disruption in financial markets beginning in 2007, the Treasury used market expectations of the 3 month London inter-bank offered rate, LIBOR, rather than the 3 month Treasury bill rate, to forecast the relevant elements of the fiscal projections. The 'spread' between LIBOR and the historically slightly lower Treasury bill rate introduced an element of caution, on the assumption that higher interest rates have an overall negative impact on public finances as set out above. In the period before mid 2007, the 3 month LIBOR was close to the rate on 3 month Treasury bills, the rate most applicable to calculations of debt interest on short term government debt, **Figure 14**.

**86** In 2007, developments in global financial markets affecting the UK began to lead to large increases in 3 month LIBOR, reflecting reluctance by banks to lend to each other, rather than an expectation that policy rates were soon to increase significantly. This in turn led to the spread between 3 month LIBOR and 3 month Treasury bills increasing to above 100 basis points (one per cent) in September 2007. At the time of the 2007 Pre-Budget Report, the spread stood at around 60 basis points. As the financial crisis began to intensify in 2008, spreads increased even further, reaching levels of between 250 and 300 basis points, as shown in Figure 14. While spreads have decreased, they are still high by historic standards.

**87** The Treasury judged at the time of the 2007 Pre-Budget Report that the unsettled behaviour of 3 month LIBOR from mid 2007 risked a distortion in its relevant projections of spending and receipts. In particular, the use of 3 month LIBOR rates for making the relevant fiscal projections, incorporating large spreads with gilt rates, implied a significant increase in estimates of future debt interest cost. Such an increase would not have reflected the cost of debt interest that the Government could have

<sup>41</sup> *Audit of Assumptions for Budget 2006*, HC937, Session 2005-06, paragraph 68.

<sup>42</sup> Paragraphs 29-36, *Audit of assumptions for Budget 2006*, HC937, Session 2005-06.

<sup>43</sup> The implied forward rates are calculated by comparison of two swap yields at different maturities, calculating the implied yield on a security that bridges the gap between them. So, for example, the implied three month yield two years ahead is calculated on the basis of the actual yield on a swap with 24 months to maturity and one with 27 months to maturity.

## 14 Spread between the 3 month LIBOR and 3 month Treasury bills rate



Source: Debt Management Office and Bloomberg. The Debt Management Office publishes the average yield on 3 month Treasury bills following gilt auctions and Bloomberg publishes outturn data for the 3 month LIBOR. The 'spread' is the difference between the two.

expected to face, determined in practice by gilt rates rather than by commercial rates. For tax receipts, elevated LIBOR would have led to higher than probable forecasts of receipts, for example, from income tax on interest earnings, given that the average rate of interest earned by savers is currently significantly below LIBOR.

**88** The Treasury therefore introduced two adjustments to its interest rate projection methodology during the rolling review period.<sup>44</sup> The first adjustment, made at the time of the 2007 Pre-Budget Report and applied since, was designed to place short term interest rate projections on a consistent basis with previous forecasts with regard to the LIBOR-gilts spread.

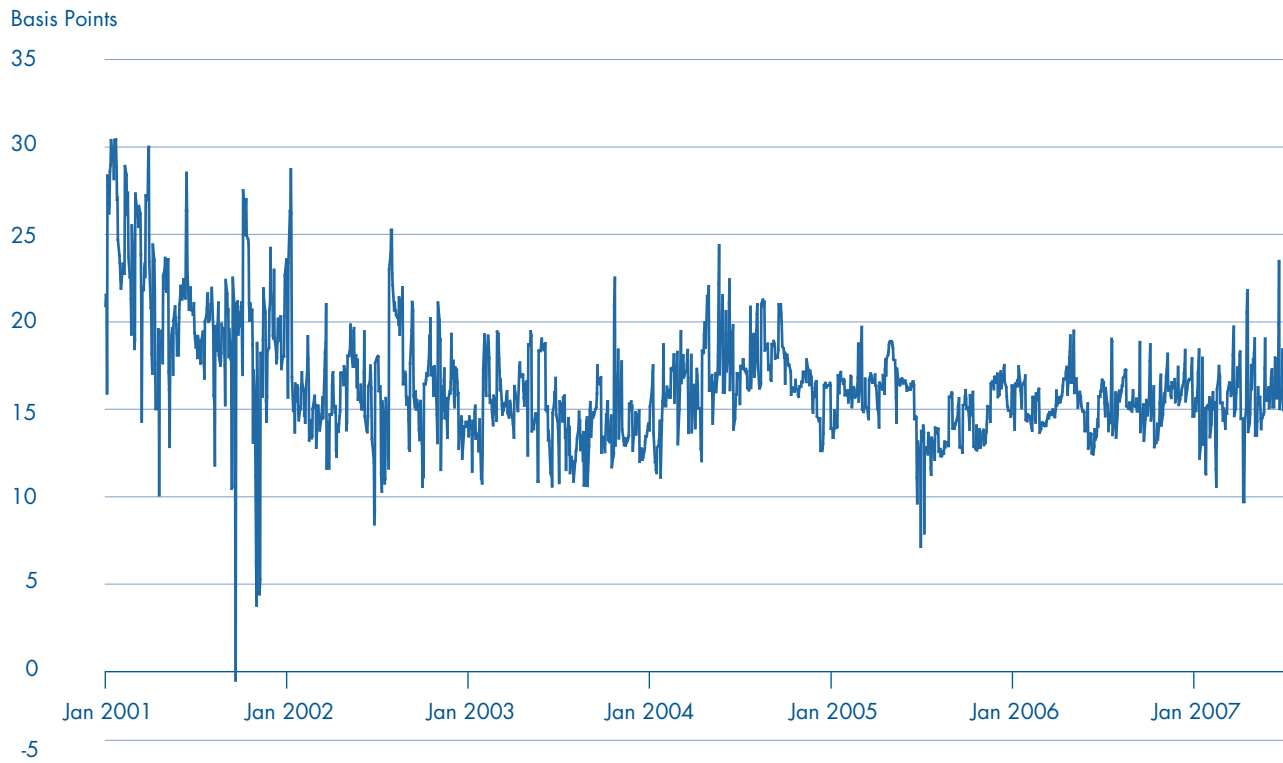
**89** Instead of using market expectations for the 3 month LIBOR as the basis for the relevant projections, the Treasury switched to using market expectations of adjusted future 3 month Treasury bill rates. The adjustment was made by taking the market expectations of future 3 month Treasury bill rates, and adding the historic average spread between 3 month LIBOR and 3 month Treasury bills. The Treasury calculated the historic spread at the time of the 2007 Pre-Budget Report, from outturn data for 3 month

LIBOR and 3 month Treasury bill rates, both supplied by Bloomberg. The average spread was calculated over the period 2001 to mid 2007, and equalled 17.8 basis points. The resulting adjusted 3 month Treasury bill rate was then comparable to market expectations of 3 month LIBOR when the spread with short term gilts was at the lower historic levels. The spread fluctuated over the period from 2001 to early 2007, **Figure 15 overleaf**, but the use of the whole period to calculate the historic average, rather than a part of it, provided a representative long term spread.

**90** Since the 2007 Pre-Budget Report, the Treasury has used market expectations of the 3 month Treasury bill rate plus 17.8 basis points for all the relevant elements of the fiscal projections, except for projections of tax deductible interest rate payments faced by corporations, for which market expectations of 3 month LIBOR are still used. Tax payments by corporations are determined more by actual LIBOR than by the adjusted rate 3 month Treasury bill rate. The use of higher interest rates for this receipt stream also adds a degree of caution, as they lead to higher tax relief for corporations, and so lower receipts from interest deductible Corporation Tax.

<sup>44</sup> Both changes were described in paragraph 3, *Audit of Assumptions for the 2008 Pre-Budget Report*, HC1150, Session 2007-08, with the expectation that I would be asked to audit the changes for the 2009 Budget.

## 15 The historic spread between 3 month LIBOR and 3 month Treasury bill rates



Source: Debt Management Office and Bloomberg. The Debt Management Office publishes the average yield on 3 month Treasury bills following gilt auctions and Bloomberg publishes outturn data for the 3 month LIBOR. The 'spread' is the difference between the two.

**91** The Treasury will continue to use the approach described until it judges that it would be possible to revert to using unadjusted market expectations of 3 month LIBOR as the basis for all of the relevant parts of the public finances forecast. The Treasury has undertaken to inform me if it reverts to the unadjusted methodology.

**92** The second adjustment, introduced at the 2008 Pre-Budget Report, was to use market expectations of both 3 month LIBOR and 3 month Treasury bills rates, derived from yield curves supplied by the Bank of England rather than by Bloomberg. Bloomberg is a commercial company, based in the United States and operating globally, which specialises in the provision of market data, news and analytical tools and whose services are widely used in financial circles.

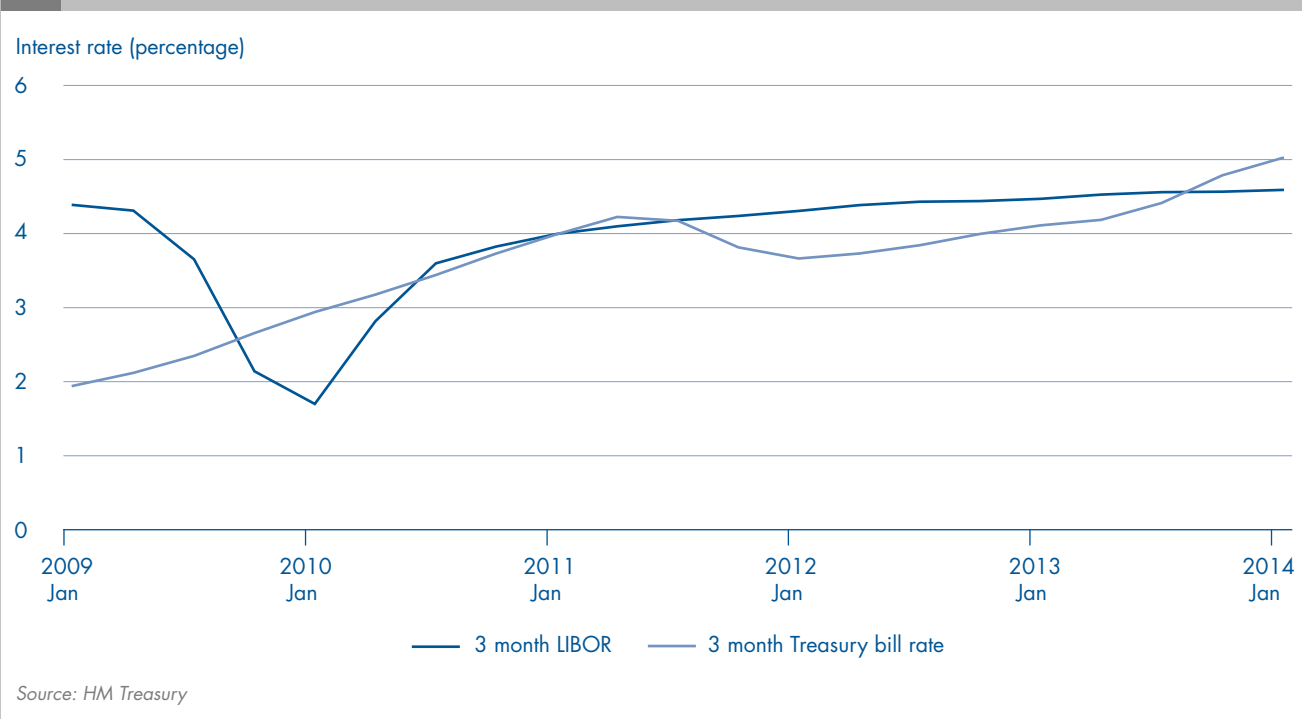
**93** The interest rate projections derived from Bloomberg at the time of the 2008 Pre-Budget Report showed an implausible pattern, with implied future 3 month LIBOR below the market implied gilt rate, **Figure 16**, despite the additional risk that lending within the inter-bank market represents.

**94** The anomaly in market expectations of rates arose in part because the data sources underlying the Bloomberg projections are short term LIBOR deposit rates and LIBOR interest rate swaps. The former in particular have been influenced by the exceptional lack of liquidity and elevated short term risk premia that exist at the present time. The path for LIBOR reflects a reduction in the risk premium in the medium term from high levels in frozen financial markets, rather than expected lower policy rates. Lower expected policy rates would have reduced market expectations of future gilt rates as well as the LIBOR.

**95** The Treasury therefore used Bank of England calculations of forward 3 month Treasury bill rates for the relevant parts of the public finances forecast, and forward 3 month LIBOR for tax deductible interest rate payments faced by corporations. The Bank's calculations of forward 3 month LIBOR implied by market prices have the advantage of being based on a wider range of instruments than the Bloomberg measure. The Bank's data are produced daily and published online without charge<sup>45</sup> (Bloomberg is a paid subscription service) providing transparency.

<sup>45</sup> <http://www.bankofengland.co.uk/statistics/yieldcurve/index.htm>

## 16 Market expectations of 3 month LIBOR and 3 month Treasury bill rates, as calculated by Bloomberg at the time of the 2008 Pre-Budget Report



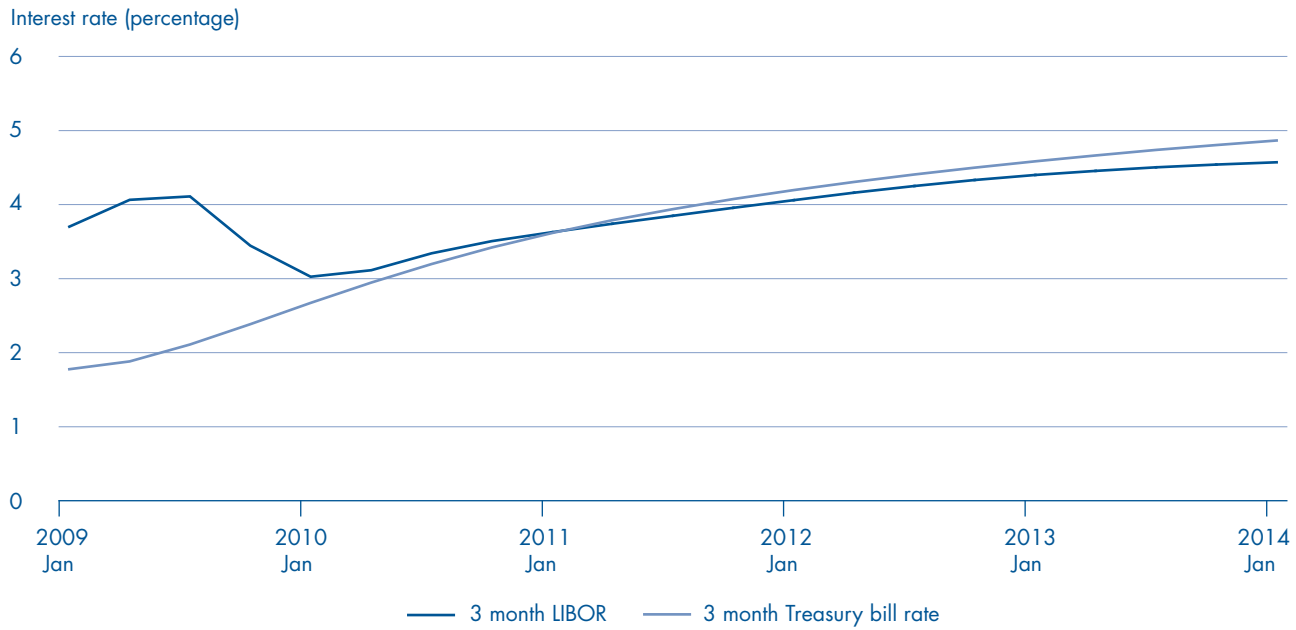
**96** Figure 17 overleaf shows expected forward rates for 3 month LIBOR and 3 month Treasury bills derived from the Bank of England yield curves at the time of the 2008 Pre-Budget Report. The projections then showed a more plausible pattern of gilt and commercial interest rates than those in Figure 16, though the gilt forward rate lay above the 3 month LIBOR after around the start of 2011. More recent curves do, however, show expected future 3 month LIBOR above expected future 3 month Treasury bill rates over the Treasury forecast period.

**97** Figure 18 overleaf and Figure 19 on page 25 show the differences between the Treasury assumption for short term interest rates at every Budget and Pre-Budget Report, over the rolling review period, and the outturn. Prior to the 2007 Pre-Budget Report, Figure 18, the differences shown relate to quarterly projections for 3 month LIBOR derived from Bloomberg, less average outturn for 3 month LIBOR for the quarter. From Pre-Budget 2007 onwards, when the Treasury adjusted its methodology, Figure 19 shows the difference between assumptions of adjusted 3 month Treasury bills and outturn for 3 month Treasury bills.

**98** Figure 20 on page 25 brings these trends together in the form of numerical differences. The figures shown for differences between projection and outturn are averages over financial years and in some cases represent a period during which the projection was above and then below outturn, for example, as is the case for Budget 2008 projections.

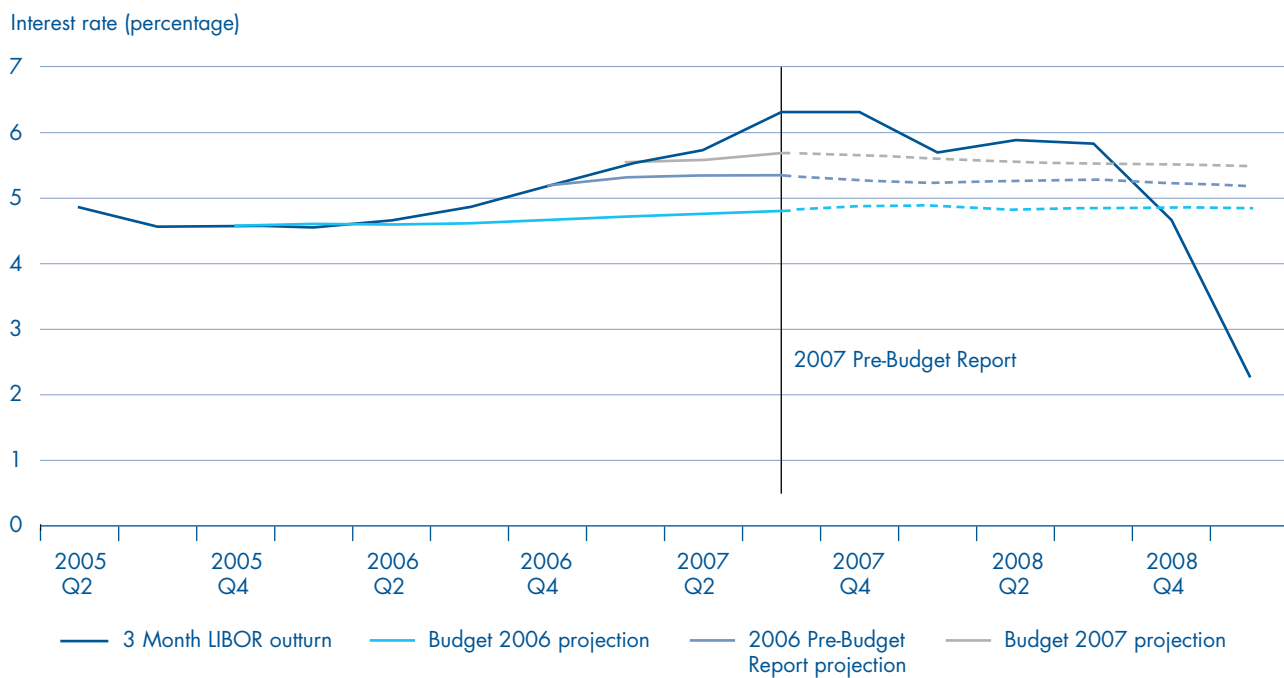
**99** The performance of the methodology for projecting future short term interest rates was variable over the rolling review period but most differences resulted from projections being greater than outturn (positive error). The largest errors were positive. As such, the projections tended to err on the cautious side, on the basis of the Treasury's sensitivity calculations, which show deteriorating public finances with higher interest rates. The Treasury believes that the negative 2006-07 errors resulted from increases in the Bank of England's base rate that were not anticipated by the market at the time of Budget 2006. Rising LIBOR during the financial crisis of 2007 and 2008 was the result of increased risk premia associated with lending to other banks, rather than expectations of higher policy rates, leading to outturns greater than projections over 2007-08.

**17** Market expectations of 3 month LIBOR and 3 month Treasury bill rates as calculated by the Bank of England at the time of the 2008 Pre-Budget Report



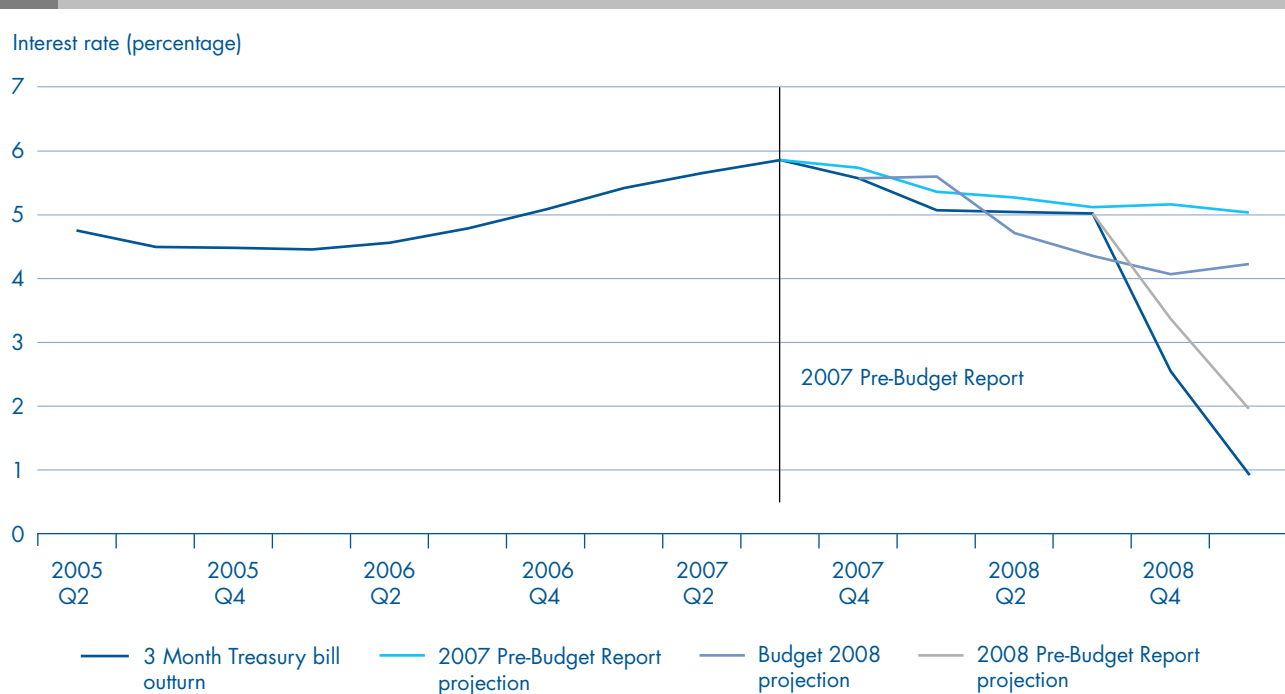
Source: HM Treasury

**18** Comparisons of projections of 3 month LIBOR and outturn 3 month LIBOR



Source: HM Treasury

## 19 Comparisons of projections of adjusted 3 month Treasury bill rates<sup>1</sup> and outturn for 3 month Treasury bill rates



### NOTE

1 Adjusted 3 month Treasury bill rate is equal to the market expectations of the rate plus the average of the historic spread between 3 month LIBOR and 3 month Treasury bill rates, 17.8 basis points.

## 20 Differences, projected less outturn interest rates, averaged over a financial year, in percentage points

Projections made for	2005-06	2006-07	2007-08	2008-09
Budget 2006	0.01	-0.41	-1.18	0.18
PBR 2006		-0.05	-0.72	0.57
Budget 2007		0.01	-0.39	0.85
PBR 2007			0.11	1.75
Budget 2008			0.13	0.95
PBR 2008				0.46

Sources: HM Treasury, Bank of England and the Debt Management Office

### NOTES

- Differences for 2008-09 are based on an outturn calculated as the average of daily rates from the 2008-09 financial year up to 12 March 2009.
- A positive figure for a difference indicates that the projection was higher than outturn. The table shows, for example, that the interest rate projection made at Budget 2006 was on average higher than outturn in the 2008-09 financial year, by 0.18 percentage points.
- Figures for differences prior to the 2007 Pre-Budget Report relate to the difference between assumptions and outturn for three month LIBOR. From that point, the figures for differences shows the difference between assumptions of adjusted 3 month Treasury bills and outturn for 3 month Treasury bills.

### Future projections of interest rates

**100** The disruption in financial markets since 2007 makes the projection of future interest rates particularly difficult at present. The market expectations approach adopted by the Treasury relies on the view that financial markets are efficient in taking account of all information available to them to value financial assets, and that yields on bonds reflect the interest rates that the market expects to prevail. Such assumptions may be questionable given recent disruption and volatility in financial markets. It is not clear, however, as in my previous review,<sup>46</sup> that any better method is available, whatever the uncertainties may be about the theoretical underpinnings of an approach based on market expectations.

**101** The move to Bank of England data, which incorporate information from a broader range of assets than before, has to date given a more plausible shape to implied forward interest rates. For the same reason, Bank of England data are likely to be a better basis for the future as well.

**102** The use of 3 month Treasury bill rates plus the historic spread between this rate and 3 month LIBOR, introduces a numerical margin of caution to the relevant parts of the public finances forecast. This margin reflects the risk of commercial banks defaulting on their borrowing, but as such, is not one relevant to the Government's borrowing, which is regarded as having minimal risk of default.

## Conclusions and recommendations

### The underlying trend growth rate, allowing for a downward adjustment to the trend output level

**103** The Treasury's assumption for trend growth for the purposes of making the fiscal projections was increased in the 2006 Pre-Budget Report from 2¼ to 2½ per cent per year, to take account of higher net inward migration. The higher level of net inward migration assumed by the Treasury was at outturn levels for 2006 and below them for 2007. Allowance for the component of trend growth due to higher net inward migration made in 2006 therefore proved to be cautious.

**104** My report on assumptions for the Pre-Budget Report in 2006 judged the trend growth rate assumption for the purposes of projecting the public finances of 2½ per cent to be reasonable and cautious at that time, in the light of

information available then. The latest external estimates for 2006, averaging 2.5 per cent, confirm that the Treasury's assumption for trend growth was reasonable for 2006.

**105** The most recent external views of trend growth for 2007 and 2008 have reduced from earlier ones in the wake of the impact of the financial crisis on the economy, and are below the Treasury's assumption of 2½ per cent applied during 2007 and up to the 2008 Pre-Budget Report, before the impact of economic developments was fully known. With hindsight, the Treasury's assumption applied in 2007 and up to the 2008 Pre-Budget Report did not prove to be cautious. At the 2008 Pre-Budget Report, the Treasury adopted a new lower assumption for trend growth, to reflect the impact of the economic shock which had occurred, on which sufficient information had by then become available to make a considered change.

**106** I commented at the time of the 2006 Pre-Budget Report that estimates of trend growth are subject to significant uncertainty and should be kept under review.<sup>47</sup> The Treasury did so over the rolling review period, and in light of economic developments, reduced its trend output assumption for the 2008 Pre-Budget Report, and reduced it further at Budget 2009.

**107** The 2008 Pre-Budget Report assumption incorporated a permanent reduction in output totalling around 4 per cent, phased in between 2007Q3 and 2009Q3. This lower assumption was arithmetically equivalent to an average trend growth rate of 1.3 per cent per year over the period end 2006 to 2008Q4, considerably lower than the most recent external forecasts for that period, averaging 2.3 per cent in 2007 and 2.0 per cent in 2008, and was therefore cautious on this test.

**108** The Treasury has reduced its trend assumption further for Budget 2009, incorporating a permanent reduction in output totaling around 5 per cent, phased in between 2007Q3 and 2010Q3. This revised lower assumption is arithmetically equivalent to an average trend growth rate of 1.4 per cent over the period end 2006 to 2008Q4. On the same basis, the trend growth path over this period which the Treasury is assuming for Budget 2009 continues to be a cautious view.

**109** The economic conditions at the time of the 2008 Pre-Budget Report were such that there were large uncertainties in making estimates of trend growth rates, which remains the case in current economic conditions. The Treasury has adopted a reasonable conceptual

<sup>46</sup> Paragraph 36, *Audit of Assumptions for Budget 2006*, HC937, Session 2005-06.

<sup>47</sup> Paragraph 48, *Audit of Assumptions for the 2006 Pre-Budget Report*, HC125, Session 2006-07.

approach by allowing for a permanent loss of output from the recession, with the impact phased in. This phasing in was assumed to take place between 2007Q3 and 2009Q3 for the 2008 Pre-Budget Report assumption, and between 2007Q3 and 2010Q3 for the Budget 2009 assumption. These periods are consistent with the Treasury's assumption that credit conditions would remain tight in 2008, and ease slowly through 2009 before stabilising in 2010, but alternative paths for trend output levels could be assumed instead.

**110** Over the period from the adjudged start of the current economic cycle in 2006H2 to 2013 (the last full year in the Treasury's forecast period) the revised trend growth assumption made at the 2008 Pre-Budget Report was arithmetically equivalent to an average annual growth rate of 1.9 per cent. This rate is slightly above the most recent average estimate of external forecasters of 1.8 per cent. The Treasury's 2008 Pre-Budget Report assumption therefore appears on current information to have been reasonable within the latitude arising from uncertainties in making estimates of trend growth. On the basis of comparisons with most recent external forecasts and my consultations, however, there was no longer a clear margin for caution.

**111** Consistent with this judgement and the factors above, the Treasury's revised trend growth rate assumption for Budget 2009, arithmetically equivalent to an average annual growth rate of 1.7 over the period 2006H2 to 2013, is below all but one of the publicly-available estimates of trend growth. On this basis the assumption is therefore reasonable, as well as containing an element of caution. This conclusion is consistent with the information available to me up to publication of my report.

### The approach used by the Treasury to produce estimates of the fiscal aggregates adjusted for the effects of the economic cycle

**112** The different approaches available for making cyclical adjustments to fiscal aggregates have advantages and disadvantages. The understanding provided by a detailed tax and spending measure, or 'bottom up' approach, is seen by some of those who adopt it as a more satisfactory one in principle than that derived from aggregate relationships of the type underlying the Treasury's ready-reckoner methodology. The Treasury complements its top down analysis with an element of the bottom up approach in its methodology, however, and uses the information in deriving its ready-reckoner.

**113** The Treasury's ready-reckoner is an approximate and simplified representation of the impact of the output gap on fiscal aggregates. It incorporates a number of judgements, where alternative views would be possible. There are limitations on the extent to which the Treasury's methodology can take account of some important factors and influences on the relationships between the fiscal aggregates and the economic cycle, but this is true also for alternative methodologies. The Treasury's methodology is based on plausible theoretical relationships that have empirical if imperfect support. The different methodologies adopted by external organisations yield similar cyclical adjustment coefficients to those in the Treasury's ready-reckoner, though the Treasury's estimates are at the high end of the range.

**114** The Treasury aims to introduce caution into the projections of the public finances through the assumptions I audit, but I have not been asked to comment separately on whether the coefficients in the Treasury ready-reckoner are cautious ones for deriving an assessment of the underlying fiscal position. Nor have I been asked to examine estimates of what that position might be. In terms of my remit to examine the approach underlying the Treasury's ready-reckoner, I conclude that it is a reasonable one to adopt provided that its limitations and the inherent uncertainties are acknowledged transparently, as the Treasury has done in its past analyses.

**115** I recommend that the Treasury sets out an analysis of the key uncertainties relevant at the time of forecasting rounds, alongside its published estimates of the cyclically adjusted public finances. As an assurance of the continued reasonableness of its methodology, the Treasury should periodically examine external estimates of the cyclical adjustment coefficients and publish a broad reconciliation of any differences from its own estimates. Such a check would provide assurance that differences between alternative estimates do not result from a substantial divergence between the results of the Treasury ready-reckoner and other methodologies, after allowing for all other factors of relevance.

### Privatisation receipts

**116** The convention for fiscal projections to include only proceeds from announced sales remains a reasonable and cautious approach. As a result of adopting this convention, all divergences between projected and actual proceeds during the rolling review period arose because actual proceeds were greater than the level included in fiscal projections. In response to my rolling review report for Budget 2006, the Treasury has put in place improved arrangements for monitoring the profile of privatisation receipts.

## The methodology for projecting interest rates

**117** Until the financial crisis, the Treasury used market expectations of commercial interest rates as the basis for the relevant elements of the public finances forecast. Commercial rates include a credit risk margin, which while not applicable to gilts as government securities, added a numerical margin of caution to the fiscal projections by increasing slightly the interest rates used in making the relevant fiscal projections.

**118** The financial crisis significantly widened the spread between gilt and commercial rates, making commercial rates less suitable as a basis for the government's fiscal projections. The use of adjusted 3 month Treasury bill rates, incorporating the historic average of the spread between this rate and the 3 month LIBOR, is currently a reasonable adjustment to make. This adjustment explicitly seeks to maintain the element of caution as before, by adding in a risk premium.

**119** While the performance of the interest rate projection methodology was variable over the rolling review period, more often than not, the various projections exceeded outturns and the largest errors were ones where projections exceeded outcomes. The projections were cautious overall, on the basis that higher interest rates have an adverse impact effect on the public finances.

**120** For the future, projections of interest rates remain uncertain and are likely to be more so in the medium term future, though the Treasury's methodology currently remains reasonable. The Treasury has undertaken to review its approach in the light of developments in the financial markets, making it clear what approach has been used in a given forecast.

# APPENDIX ONE

## Individuals and organisations consulted outside HM Treasury

Professor Peter Spencer, University of York and Economic Adviser, Ernst & Young ITEM Club

Bank of England

Confederation of British Industry

European Central Bank

European Commission, Directorate General for Economic and Financial Affairs

International Monetary Fund

Morgan Stanley

National Institute of Economic and Social Research

Organisation for Economic Co-operation and Development

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