















































<sup>a</sup> For recent analysis of fiscal multipliers in 'normal' times see: T. Warmedinger, C. D. Checherita-Westphal, P. Hernandez de Cos, 'Fiscal Multipliers and Beyond', *ECB Occasional Paper 162*, June 2015 and V. A. Ramey, 'Ten Years after the Financial Crisis: What Have We Learned from the Renaissance in Fiscal Research?', *NBER Working Paper No. 25531*, February 2019.

<sup>b</sup> See for example: E. M. Leeper, et al. 'Fiscal foresight and information flows', *Econometrica* 81 (3), 2013 and R. Barrell and M. Weale, 'The Economics of a Reduction in VAT', *Fiscal Studies: The Journal of Applied Public Economic* 30 (1), March 2009.

<sup>c</sup> O. Blanchard, and D. Leigh, "Growth Forecast Errors and Fiscal Multipliers", *American Economic Review* 103 (3), 2013.

<sup>d</sup> S. Sumner, 'Why the Fiscal Multiplier is Roughly Zero', *Mercatus Policy Briefs*, November 2013.

<sup>e</sup> C. Glocker, G. Sestieri, & P. Towbin, 'Time-varying fiscal spending multipliers in the UK', *Banque de France Working Paper 643*, January 2019.

<sup>f</sup> S. Arslanalp, S., F. Bornhorst, S. Gupta & E. Sze, 'Public capital and growth', July 2010 and E. Pappa, 'Government spending multipliers: An international comparison', June 2010.

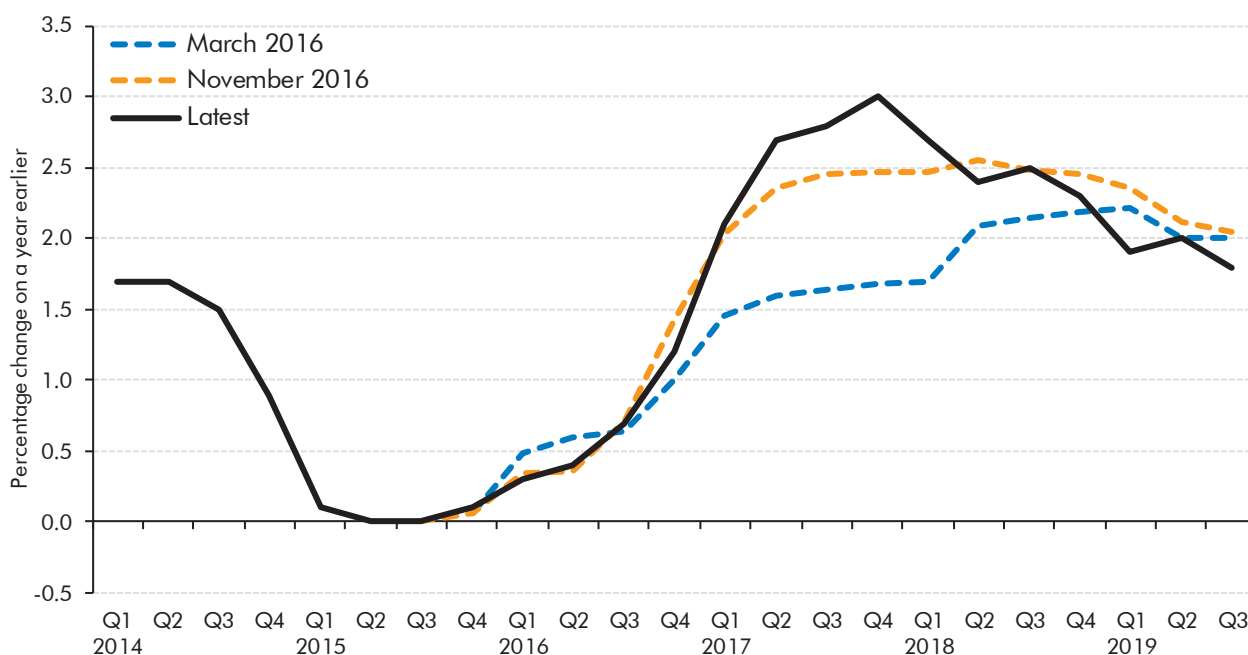
<sup>g</sup> Z. An, A. Kangur & C. Papageorgiou, 'On the Substitution of Private and Public Capital in Production', *IMF Working Paper 232*, November 2019.

## Consumer price inflation

**2.17** In March 2016, we forecast that CPI inflation would rise slowly to reach the Bank of England's 2 per cent target in 2018. In the event, it picked up more sharply in 2017 and 2018, peaking at 3.0 per cent in the final quarter of 2017, before then falling to 1.8 per cent in the third quarter of 2019.

**2.18** The initial overshoot was predominantly due to the fall in the pound associated with the vote to leave the EU. In our first post-referendum forecast in November 2016, we revised up our CPI inflation forecast to take account of the sterling depreciation. Outturns were still higher than expected in 2017 and the first quarter of 2018, in part reflecting an unexpected rise in oil prices. From the second quarter of 2018 onwards, outturns have instead been below our November 2016 forecast, largely due to the unexpected appreciation of sterling in the first half of 2018.

Chart 2.4: Forecasts and outturns for CPI inflation



Source: ONS, OBR





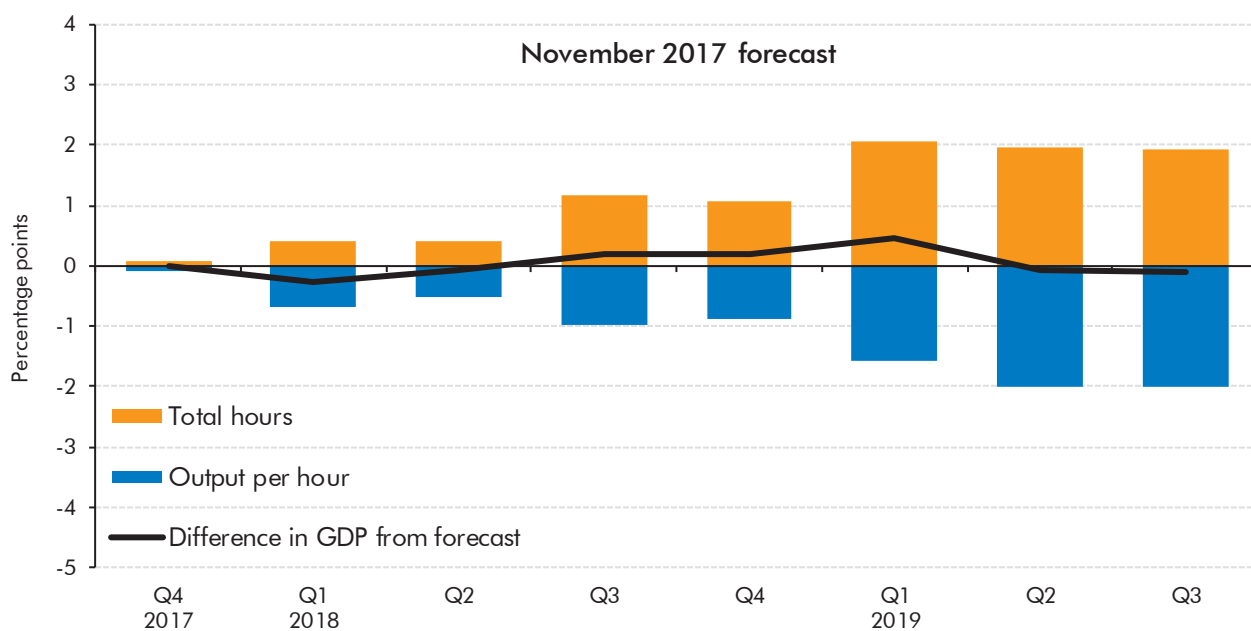








Chart 2.6: Real GDP, total hours and productivity growth surprises: November 2017



Source: ONS, OBR









































Table 3.8: The change in public sector net debt in 2018-19

	£ billion				
	Forecast <sup>1</sup>		Estimates	Difference	
	March 2016	November 2016		March 2016	November 2016
<b>Net borrowing</b>	<b>18.9</b>	<b>43.6</b>	<b>23.3</b>	<b>4.4</b>	<b>-20.3</b>
<b>Financial transactions</b>	<b>26.3</b>	<b>28.5</b>	<b>14.4</b>	<b>-11.9</b>	<b>-14.1</b>
<i>of which:</i>					
Net lending	21.8	22.0	23.1	1.4	1.2
Sales or purchases of financial assets	-9.2	-7.6	-13.3	-4.2	-5.7
Bank of England schemes	0.0	0.0	-5.8	-5.8	-5.8
Other factors	13.7	14.1	10.4	-3.3	-3.7
<b>Valuation</b>	<b>-6.7</b>	<b>-8.0</b>	<b>-8.3</b>	<b>-1.6</b>	<b>-0.3</b>
<i>of which:</i>					
Gilt premia	-6.6	-8.2	-5.4	1.2	2.8
Reserves	-0.2	0.2	-2.9	-2.7	-3.1
<b>Classification</b>	<b>-6.0</b>	<b>-6.0</b>	<b>-6.0</b>	<b>0.0</b>	<b>0.0</b>
<b>Change in net debt</b>	<b>32.4</b>	<b>58.1</b>	<b>23.4</b>	<b>-9.0</b>	<b>-34.7</b>

# 4 Refining our forecasts

## Introduction

- 4.1 We strive to provide the greatest possible transparency around our forecasts, both to facilitate understanding and to ensure that we can be held to account for our judgements. Transparency also permits us to scrutinise our own forecasts in detail, examining and explaining the inevitable differences from outturns. We hope that this will reassure users that our forecasts are based on impartial professional judgement, rather than politically motivated wishful thinking, even if they disagree with our conclusions. The process also affords an opportunity to learn lessons that can be applied to future forecasts.
- 4.2 In this chapter we:
- **Identify the lessons that have emerged from this year’s forecast evaluation exercise** described in Chapters 2 and 3.
  - **Report on progress against last year’s modelling recommendations** following our systematic review of fiscal forecasting models.
  - Based on the modelling principles documented in our October 2017 *Forecast evaluation report (FER)*, we **set out our main modelling priorities for the coming year**.

## Lessons learnt

- 4.3 Lessons highlighted in our *FERs* have often already been acted upon, because they had been identified during the preparation of our *Economic and fiscal outlook (EFO)* forecasts. This is particularly true this year as we consider two older vintages of forecast.
- 4.4 In recent *FERs* we have highlighted the importance of the in-year estimates for receipts and spending that form the starting point for our fiscal forecast. Chapter 3 noted that the forecast difference for borrowing in subsequent years in our November 2016 forecast can be more than explained by the in-year forecast for 2016-17 proving too pessimistic.
- 4.5 We reviewed the performance of our in-year forecasts, and the challenges we face in producing them, in a working paper published last year.<sup>1</sup> This identified some areas for development, including the bonus assumptions in our income tax and NICs forecast and payment patterns in the onshore corporation tax forecast. We have looked more closely at these in-year estimates in the past year and continue to seek to make greater use of real-time PAYE information on income tax and NICs to inform our assumptions.

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<sup>1</sup> Taylor, J., and Sutton, A., *Working Paper No 13: In-year fiscal forecasting and monitoring*, September 2018.



4.6 Many of the lessons from a retrospective evaluation of our 2016 forecasts have already been highlighted in past *FERs*. But comparing those forecasts with the latest data has altered some of those lessons, while reinforcing others. For example:

- The difficulties in **predicting how households will react to changes in the outlook for real income**. We drew attention in last year's *FER* to the unexpected resilience of real household consumption following the referendum. More recent data have altered that story somewhat, and the forecast difference has shrunk considerably. Annual growth in household spending to the second quarter of 2019 was revised down from 1.8 to 1.1 per cent in the latest Quarterly National Accounts. Alongside upward revisions to household income growth, this means that the saving rate has held up better than previously thought. The recurring pattern of upward revisions to the saving ratio was discussed in Box 3.4 of our October 2018 *EFO*.
- The challenge of **anticipating how quickly shocks will affect the economy and the public finances**. After the referendum, business investment initially held up better than we expected. But more recently it has disappointed, falling in five of the past eight quarters, reaching a level significantly below our first post-referendum forecast. It is likely that this recent weakness reflects the impact of the postponement of the UK's departure from the EU and the continuing uncertainty about the post-Brexit trading relationship.<sup>2</sup> The change in the exit date is not something that we could reasonably have foreseen and in any case our forecasts have to be conditioned on stated government policy. Nevertheless, the past year has provided further evidence of the effect that sustained periods of elevated uncertainty can have on business decisions.
- The importance of the **composition of labour income**, in particular the continued strength in employment and weakness in average earnings growth. In response we revised down our estimate of the sustainable unemployment rate in both March 2017 and October 2018. And productivity growth has fallen far short of even our downwardly revised November 2017 forecast. The more recent forecast differences may be due in part to the continuation of the uncertainty surrounding the UK's exit from the EU and the nature of the subsequent trading relationship. Businesses appear to have preferred to meet demand by employing labour rather than investing in capital because the former is more easily reversed, while preparations for Brexit may also have led to a diversion of effort.
- The importance of trends in the **use of corporation tax deductions and reliefs**. A key reason for the underestimate of receipts in both 2016 forecasts was that fewer capital allowances were used than expected. In light of this, we revised down significantly our March 2019 forecast of their use, increasing our forecast for corporation tax revenues. Less use of other deductions, such as group relief, also explains some of our over-pessimism on receipts. We will review these assumptions over the coming year.

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<sup>2</sup> B. Broadbent, *Investment and uncertainty: the value of waiting for news*, speech at Imperial College Business School, May 2019.

- **Local authorities' use of borrowing to finance capital expenditure** has been much greater than anticipated – in 2018-19 it was almost twice what we forecast in March and November 2016. We have raised our forecast significantly, but information in this area is relatively poor so the forecast is uncomfortably reliant on judgement. The Treasury has recently increased the interest rate it charges local authorities to borrow from the Public Works Loan Board – their main source of borrowing. It will be challenging to estimate the effect of this on capital spending.

4.7 This year we analysed our spending forecasts relative to the categories that the ONS uses in its monthly outturn data, rather than the more detailed ones we employ in each *EFO* that are derived from the Treasury's spending control framework and the National Accounts. This revealed some issues with the mapping between the two that we intend to improve in future forecasts. Doing so will facilitate monitoring outturn data against our most recent published forecast.

## Review of fiscal forecasting models

- 4.8 In 2016, we introduced a more systematic approach to following up our analysis of fiscal forecasting differences and issues raised in *EFO* forecasting rounds.<sup>3</sup> We have been working closely with our partners across government in doing so. We described the criteria and analysis we deploy when reviewing fiscal forecast models in Chapter 4 of our 2016 *FER*.
- 4.9 Last year we identified 19 separate tax and spending models to look at in greater detail, of which seven were carried over from the previous year. We codified a set of questions that allowed us to benchmark fiscal forecasting models against our ideal requirements for them. We then assessed each model against these requirements and identified priorities for modelling work in 2019. These were based on the importance of each issue in relation to the tax or spending stream itself and of each issue to our overall fiscal forecast.

### Progress against last year's recommendations

- 4.10 Last year's *FER* set out 45 recommendations for model development work across the 19 models. During the year we agreed with HMRC to review alcohol duties instead of betting and gaming duties. Of the now 46 recommendations, 15 have been fully resolved and 8 partly resolved. With most of this work progressing during the summer, these have yet to be reflected in a forecast, but will feed into our next one. We have published a full update in the 'model assessment database' on our website, but the key steps include:
- Our assumptions on differential earnings growth across the income distribution will be informed by **real-time information (RTI) from the PAYE income tax system**, following work by HMRC to investigate potential options for including this data source. In the short term, RTI will be used to inform the assumptions built into the personal tax model (PTM), while HMRC will continue to investigate how RTI can be used directly in the model. The use of this source will enable much more timely information to be included

<sup>3</sup> *HM Treasury review of the Office for Budget Responsibility*, HM Treasury, September 2015.

## Refining our forecasts

on movements in the earnings distribution, particularly at the very top end which accounts for a disproportionate share of receipts. This assumption has been a major source of forecast differences in the past. We will also adopt a new methodology for forecasting income tax on occupational and personal pensions, drawing more effectively on information in our state pension forecast.

- We made progress on several fronts in respect of our forecasts of **onshore corporation tax**. HMRC has improved the transparency of the methodology used to time-shift cash receipts onto the National Accounts basis used in our forecasts, and of the way in which the pool of historical spending in the capital allowances model evolves over time. These will enable us to make better informed forecast judgements, and the time-shifting methodology should also permit more effective monitoring of receipts as payments from large companies are brought forward. Despite this progress, there is still a considerable programme of work underway to improve the model further.
- The behavioural responses embedded in our forecasts of **alcohol duties** will now be linked to the overall product price, rather than just the rate of duty applied, given that consumer behaviour will depend on the full price and not just the duty element.
- The **student loans forecast model** has been converted to deliver outputs in line with the new ONS treatment of student loans in the public sector finances.
- We reviewed and updated the **structure and assumptions underpinning several smaller models**, including those for capital gains tax, carer's allowance and devolved income tax.

## Modelling priorities for the coming year

**4.11** The process of refining our models and the judgements underpinning our fiscal forecasts is a continuous one that draws on analysis prepared in *EFO* forecasting rounds and for our *FERs*. This review builds on existing processes and helps to ensure they are more consistent and followed up in a more systematic way. In carrying out the model review this year:

- **We selected six new separate tax and spending forecast models** to look at in greater detail. Our choices were based on a review of issues raised during past challenge and scrutiny processes, the amount of tax or spending that they cover, their performance against the forecast accuracy analysis that we generate as part of the *FER* each year, and our need to forecast new areas of the public finances due to ONS classification changes. These criteria generated 12 new priorities for model development.
- **We have carried forward 21 recommendations that were not fully resolved from last year's review**, related to 13 individual fiscal forecasting models, and added a further 12 priorities for these models.

**4.12** The model review priorities this year sit within some overarching themes identified in previous years' reviews, including:

- **Understanding and fully exploiting outturn data sources.** We hope to increase further our use of RTI data over the coming year. This will include, if possible, using the data more fully in our forecasts of Scottish and Welsh devolved income tax receipts. Similarly, progress has been made on the use of universal credit (UC) administrative data to inform our forecasts, with better identification of claimant characteristics and a better match with payments made. But further work is needed to understand how UC is affecting spending month by month, so that we can be more confident about what explains changes in total spending on UC and the legacy benefits and tax credits in the year in progress. Better understanding of what is happening concurrently is essential to inform our judgement about the implications of outturn data for future spending.
- **Better alignment with ONS accounting treatment, including the consequences of recent classification changes.** In the past year we have made progress on student loan modelling, time-shifting corporation tax receipts and central government accounting adjustments, though there is more to do. The major ONS classification and methodological changes affecting funded public service pension schemes and capital stocks and depreciation require significant model development. This work will also encompass the requirements of forecasting wider measures of the public sector balance sheet such as public sector net worth (PSNW).
- **Improving the plausibility and transparency of forecast models.** This includes stronger links with the determinants in our economy forecast, which was identified as an issue in this year's review of the capital gains tax model, as well as reviewing our incorporations modelling to ensure that it reflects recent policy changes in relevant taxes. Greater transparency helps us better specify the key assumptions of the models, and make more informed judgements about them, as with the continuing development of the models underpinning our corporation tax forecasts. Bringing key policy changes within the models, such as with the residential nil rate band for inheritance tax and first-time buyers relief for stamp duty land tax, will both improve transparency and each model's efficiency and effectiveness.

4.13 The results of this review do not capture every potential issue that may arise and the appropriate conclusions may evolve over time. In our next *FER*, we will review progress against these updated priorities and will set out new recommendations for work in 2021.



# A Comparison with past official forecasts

- A.1 This annex compares the difference between the OBR's various fiscal forecasts and the latest outturns with the average differences in official forecasts over the previous 20 years.
- A.2 This exercise provides some guide to relative forecast performance, but with important limitations. Most fundamentally, these comparisons are often influenced by factors beyond the control of the forecaster in question. For example, we may be looking at periods in which the underlying behaviour of the public finances was inherently more or less predictable, in which the size and distribution of unforeseeable shocks was different, or in which policymakers responded differently when the public finances diverged from expectations. And we have not yet had to forecast through a recession, which is often when the largest forecast differences arise (because their timing and depth are so uncertain). We therefore evaluate our forecasts against the median absolute average of the previous 20 years' forecasts – which excludes the large forecast differences associated with the recession in the late 2000s – as well as reporting against the mean absolute average difference.
- A.3 We have so far produced 20 forecasts, but the sample that we can compare against outturns is still relatively small – especially at longer time horizons. We can compare only twelve of our fiscal-year forecasts at a four-year horizon and nine at a five-year horizon.
- A.4 In addition to the public finances, we also undertake this comparison for our forecasts of real GDP growth. As we have emphasised throughout this report, real GDP is not the most important economic determinant of the public finances, but it is the measure that most commentators focus on when judging the performance of macroeconomic forecasts.
- A.5 For what it is worth, our forecast differences for real GDP and net borrowing have, more often than not, been smaller in size than the average differences in official forecasts over the 20 years before the OBR was created.

## Real GDP growth

- A.6 Table A.1 shows our forecast differences for real GDP growth. Large differences between forecast and outturn are infrequent and concentrated near the forecast horizon, reflecting the increased effect of our over-optimism in projecting potential growth. These instances aside, other notable differences include:
- Our **June 2010 and November 2010** forecasts were both over-optimistic regarding GDP growth in 2012, failing to foresee the intensification of the euro crisis. Only by late 2011 did we (and most other forecasters) significantly revise down our forecasts

for GDP growth in 2012. Thanks to subsequent upward data revisions, our November 2011 forecast now appears to have been too pessimistic about growth in 2012.

- Our **November 2011 and March 2012** forecasts proved particularly over-optimistic regarding GDP growth in 2016. We assumed that growth would be higher as spare capacity would be brought back into productive use, on top of an assumed potential growth rate of 2.3 per cent. In the event, 2016 saw GDP growth slow to 1.9 per cent. Based on our view of potential output and the output gap in our March 2019 forecast, this difference can be attributed both to potential growth and to cyclical factors being weaker than we had assumed.
- Our **December 2012** forecast was too pessimistic relative to the latest estimate of growth in 2012, despite the fact that initial estimates of GDP growth in the first three quarters of 2012 were available at the time. Much of the in-year forecast difference reflects subsequent data revisions (see Box 2.2 of our 2018 *Forecast evaluation report*).
- Our **March 2013** forecast was too pessimistic regarding growth in 2013. The revised data show more momentum in the economy in 2012 than the initial estimates did, and there were several policy developments that may have supported output growth by more than we had assumed – including, for example, the President of the European Central Bank’s confidence-boosting commitment to ‘do whatever it takes’ to preserve the euro, and the launch of the Bank of England’s Funding for Lending Scheme.
- Our **December 2013** forecast was too optimistic about growth in 2018. We assumed that by the end of the forecast period real GDP growth would strengthen to 2.7 per cent, as both potential output growth recovered and the remaining spare capacity in the economy was used up. But the latest outturn data record growth of just 1.4 per cent. At such a long horizon, a forecast difference of this size is well within the range of uncertainty. Indeed in December 2013 we estimated that there was a 40 per cent chance that growth in 2018 would be within the range of 1.4 to 3.9 per cent.
- As discussed in Chapter 2, our **March 2016** forecast was too optimistic about growth in 2018. Our forecast was based on prevailing government policy that the UK would not leave the EU, so we did not foresee the slowdown in growth that occurred in 2018 due to the impact of Brexit-related uncertainty on domestic demand.

Table A.1: Forecast differences for real GDP growth

	Per cent <sup>1</sup>					
	Calendar years ahead					
	In-year	One	Two	Three	Four	Five
<b>Forecast differences (colours reflect magnitude relative to pre-OBR median)</b>						
June 2010	0.7	-0.8	-1.3	-0.8	-0.1	-0.3
November 2010	0.1	-0.6	-1.1	-0.8	-0.2	-0.3
March 2011	-0.2	-1.0	-0.8	-0.3	-0.4	
November 2011	0.6	0.8	0.0	-0.1	-0.6	-1.1
March 2012	0.7	0.1	-0.1	-0.6	-1.1	
December 2012	1.6	0.9	0.6	0.1	-0.8	-0.9
March 2013	1.5	0.8	0.1	-0.8	-0.9	
December 2013	0.7	0.2	0.2	-0.7	-0.8	-1.3
March 2014	-0.1	0.1	-0.7	-0.7	-1.1	
December 2014	-0.4	0.0	-0.3	-0.5	-0.9	
March 2015	-0.1	-0.4	-0.4	-0.9		
July 2015	0.0	-0.4	-0.5	-1.0		
November 2015	0.0	-0.5	-0.6			
March 2016	-0.1	-0.3	-0.7			
November 2016	-0.1	0.5	-0.3			
March 2017	-0.1	-0.2				Smaller than median absolute difference
November 2017	0.4	0.0				Median sized difference
March 2018	-0.1					Less than ½ std. dev. above median absolute
November 2018	0.1					More than ½ std. dev. above median absolute
Median absolute differences over the 20 years preceding the creation of the OBR						
Spring/summer	0.6	0.7	0.8	0.7	0.8	n/a
Autumn	0.8	0.7	0.6	0.8	0.8	0.7
<b>Forecast differences (colours reflect magnitude relative to pre-OBR mean)</b>						
June 2010	0.7	-0.8	-1.3	-0.8	-0.1	-0.3
November 2010	0.1	-0.6	-1.1	-0.8	-0.2	-0.3
March 2011	-0.2	-1.0	-0.8	-0.3	-0.4	
November 2011	0.6	0.8	0.0	-0.1	-0.6	-1.1
March 2012	0.7	0.1	-0.1	-0.6	-1.1	
December 2012	1.6	0.9	0.6	0.1	-0.8	-0.9
March 2013	1.5	0.8	0.1	-0.8	-0.9	
December 2013	0.7	0.2	0.2	-0.7	-0.8	-1.3
March 2014	-0.1	0.1	-0.7	-0.7	-1.1	
December 2014	-0.4	0.0	-0.3	-0.5	-0.9	
March 2015	-0.1	-0.4	-0.4	-0.9		
July 2015	0.0	-0.4	-0.5	-1.0		
November 2015	0.0	-0.5	-0.6			
March 2016	-0.1	-0.3	-0.7			
November 2016	-0.1	0.5	-0.3			
March 2017	-0.1	-0.2				Smaller than mean absolute difference
November 2017	0.4	0.0				Mean sized difference
March 2018	-0.1					Bigger than mean absolute difference
November 2018	0.1					
Mean absolute differences over the 20 years preceding the creation of the OBR						
Spring/summer	0.8	1.2	1.2	1.2	1.2	n/a
Autumn	0.8	1.0	1.1	1.1	1.2	1.1

<sup>1</sup> A positive figure indicates outturn was above forecast.



## Public sector net borrowing

A.7 Nominal GDP has been revised up significantly in recent years, in particular in the 2014 Blue Book that brought the National Accounts into line with the 2010 European System of Accounts (ESA10). Changes to the level of GDP do not greatly affect our interpretation of how the public finances have evolved, but the upward revisions have reduced the ratios of fiscal measures expressed as a share of GDP. This makes comparisons of forecasts expressed on that basis hard to interpret, so in this annex we:

- compare **cash borrowing** (Table A.2) and **cash spending** (Table A.3) forecast differences normalised by the latest GDP estimates; and
- present our forecasts for the **change in receipts as a share of GDP** against outturns over time, which abstracts from the effects of revisions to the denominator (Table A.4).

A.8 We have also restated our fiscal forecasts and adjusted outturns using the same methodology set out in Chapter 3 in order to make like-for-like comparisons.

A.9 Table A.2 shows that less than a fifth of our PSNB forecasts show larger forecast differences than the median difference over the preceding 20 years. These larger differences include:

- Our **first three forecasts for 2013-14 to 2015-16** were too optimistic, with November 2010 particularly so. This largely reflected lower-than-expected tax receipts. In particular, the productivity-related weakness in earnings growth, as well as policy changes to raise the income tax personal allowance faster than inflation, put downward pressure on the effective tax rate.
- Our **in-year forecasts for 2010-11 to 2014-15** were consistently too pessimistic. We set out a full analysis of our in-year forecasting performance in *Working Paper No. 13: In-year fiscal forecasting and monitoring*.<sup>1</sup> One particular issue during this period was local authority net borrowing. Local authorities added to their reserves rather than reducing them, but this only became apparent much later when reliable data became available. More timely quarterly data are now available to inform our forecasts.
- Our **in-year forecasts for 2016-17** were too pessimistic. The bulk of this reflected stronger-than-expected tax receipts during the second half of the year, although this was partly related to significant revisions to the in-year data.

A.10 **Cash spending forecast differences** have consistently been smaller than the average of the previous 20 years (Table A.3). The larger under-estimates for spending in 2016-17 onwards in some forecasts – particularly December 2014 and March 2015 – reflect the Conservative Government’s Summer Budget 2015 decision not to carry out the cuts to departmental spending that had been pencilled in by the Coalition before the 2015 General Election.

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<sup>1</sup> Taylor, J. and Sutton, A., OBR Working paper No. 13: *In-year fiscal forecasting and monitoring*, September 2018.









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