

# *Inflation Report* fan charts

## November 2016

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The charts and tables in this document show the MPC's fan charts as described in Section 5 of the November 2016 *Inflation Report*. They are based on a number of conditioning assumptions that are set out in more detail in the 'Conditioning assumptions, MPC key judgements, and indicative projections' document.

The charts and tables showing the November projections have been conditioned on the assumption that the stock of purchased gilts financed by the issuance of central bank reserves reaches £435 billion and remains there throughout the forecast period; the stock of purchased corporate bonds financed by the issuance of central bank reserves reaches £10 billion and remains there throughout the forecast period; on the announced Term Funding Scheme (TFS) financed by the issuance of central bank reserves; and market interest rates, unless otherwise stated. The August projections were conditioned on the same asset purchase and TFS assumptions and market interest rates.

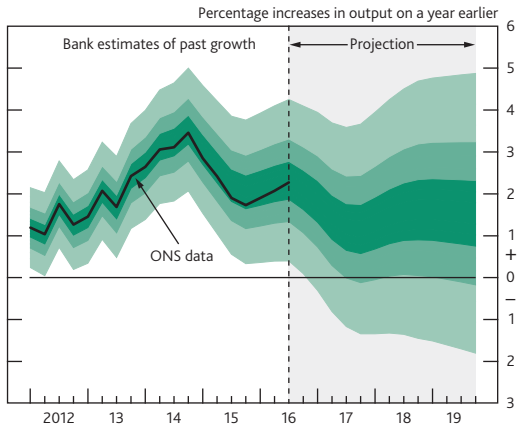
The data behind the distributions in November are available at [www.bankofengland.co.uk/publications/Documents/inflationreport/ir16novprob.xlsx](http://www.bankofengland.co.uk/publications/Documents/inflationreport/ir16novprob.xlsx).

The data behind the distributions in August are available at [www.bankofengland.co.uk/publications/Documents/inflationreport/ir16augprob.xlsx](http://www.bankofengland.co.uk/publications/Documents/inflationreport/ir16augprob.xlsx).

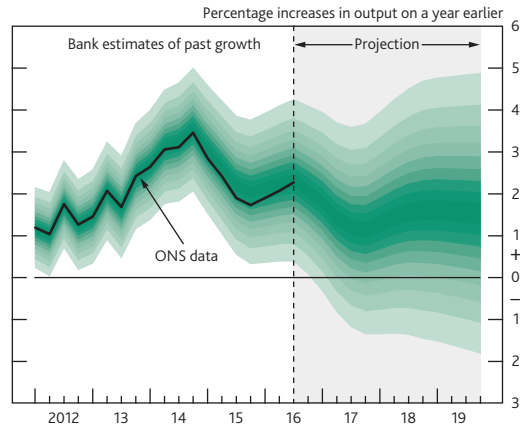
The market interest rate paths underlying some of these projections are available at [www.bankofengland.co.uk/publications/Documents/inflationreport/market\\_profiles.xlsx](http://www.bankofengland.co.uk/publications/Documents/inflationreport/market_profiles.xlsx).

The 'Conditioning assumptions, MPC key judgements, and indicative projections' document is available at [www.bankofengland.co.uk/publications/Documents/inflationreport/2016/novca.pdf](http://www.bankofengland.co.uk/publications/Documents/inflationreport/2016/novca.pdf).

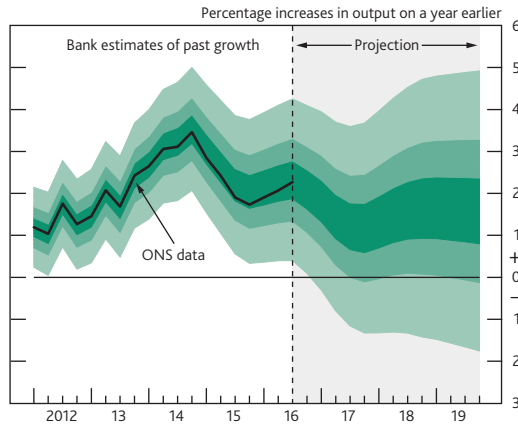
GDP projection (wide bands)<sup>(a)(b)</sup>



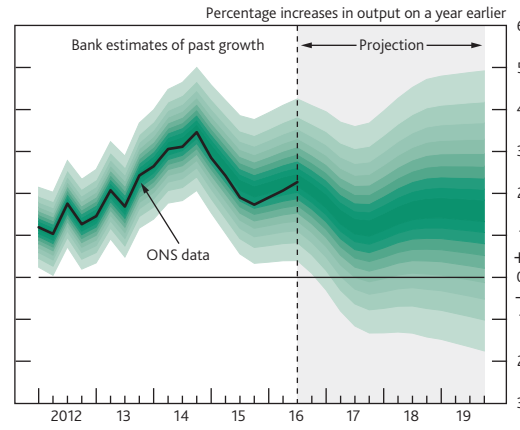
GDP projection (narrow bands)<sup>(a)(b)</sup>



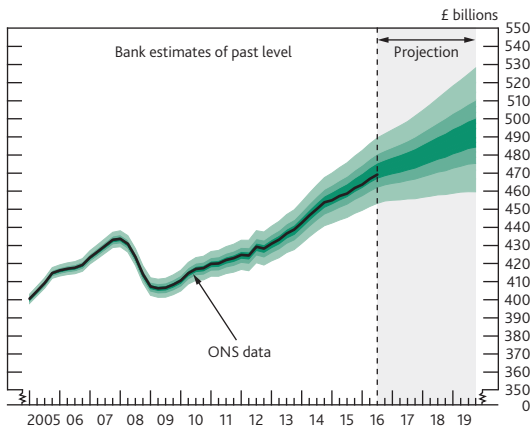
GDP projection based on constant nominal interest rates at 0.25% (wide bands)<sup>(a)(b)</sup>



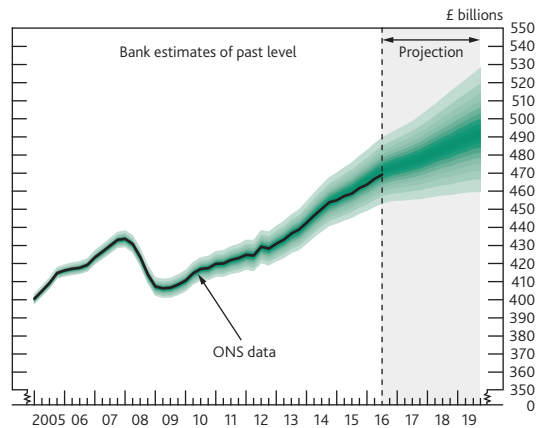
GDP projection based on constant nominal interest rates at 0.25% (narrow bands)<sup>(a)(b)</sup>



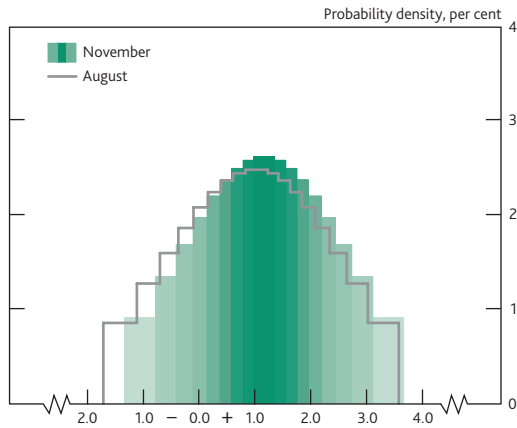
Projection of the level of GDP (wide bands)<sup>(a)(b)(c)</sup>



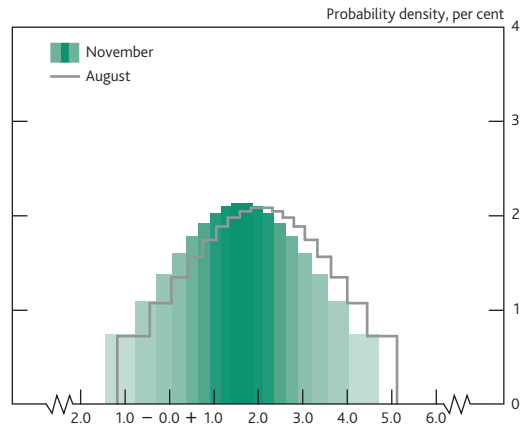
Projection of the level of GDP (narrow bands)<sup>(a)(b)(c)</sup>



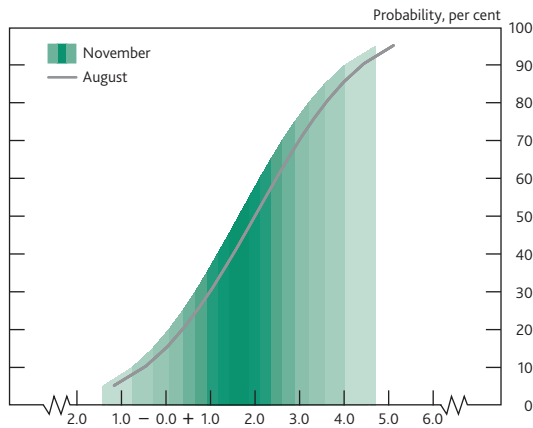
Projected probabilities of GDP growth in 2017 Q4 (central 90% of the distribution)<sup>(a)(d)</sup>



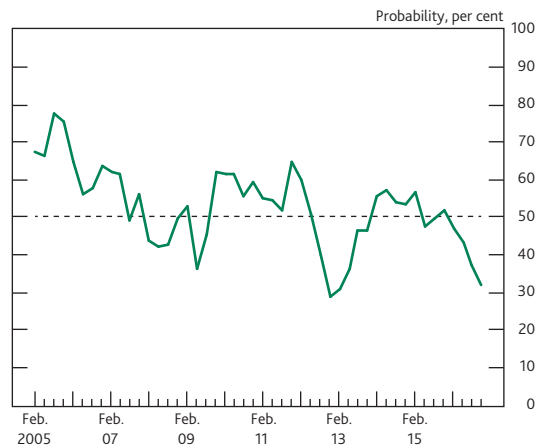
Projected probabilities of GDP growth in 2018 Q4 (central 90% of the distribution)<sup>(a)(d)</sup>



Projected cumulative probabilities of four-quarter GDP growth in 2018 Q4<sup>(e)</sup>



Probability that two year ahead GDP growth will be above its historical average rate from successive Inflation Report projections<sup>(f)</sup>



Percentiles of the four-quarter GDP growth distribution<sup>(e)</sup>

Probability	10%	25%	50%	75%	90%
2017 Q4	-0.8	0.1	1.2	2.2	3.1
2018 Q4	-0.8	0.4	1.6	2.9	4.0
2019 Q4	-1.1	0.2	1.5	2.9	4.1

Percentiles of the four-quarter GDP growth distribution in August<sup>(e)</sup>

Probability	10%	25%	50%	75%	90%
2017 Q4	-1.1	-0.1	1.0	2.0	3.0
2018 Q4	-0.5	0.7	2.0	3.3	4.4

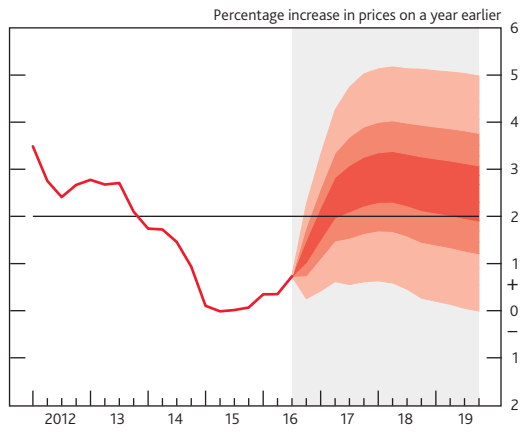
Calendar-year GDP growth rates of the modal, median and mean paths<sup>(g)</sup>

	Mode	Median	Mean
2016	2.2	2.2	2.2
2017	1.4	1.4	1.4
2018	1.5	1.5	1.5
2019	1.6	1.6	1.6

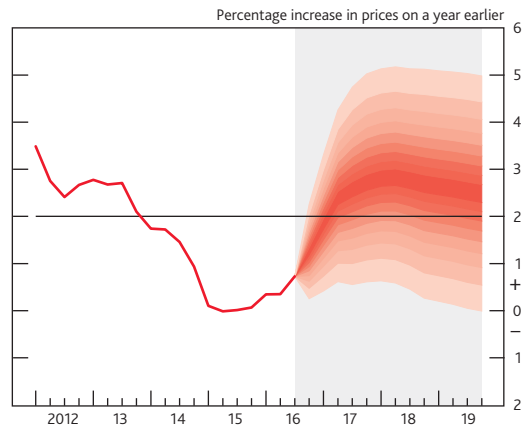
Calendar-year GDP growth rates of the modal, median and mean paths in August<sup>(g)</sup>

	Mode	Median	Mean
2016	2.0	2.0	1.9
2017	0.8	0.8	0.7
2018	1.8	1.7	1.7

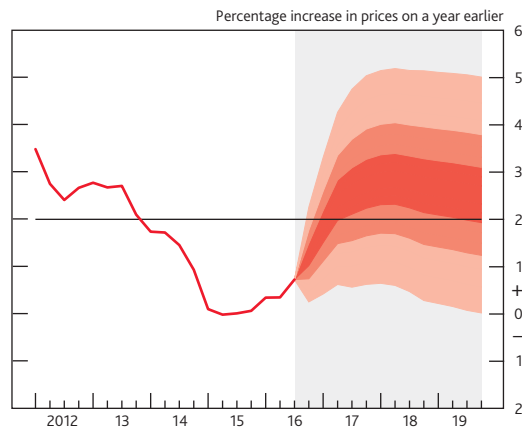
CPI inflation projection (wide bands)<sup>(a)</sup>



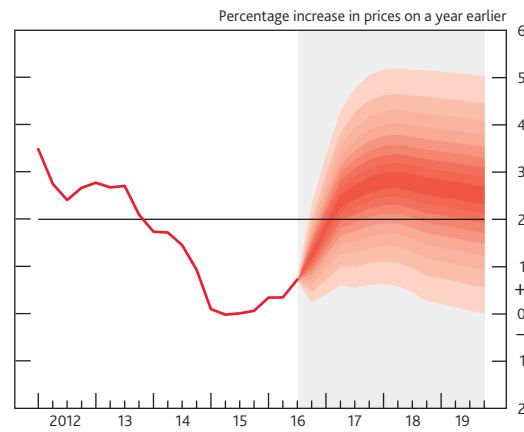
CPI inflation projection (narrow bands)<sup>(a)</sup>



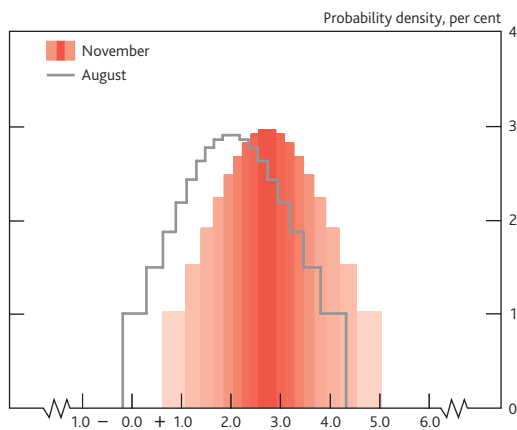
CPI inflation projection based on constant nominal interest rates at 0.25% (wide bands)<sup>(a)</sup>



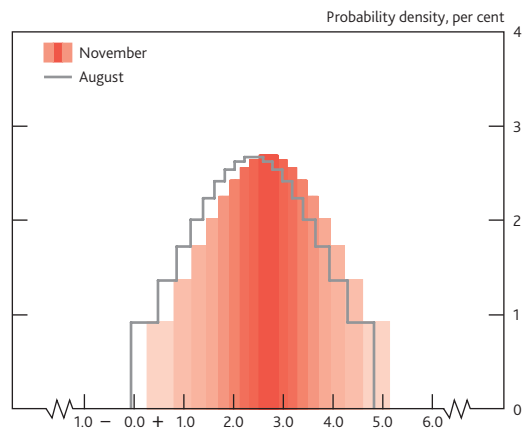
CPI inflation projection based on constant nominal interest rates at 0.25% (narrow bands)<sup>(a)</sup>



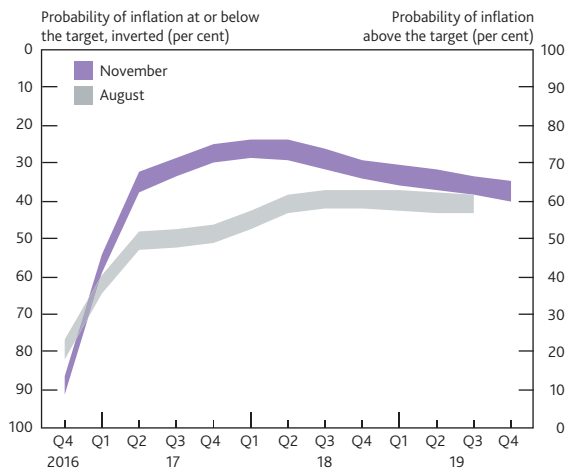
Projected probabilities of CPI inflation in 2017 Q4 (central 90% of the distribution)<sup>(a)(d)</sup>



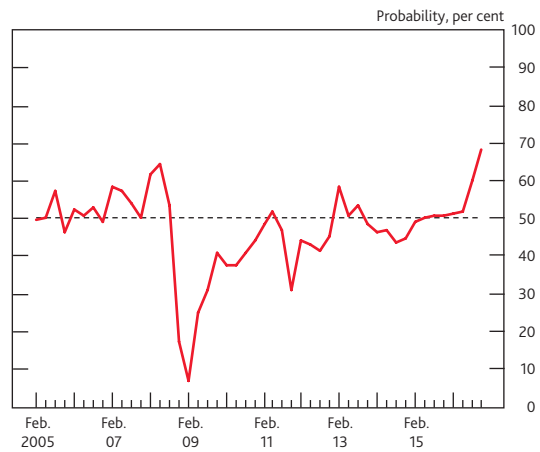
Projected probabilities of CPI inflation in 2018 Q4 (central 90% of the distribution)<sup>(a)(d)</sup>



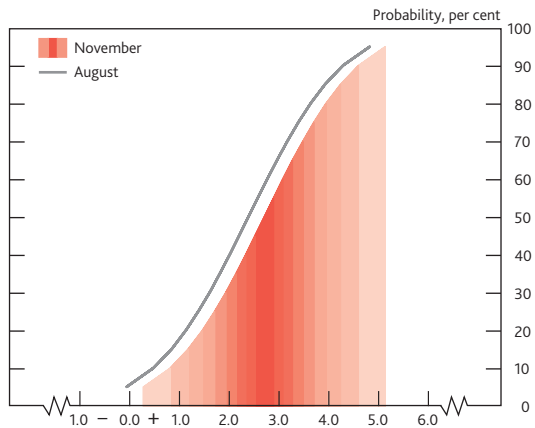
**Inflation probabilities relative to the target<sup>(h)</sup>**



**Probability that two year ahead inflation will be above the target from successive *Inflation Report* projections<sup>(f)</sup>**



**Projected cumulative probabilities of CPI inflation in 2018 Q4<sup>(e)</sup>**



**Percentiles of projected CPI inflation distribution<sup>(e)</sup>**

Probability	10%	25%	50%	75%	90%
2017 Q4	1.1	1.9	2.8	3.7	4.6
2018 Q4	0.8	1.7	2.7	3.7	4.6
2019 Q4	0.5	1.5	2.5	3.5	4.4

**Percentiles of projected CPI inflation distribution in August<sup>(e)</sup>**

Probability	10%	25%	50%	75%	90%
2017 Q4	0.3	1.1	2.0	3.0	3.8
2018 Q4	0.5	1.4	2.4	3.4	4.3

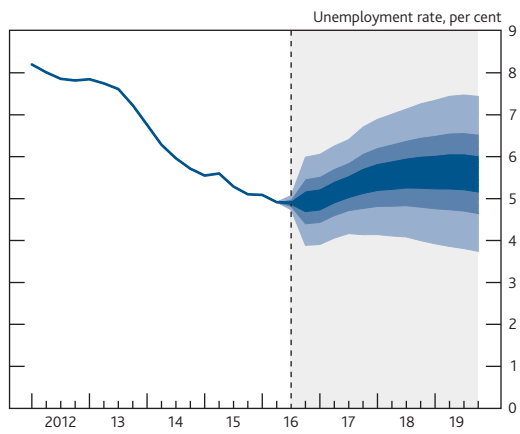
**Q4 CPI inflation**

	Mode	Median	Mean
2016 Q4	1.3	1.3	1.3
2017 Q4	2.7	2.8	2.8
2018 Q4	2.7	2.7	2.7
2019 Q4	2.5	2.5	2.5

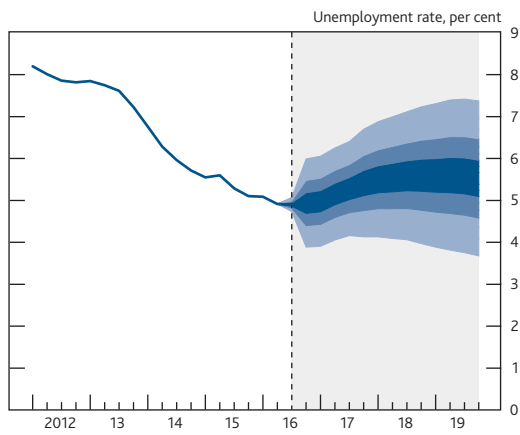
**Q4 CPI inflation in August**

	Mode	Median	Mean
2016 Q4	1.2	1.3	1.3
2017 Q4	2.0	2.0	2.1
2018 Q4	2.4	2.4	2.4

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**Unemployment rate projection<sup>(a)(b)(i)(j)</sup>**

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**Unemployment rate projection based on constant nominal interest rates at 0.25%<sup>(a)(b)(i)(j)</sup>**

## Endnotes

- (a) The fan charts and associated cross-sections depict the probability of various outcomes for GDP growth, CPI inflation or the unemployment rate. In the GDP fan chart, the distribution to the left of the vertical dashed line reflects the likelihood of revisions to the data over the past. Over the forecast period, the distribution reflects uncertainty over the evolution of GDP growth, CPI inflation or the unemployment rate in the future. If economic circumstances identical to today's were to prevail on 100 occasions, the MPC's best collective judgement is that CPI inflation, the unemployment rate or the mature estimate of GDP growth would lie within the darkest central band on only 10 of those occasions in the narrow-band fan charts and 30 of those occasions in the wide-band fan charts. The fan chart is constructed so that outturns are also expected to lie within each pair of the lighter coloured areas on 10 (narrow bands) and 30 (wide bands) occasions. In any particular quarter of the forecast period, GDP growth, CPI inflation or the unemployment rate are therefore expected to lie somewhere within the fan on 90 out of 100 occasions. And on the remaining 10 out of 100 occasions they can fall anywhere outside the coloured area of the fan chart. Over the forecast period, this has been depicted by the light grey background. In any quarter of the forecast period, the probability mass in each pair of identically coloured bands sums to 10% (narrow bands) and 30% (wide bands). See the box on pages 48–49 of the May 2002 *Inflation Report* for a fuller description of the fan chart and what it represents.
- (b) The dashed vertical lines in the GDP and unemployment fan charts show the start of the forecast period.
- (c) Chained-volume measure (reference year 2013). The width of this fan over the past has been calibrated to be consistent with the four-quarter growth fan chart, under the assumption that revisions to quarterly growth are independent of the revisions to previous quarters. Over the forecast, the mean and modal paths for the level of GDP are consistent with **Chart 5.1** on page 36 of the November *Inflation Report*. So the skews for the level fan chart have been constructed from the skews in the four-quarter growth fan chart at the one, two and three-year horizons. This calibration also takes account of the likely path dependency of the economy, where, for example, it is judged that shocks to GDP growth in one quarter will continue to have some effect on GDP growth in successive quarters. This assumption of path dependency serves to widen the fan chart.
- (d) Cross-sections of the fan charts. The figures on the y-axis indicate the probability of GDP growth or CPI inflation being within  $\pm 0.05$  percentage points of any given growth rate, specified to one decimal place; figures are average probability within each band.
- (e) Probability of GDP growth or CPI inflation being at or below different rates. The bands have been coloured to match the equivalent fan chart bands. In order to construct the chart, the probability mass allocated to each of the upper and lower tails is assumed to be in line with the skew assumed for the central 90% of the distribution.
- (f) Probabilities of above-average growth or above-target inflation at the respective two-year points of each *Inflation Report* forecast based on successive market rate projections with the exception of August 2013 which shows the constant rate projection. Since May 2009 these forecasts have been conditioned on paths for purchased assets as described in each *Report*. The historical average GDP growth rate is currently estimated at 2½% based on data from 1955.
- (g) The table shows the projections for calendar-year growth of real GDP consistent with the modal, median and mean projections for four-quarter growth of real GDP implied by the fan chart. Where growth rates depend in part on the MPC's backcast, revisions to quarterly growth are assumed to be independent of the revisions to previous quarters.
- (h) Assessed probabilities of inflation relative to the target in each quarter of the forecast period. The 5 percentage points width of the swathes reflects the fact that there is uncertainty about the precise probability in any given quarter, but they should not be interpreted as a confidence interval.
- (i) LFS measure. The calibration of this projection takes account of the likely path dependency of the economy, where, for example, it is judged that shocks to unemployment in one quarter will continue to have some effect on unemployment in successive quarters. 2016 Q3 is a staff projection for the unemployment rate, based in part on data for July and August.
- (j) In the later part of the forecast period, a significant proportion of this distribution lies below Bank staff's current estimate of the long-term equilibrium unemployment rate. There is therefore uncertainty about the precise calibration of this fan chart.