20.10.15

ESSENTIAL READING

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FORECAST EVALUATION 2015

Key messages

- This note evaluates the MPC's forecast performance relative to the August 2014 *IR*. We have made our largest downside one-year-ahead error since we started targeting CPI inflation. In contrast, outturns for GDP growth and unemployment have been only slightly below the modal projection, and within the central band of the fan charts.

- While GDP growth has only been slightly weaker than projected, underlying that is a combination of broadly offsetting shocks. The most significant of these have been weaker world demand, offset by support from a notably lower yield curve and falls in energy prices. Aided by the boost from energy prices, broadly as-expected consumption growth was wholly funded by stronger than expected real income growth, rather than in part through a lower saving rate. Business investment was weaker than expected. And despite weaker exports, net trade growth was stronger than expected as imports were markedly weaker than anticipated.

- The large downside error on CPI inflation reflects a number of contributory factors. A large part of it reflects unexpected weakness in energy and food prices. Unit labour cost growth in 2014 was also notably weaker than anticipated, although the extent to which that may have contributed to the unexpected weakness in CPI inflation over the last year may be subject to interpretation: it reflected unexpected weakness in employer's social contributions, rather than softness in wage growth. More recently, growth in both wages and unit labour costs has been somewhat higher than expected in the August 2014 IR.

Introduction

Every year, the MPC publishes an assessment of its forecasting performance in the *Inflation Report.* This exercise allows us to take a step back and consider what we have learnt about the economy, and to evaluate the judgements that have been made over the past year.

This note assesses the MPC's forecast performance over the past year, forming the basis of a box that is to be published in the November 2015 *Report*. We compare outturns up to 2015 Q2, and staff best guesses up to 2015 Q3, with the August 2014 profiles, which was when the previous evaluation was conducted. [1]

News to the August 2014 forecast: the headlines

In August last year, output growth was expected to moderate slightly from above trend rates as the boost from pent-up demand faded. Growth rates were expected to be close to historical average rates, sustained by a revival in productivity and household real incomes. Robust rises in employment contrasted with the weakness of wage growth, suggesting a greater degree of slack than previously estimated. The pace at which

remaining slack would be absorbed was projected to slow, which, together with the impact of the appreciation in sterling on import prices, would restrain cost pressures. Inflation was expected to remain a little below, but close to, 2% over the first two years of the forecast period, before reaching the target by the end of the forecast horizon.

Chart 1: GDP growth inflation outturns relative to the August 2014 IR fan chart

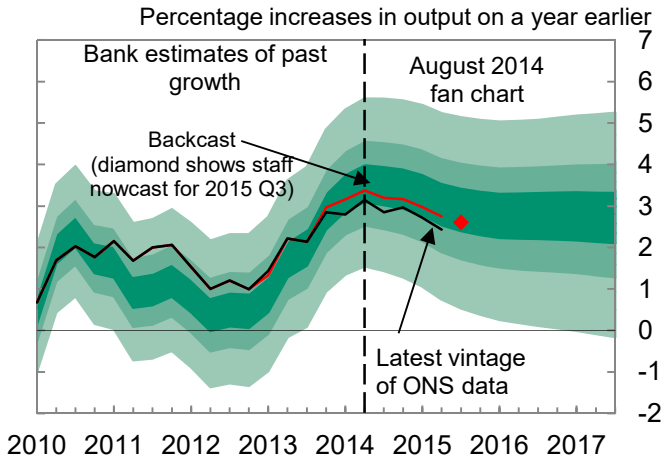
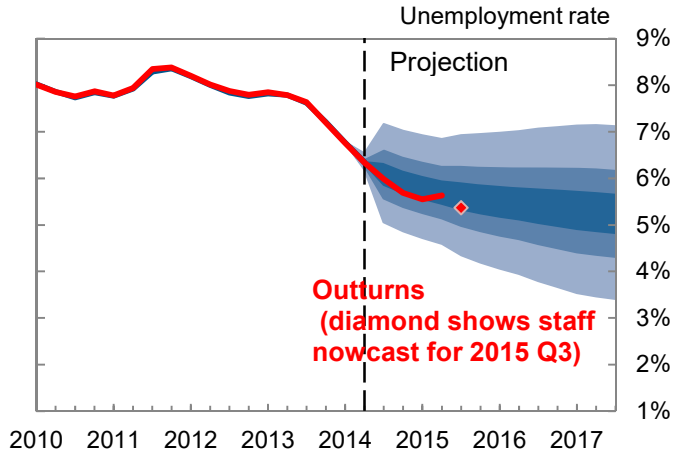


Chart 2: Unemployment rate outturns relative to the August 2014 IR fan chart



Since the August 2014 *IR* was published, GDP growth has been slightly weaker than projected (**Chart 1**). Underlying that is a combination of largely offsetting shocks. World demand has been weaker than expected (Table 1, KJ1), but that has been offset by a materially lower yield curve and a faster than expected recovery in real income growth (Table 1, KJ2), reflecting moderately stronger than expected wage growth as well as a boost from significantly lower energy and food prices.

Unemployment has fallen a little more quickly than anticipated over the last few quarters, such that the staff's nowcast for the unemployment rate in 2015 Q3 is around 0.2pps lower than projected in the August 2014 IR (Chart 2). Total hours have been weaker than expected, however, reflecting weaker participation and average hours. As a result, the underlying mix of supply between hours growth and productivity (per hour) growth differed from expectations, with productivity (per hour) growth making a larger contribution over the past year (Table 1, KJ3).

Table 1: Evaluating the Key Judgements made in the August 2014 Inflation Report

	Key Judgements in August 2014 *Report*	**Assessment**
KJ1	Global economy expands steadily in the face of continuing economic and fiscal challenges	Level of world GDP around 1% weaker in 2015 Q3.
KJ2	Gradual revival in productivity and real incomes underpins a sustained expansion in private sector spending	Growth in productivity per hour (but not per head) and real income growth both stronger than expected.
KJ3	The remaining slack in the economy is absorbed, but at a more gradual pace than in the recent past, reflecting a modest expansion in supply	Degree of slack judged to be wider in 2014 H2 and 2015. Composition of supply somewhat different, with stronger productivity per hour, but weaker average hours and participation rate.
KJ4	As the drag from slack lessens, the associated path for wage growth and margins is consistent with the inflation target	Inflation significantly weaker, reflecting falls in energy and food prices. Wage growth moderately stronger than expected.
Conditioning assumptions: Sterling and commodity prices to remain broadly stable		Sterling around 5% higher in 2015Q3; oil prices around 50% lower.

Wage growth was moderately stronger than anticipated (Table 1, KJ4). However, unexpected softness in non-wage labour costs meant that unit labour cost growth in 2014 was weaker than anticipated. More recently though, unit labour cost has been stronger than expected, reflecting stronger wage growth, moderately weaker productivity (per head) growth, and broadly neutral non-wage labour cost growth. CPI inflation in 2015

Q3 was 1.7 percentage points weaker than expected in August last year, an outcome on which the Committee had placed less than 10% probability in August 2014. It is also the largest downside one-year-ahead error since the MPC started targeting CPI inflation, and continues a string of consecutive downside errors since Q1 2014 (**Chart 4**). That shortfall largely reflected the 50% fall in oil prices and unexpected weakness in food price inflation, but may also in part have reflected the unexpected weakness in unit labour costs in 2014.

Chart 3: CPI inflation outturns relative to the August 2014 fan chart

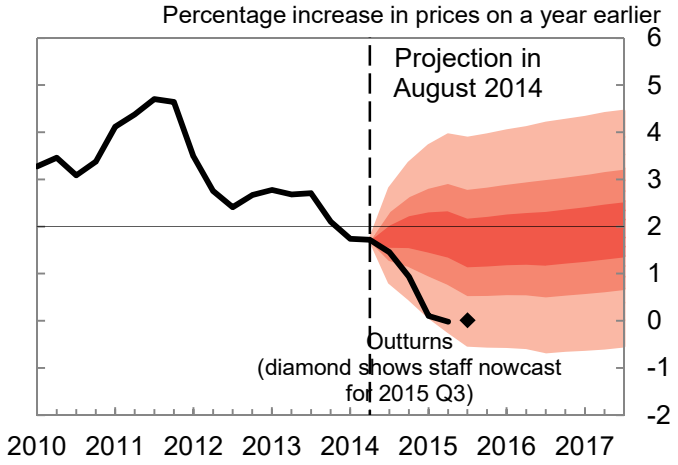
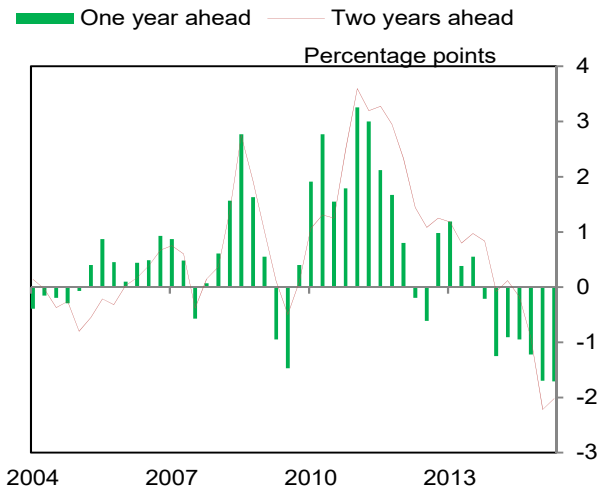


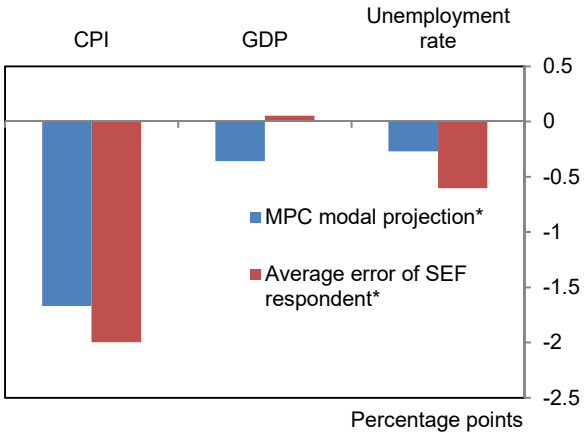
Chart 4: Inflation forecast errors (modal CPI inflation projection)



Consistent with the large role played by oil price falls in dragging down inflation, the downside news to inflation in 2015 is not unique to the United Kingdom. The IMF revised down their inflation projections for 35 out of 37 advanced economies between their October 2014 and October 2015 forecasts. IMF revisions to GDP growth have been relatively more evenly mixed between upward and downward revisions.

Looking at the United Kingdom specifically, external forecasters on average have, like the MPC, made a large one-year-ahead downside error on CPI inflation. External forecasters made larger errors on inflation and unemployment, although the magnitude is broadly similar (**Chart 5**). But they forecast GDP growth broadly accurately, in contrast to the MPC's small downside error.[2]

Chart 5: External economists have made a broadly similar error on inflation



* MPC errors compare staff nowcasts for 2015 Q3 with the August 2014 projections; SEF errors compare projections for 2015 Q3 in August 2014 with Bank staff nowcasts.

The rest of this note digs further into the detail behind this headline news, and assesses the performance of the MPC's Key Judgements. In Section 1 we discuss the news in GDP growth, both in terms of news to expenditure components, as well as from the point of view of the shocks that have affected the economy over the past year. Section 2 examines the news in supply in greater detail, and Section 3 discusses the news to inflation and the role played by external and domestic factors. The final section concludes with a discussion of the lessons we have learnt from forecast errors over the past year.

[2] This compares external forecasters projections for 2015 Q3 at the time of the August 2014 Survey of External Forecasters with Bank staff best guesses for Q3.

1. GDP: Boost from falls in oil prices and a lower yield curve broadly offset by weaker world demand

Although our GDP growth errors over the past year have been relatively modest, underlying them has been a combination of opposing global and domestic shocks. Using simulations in COMPASS , we find that the effects of weaker than expected world demand, and, to a lesser extent, the stronger exchange rate, wider credit spreads and tighter fiscal policy, were broadly offset by the sizeable falls in commodity prices and the yield curve[3] (**Chart 6**).

In this section we discuss the shocks in greater detail, and assess the news in expenditure components in the context of those shocks.

Chart 6: Accounting for YoY GDP growth forecast errors

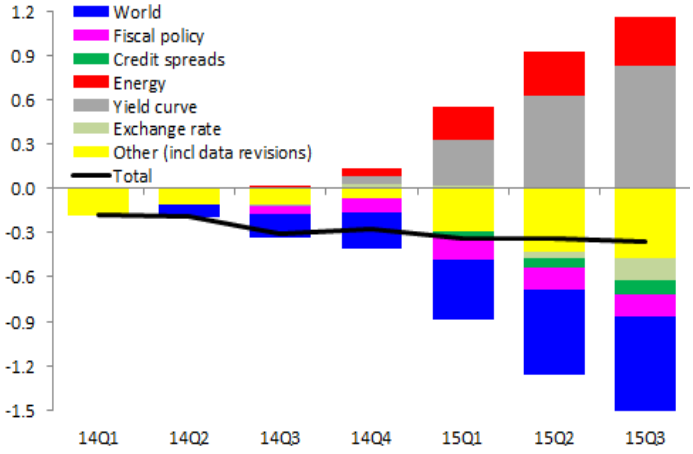
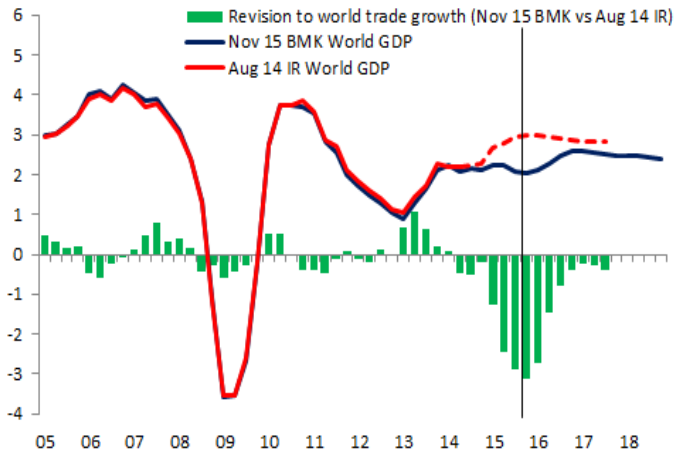


Chart 7: Downward revisions to world activity



External factors have played an important role over the past year

Compared with our August 2014 *IR* forecasts, the world economy has been weaker than expected. Cumulative growth in UK-weighted world GDP since 2014Q1 has been around 1pp weaker than projected, with UK-weighted world trade around 3pps weaker than anticipated (**Chart 7**). In the November Benchmark forecasts, those shortfalls are expected to accumulate further over the medium-term. Simulating the effect of those global factors on the UK economy in COMPASS suggests that all else equal, they would have dragged down on UK GDP growth by around 0.6pp in mid-2015.

Another significant global development since August 2014 has been the around 50% fall in sterling oil prices, compared with a broadly flat futures curve at the time of the August 2014 *IR*. This fall partly reflects weaker external demand, although supply factors are judged to have played the larger role.[4] Taken in isolation, however, lower oil prices represent a positive supply shock to many parts of the UK economy. All else equal, the decline in oil and broader energy prices relative to the August 2014 profile may have pushed up GDP growth by around 0.3 percentage points in mid-2015.

Fiscal policy has been modestly tighter than assumed

The August 2014 *IR* was conditioned on the Government's plans set out in the March 2014 Budget. The Government has refined its plans three times since then, and the net impact of these has been to tighten discretionary fiscal policy modestly, by around 0.2 percentage points of GDP in 2014-15 and a similar amount in 2015-16. That additional tightening will likely have imparted a modest further drag on GDP growth in recent quarters (**Chart 6**). Set against that, however, the direct effects of government spending on GDP in the

[3] Changes in the yield curve here are processed using our standard forecast treatment, rather than using pure COMPASS. See analytical 7256338.

[4] See for example Kindberg-Hanlon and Middledorp (2015), 'Oil is not as it seems :expectations of future oil supply key to explaining drop in price', Bank Underground.

National Accounts (government consumption and investment) over the last few quarters have been more positive than expected in the August 2014 *IR* projections: by around a cumulative 0.2pps of GDP since 2014Q1.

Credit spreads have been a little higher

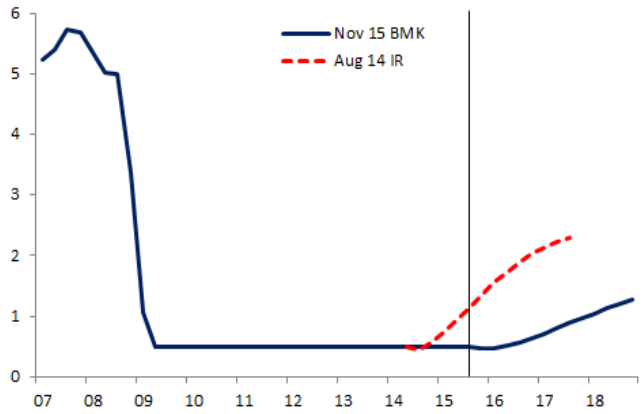
In aggregate, the credit spread has been around 10-20 basis points wider than expected in the August 2014 I*R* over the last few quarters. This was driven by wider than expected household spreads, particularly for deposit rates and credit cards, where the pass through of falls in swap rates was smaller than expected.

Partly offsetting this news, falls in mortgage rates and other unsecured products were greater than the fall in swap rates, in part reflecting competition among lenders – contributing to the judgement made in the November 2015 Benchmark forecast. And corporate credit spreads were narrower than expected. Overall, the slightly wider than expected aggregate credit spreads relative to the August 2014 *IR* projections is estimated to have weighed on GDP only marginally over the last few quarters.

The yield curve is markedly lower, but the exchange rate is notably higher

Developments in both the exchange rate and the yield curve over the last few quarters have been markedly different to the conditioning assumptions used for the August 2014 *IR*. The exchange rate in 2015 Q3 was around 5% higher than assumed. Set against that, however, the yield curve is now markedly lower. The August 2014 *IR* was conditioned on Bank Rate reaching around 1.1% by 2015 Q3 and 2.3% by 2017 Q3. In contrast, market-implied Bank Rate expectations reach only 0.9% in 2017 Q3, and around 1.3% at the end of the current three-year horizon.

Chart 8: The yield curve



Taken together, the combination of world, credit, fiscal, energy, and exchange rate news over the last year would have warranted a somewhat looser path for monetary policy compared with the August 2014 IR, according to the Taylor Rule in COMPASS. So those developments, alongside the steer from the MPC's communications, help to explain the flattening in the market yield curve relative to the August 2014 *IR* profile (Chart 8). The corresponding stimulus is estimated to have pushed up on GDP growth by around 0.8pps recently, relative to expectations in the August 2014 *IR* (Chart 6).

The composition of GDP: investment and exports weaker than expected, offset by weaker imports

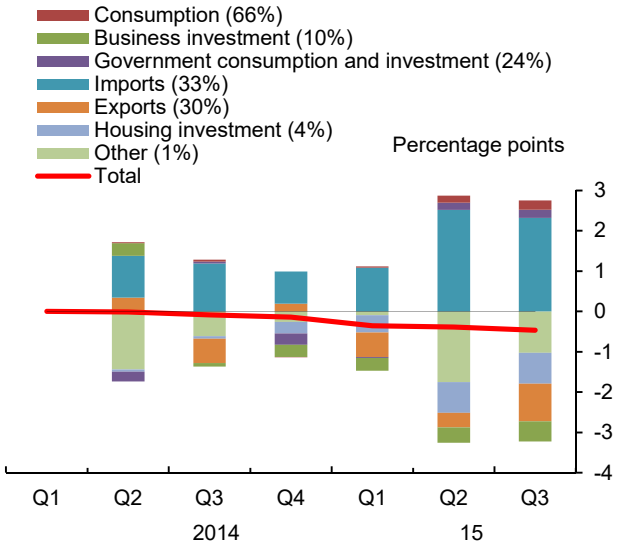
Another way of assessing the news since the August 2014 *IR* is by looking at the news in the expenditure components of GDP. As Chart 9 shows, GDP growth since 2014 Q1 has been characterised by weaker than expected growth in business investment and exports, along with an unexpectedly large drag from changes in inventories. Set against that though, imports have shown even more unexpected weakness than exports, such that net trade has pushed up GDP by more than expected. Consumption has been broadly in line with expectations. The bullets below discuss the news in the key components:

- **Consumption** growth has evolved broadly as expected, despite stronger than expected real income growth and the falls in the yield curve. In the August 2014 *IR* we had expected consumption growth to be funded by both growth in real incomes and reductions in the saving rate. But the saving rate has actually been broadly flat, and consumption growth has been funded entirely by stronger than expected real income growth (**Chart 10**). Thus, the marginal propensity to consume out of any given amount of real income has implicitly been smaller than expected. The unexpected strength of real

income growth has reflected the boost from food and energy price falls, as well as stronger than expected wage growth (Section 3).

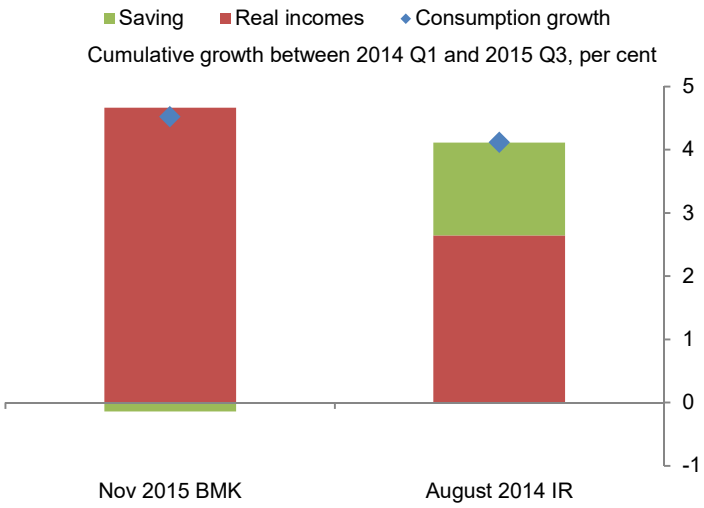
- **Business investment** growth over the last few quarters is currently estimated to have been weaker than expected in the August 2014 *IR*. Cumulative growth from 2014 Q1 to 2015 Q3 is currently expected to be around 10%, compared with around 16% anticipated in the August 2014 *IR*. Part of that reflects weaker investment in the energy sector following sharp falls in oil prices. The weaker than expected world backdrop could also have weighed on business investment, though the lower yield curve is likely to have offered some support.

Chart 9: Cumulative levels news in expenditure components since 2014 Q1 relative to Aug 2014 IR[(a)]



(a) Includes staff nowcasts for 2015 Q3. Numbers in brackets refer to GDP expenditure shares in 2013.

Chart 10: Contributions to consumption growth[(a)]



(a) Includes staff nowcasts for 2015 Q3.

Business investment data are subject to large revisions through time though. For example, in Blue Book 2015 the ratio of business investment to GDP was revised down markedly. In part, that reflected Network Rail and TFL being re-classified from the private to the public sector. But that reclassification did not drive the material downward revisions to business investment *growth* over the last three years or so (**Chart 11**). Despite those revisions, and despite much softer than expected business investment growth, the ratio of business investment to GDP was still somewhat higher than projected in the August 2014 *IR*, largely reflecting revisions to the data in Blue Book 2014 (**Chart 12**).

Chart 11: Business investment growth (% YoY)

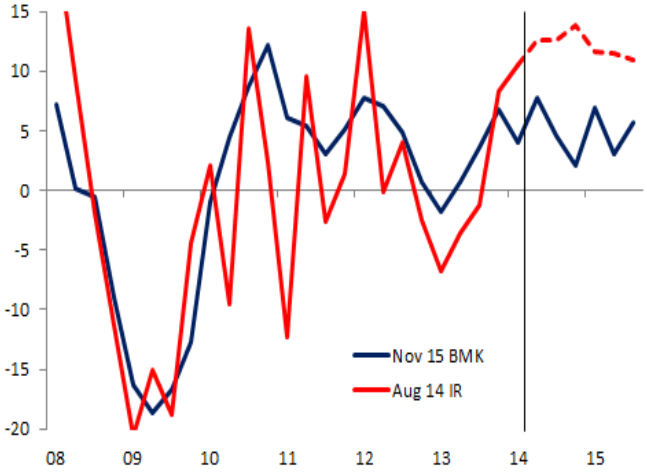
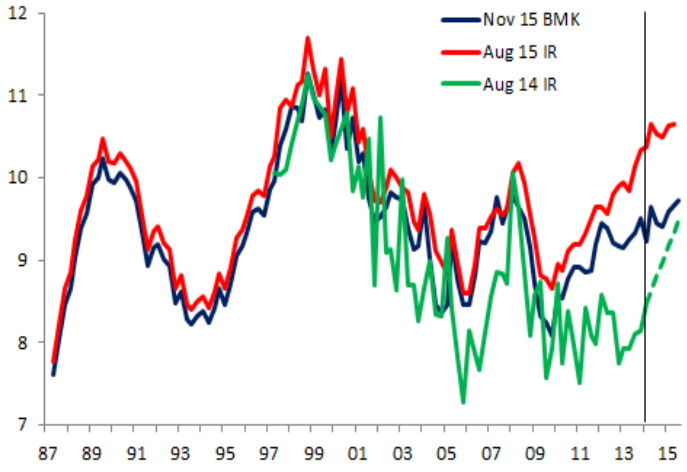


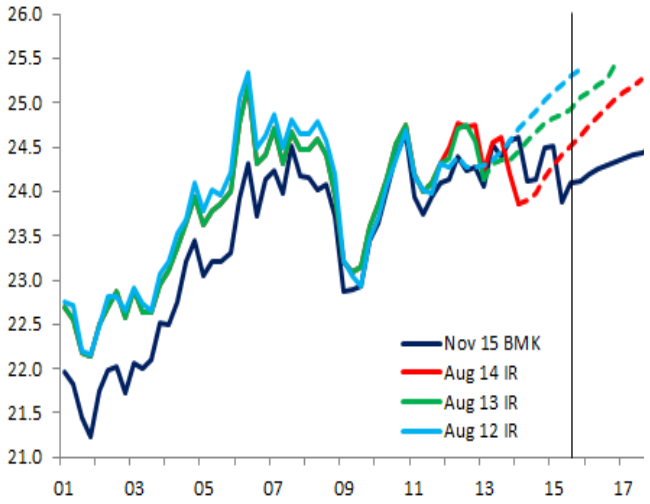
Chart 12: Business investment / GDP ratios (%)



- **Net trade** has been much stronger than expected in recent quarters, contributing around +1¼ pp to cumulative growth in GDP since the start of 2014, compared with a broadly neutral contribution projected in the August 2014 *IR*. Exports have been modestly weaker than expected (**Chart 9**), though less weak than the combination of the downward revisions to UK-weighted world demand and the appreciation of sterling would have suggested.

At the same time, imports have been notably weaker than expected over the same period. That could reflect the cumulative impact of the downside news in investment, exports and stockbuilding over the last few quarters - all of which are relatively import-intensive. Stepping back though, we have now over-estimated import penetration for the last three years (**Chart 13**). To some degree that may again reflect developments in the composition of demand. It may also reflect less expenditure switching away from imports as a result of lower pass-through from changes in the exchange rate into import prices than we had previously assumed.

Chart 13: Import penetration (%)



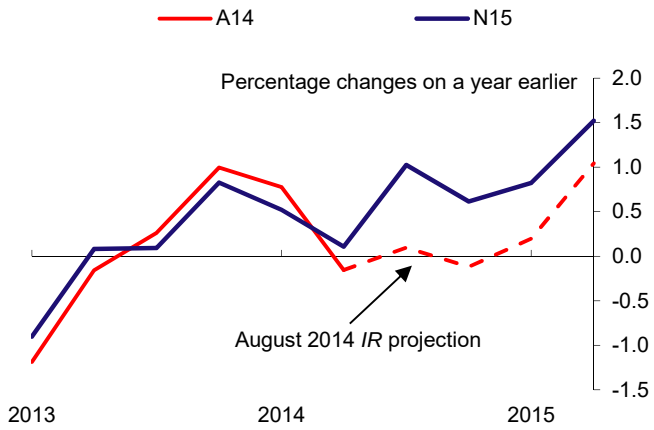
2. Supply and spare capacity: hourly productivity has been stronger than expected, and total hours weaker

As noted above, GDP growth over the last few quarters has been modestly weaker than anticipated in the August 2014 *IR* projections. The composition of GDP from the supply side has also been somewhat different than expected. In August last year, the majority of GDP growth through 2014 and 2015 was expected to be accounted for by growth in total hours, with only a modest pickup in productivity growth. Subsequent GDP growth outturns have, however, been broadly equally split between productivity and hours growth **(Table 2)**. Within that, growth in productivity per hour has been moderately stronger than expected (**Chart 14**). This is only the second upside one-year-ahead error we have made on hourly productivity growth since 2006. Section 4 discusses the signal we have taken from this for the forecast.

Table 2: Labour market news[(a)]

	Aug 2014 projections	Nov 2015 benchmark	Difference(b)
Percentage change, 2014 Q1 to 2015 Q3			
Productivity	0.9	1.9	1.0
Total hours	3.8	2.3	-1.5
Forecast/nowcast for 2015 Q3			
Unemployment rate	5.6	5.4	-0.3
Participation rate	64.1	63.3	-0.8
Average hours	32.4	32.0	-1.2

Chart 14: Hourly productivity growth



(a) Includes staff nowcasts for 2015 Q3.
(b) Shows percentage point differences for all series, except for average hours, where the percentage difference is shown.

However, with average hours notably weaker than expected over the last few quarters, productivity per **head** from 2014 Q1 through to 2015 Q3 was broadly in line with the August 2014 *IR* projections. More broadly on the supply side, the moderately weaker than expected cumulative growth in GDP since the start of 2014 has been more than accounted for by unexpected weakness in average hours and the participation rate, set against stronger than expected growth in population and productivity per hour, and somewhat faster falls in the unemployment rate than envisaged (**Chart 15**).

Chart 15: Cumulative supply-side surprises, 14Q1 to 15Q3

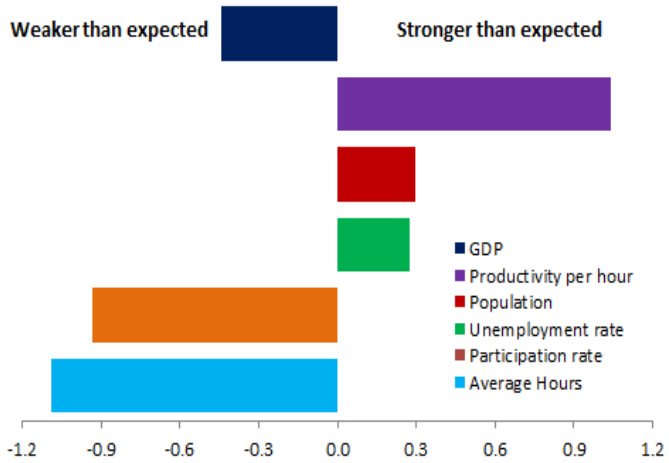
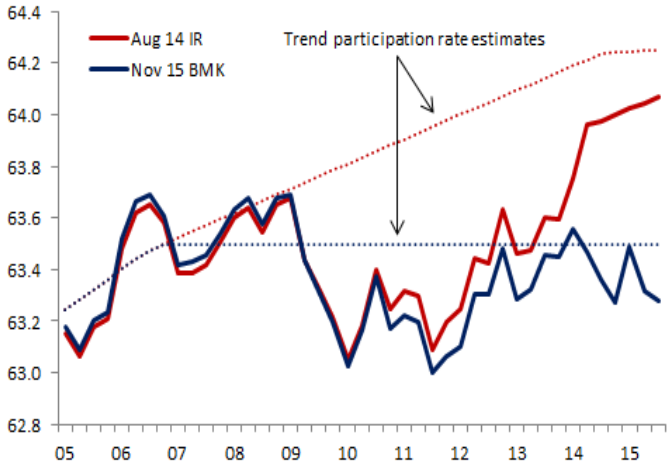


Chart 16: Downside participation rate surprises



Alongside the upside news in actual productivity per hour over the last few quarters, we have also revised up our estimates of potential productivity per hour. However, we have not interpreted all of the upside news in productivity as structural, reflecting judgements taken since the August 2015 *IR* that some of the recent growth in productivity per hour has been cyclical. More broadly, we have also made various other changes to our estimates of potential supply since the August 2014 *IR*:

- Upward revisions to population growth, reflecting higher net migration outturns that are yet to be incorporated into the LFS population data.
- An upward revision to trend average hours, as part of the May 2015 supply stocktake.
- Partly offsetting these factors, the trend participation rate was revised down in the May 2015 supply stocktake. That reflected broadly flat participation rate outturns, along with evidence that the cyclical recovery in participation may have already happened. Trend participation is now judged to be broadly flat (**Chart 16**).

The net impact of those revisions was to revise down the level of potential supply - and thus narrow our estimates of the output gap - from 2009 through to the start of 2014 (**Chart 17**).

However, since then, with cumulative GDP growth from 2014 Q1 to 2015 Q3 having been around 0.4pps weaker than expected and our estimates of *potential* GDP growth having been revised up by around 0.6pps over the same period, the output gap has narrowed at a somewhat slower pace than envisaged in the August 2014 *IR*. So despite the starting point for the output gap in 2014 Q1 having been revised slightly *narrower* since the August 2014 *IR,* in 2015 Q3 the output gap is now estimated to be slightly *wider* than projected back then (**Chart 18**).

Within the composition of our current estimate of the output gap, the unexpected weakness in average hours recently - both relative to the August 2014 *IR* and indeed relative to the August 2015 *IR* - has resulted in a significantly wider average hours gap (**Chart 18**). But set against that, the capacity utilisation component of the output gap is significantly positive at present - and markedly higher than expected in the August 2014 *IR* - as a result of both top-down judgements and survey evidence. As noted at the Benchmark forecast meeting though, risks would seem to be skewed towards both the average hours gap and the capacity utilisation gap being narrower than our current estimates (Section 4).

Chart 17: Output gap estimates

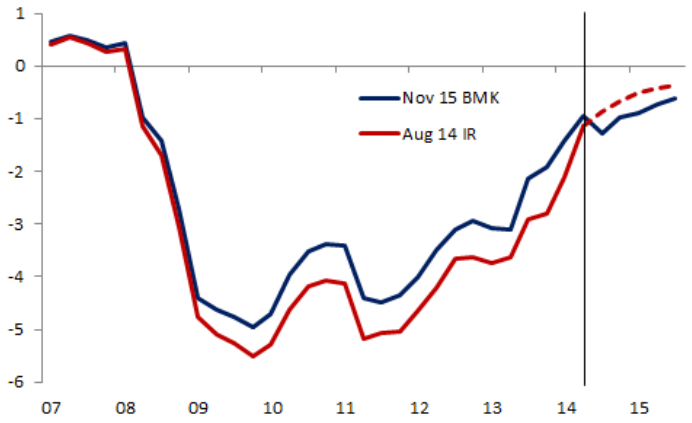
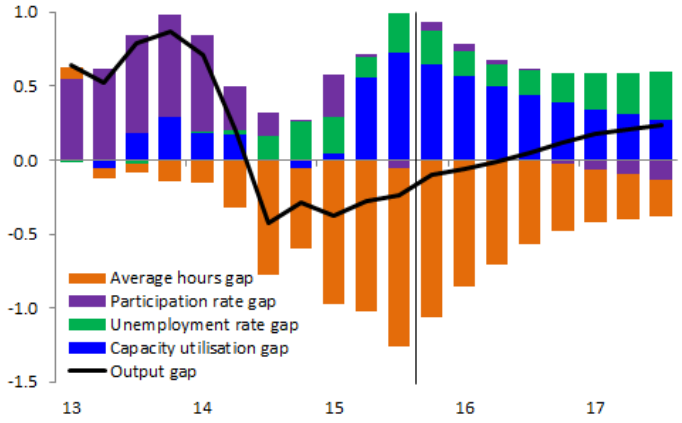


Chart 18: Revisions to the output gap between August 2014 and November 2015 BMK



3. CPI inflation: Significantly weaker than expected inflation largely reflects external factors

CPI inflation has been markedly weaker than expected over the last few quarters: the August 2014 *IR* projected CPI inflation at around 1¾% in mid-2015, compared with recent outturns of around zero.

Energy prices have played a large role

Using COMPASS and our semi-structural inflation accounting framework to investigate that shortfall further suggests that it reflects a number of factors. The most significant of these is a drag of around 1pp on CPI inflation from energy prices in recent months (**Chart 19**), compared with expectations of only a marginal drag in the August 2014 *IR*. The greater degree of slack in the labour market over the past year (Section 2) is also estimated to have made a modest contribution to the downside news on inflation.

Chart 19: Inflation accounting decompositions for 15Q3 (relative to 2% target)[4]

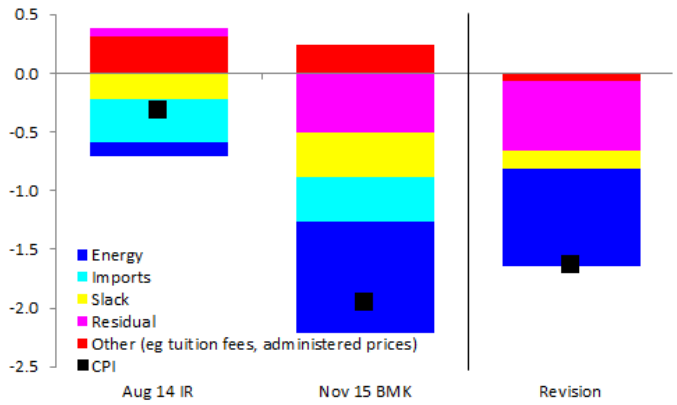
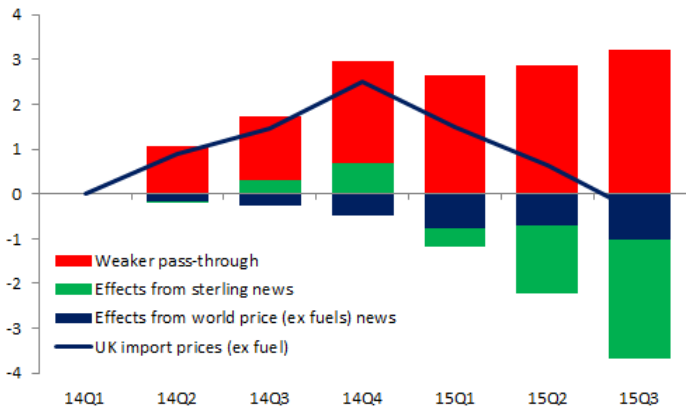


Chart 20: Cumulative import price level news since 14Q1, relative to the August 2014 *IR*[4]



The drag from import prices on inflation has been broadly as anticipated

In contrast, our estimate of the drag on CPI inflation from import prices at present is broadly as anticipated in the August 2014 *IR* (**Chart 19**)[5]. That is despite the further unexpected appreciation in sterling and weaker than expected non-energy world trade prices (**Chart 20**). The relative resilience of import price inflation in light of the 16% appreciation of sterling since early 2013 prompted the downward revisions to our estimates of pass-through from changes in the exchange rate in the August 2015 round.

Weaker unit labour cost growth in 2014 might have contributed to downside inflation errors

Another notable development over the past year has been the recovery in wage growth at a moderately faster pace than projected in August last year. That upside news in total pay over the past year does not reflect bonus effects: while we do not forecast regular pay separately, recent regular pay growth outturns have outstripped our August 2014 *IR* forecasts for total pay (**Chart 21**).

In August 2014, our suite of wage equations suggested that AWE growth was inexplicably weak, prompting the Committee to judge that there was a greater margin of spare capacity in the labour market. More recently, however, wage growth has been in line with the suite equations.

Chart 21: Wage growth has been stronger than expected

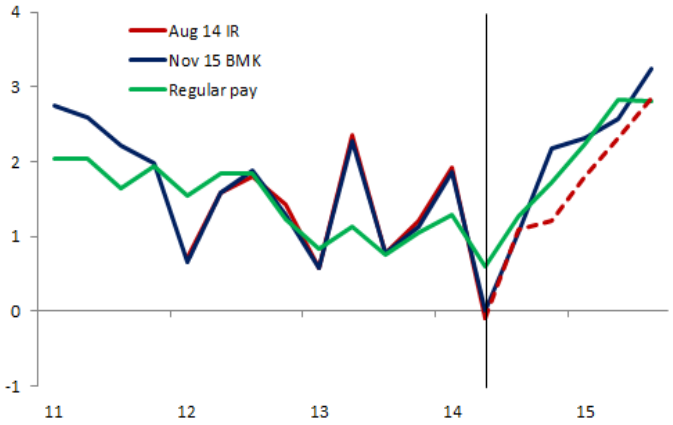
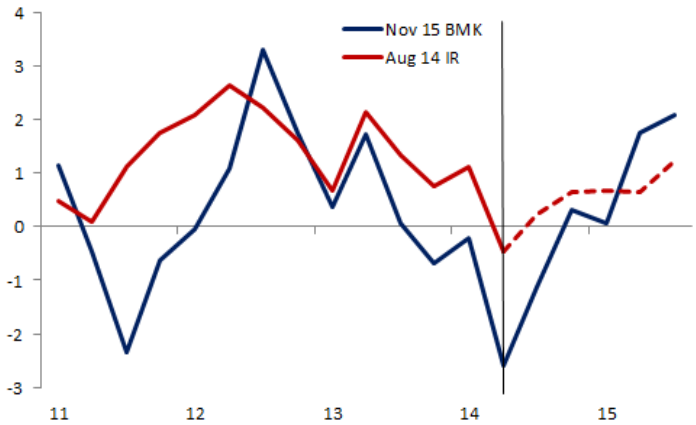


Chart 22: ….but unit labour cost growth was weaker during 2014



Despite somewhat stronger wage growth in the second half of last year than projected in the August 2014 IR, unit labour cost growth was much weaker than expected in 2014 (**Chart 22**). That predominantly reflected unexpectedly weak employers' social contributions. The extent to which unanticipated weakness in unit labour costs last year might therefore have contributed to some of the unexpected weakness of CPI inflation since then is thus perhaps subject to interpretation. Non-wage labour costs have been broadly neutral more recently though, and so with wage growth moderately stronger than expected and productivity (per head) growth moderately weaker than expected over the last year, unit labour cost growth in 2015 Q3 was stronger than anticipated in the August 2014 *IR*.

Food prices can also explain some of the downside news to inflation

Around one-third of the downside news in inflation relative to the August 2014 *IR* cannot be explained through our inflation accounting framework (**Chart 19**). But a decomposition of some of the bottom-up Short-Term Inflation Forecast (STIF) errors can help dig into this unexplained contribution further. Most notably, our inflation accounting framework does not explicitly capture food prices, but STIF errors suggest that weaker than expected food price inflation can account for a material part of the remaining unexplained weakness of

[5] Given the significant distortions to both trade price and trade volume data at present caused by large impacts from non-monetary gold and illegal drugs (introduced in Blue Book 2015), the August 2014 *Inflation Report* forecast for import prices is compared against the August 2015 *Inflation Report* here, rather than against the November 2015 Benchmark forecast.

inflation relative to the August 2014 *Inflation Report* projections. That is likely to reflect the 20% fall in global food commodity prices since August 2014, together with unexpectedly strong supermarket price competition.

Evidence from the STIF also corroborates significantly weaker than expected energy prices over the last few quarters, and also suggests unexpected weakness in both underlying goods and services inflation. It can shed relatively little light on the underlying determinants of the latter two, however, given that it is a short-term statistical model rather than a behavioural model.

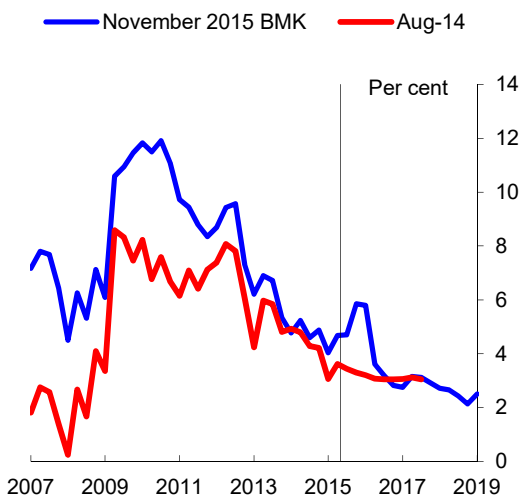
4. The lessons learnt for the forecast

In this final section, we consider what lessons the forecast errors since the August 2014 *IR* contain for our projections, and to what extent the signals from those errors have been incorporated in the latest November 2015 Benchmark profiles.

1. **Risks from the household saving ratio:** The August 2014 *IR* expected growth in household consumption over the forecast horizon to be supported by falls in the saving ratio. In the event, consumption growth was in line with expectations, but was wholly accounted for by unexpectedly strong real income growth, with the saving ratio broadly flat. So implicitly, consumers' propensity to spend out of any given amount of income was lower than expected.

   The November 2015 Benchmark forecast also incorporates growth in consumer spending being supported by falls in the saving ratio. But there is a risk - to be discussed at the Key Issues meeting on Thursday - that the saving ratio could remain somewhat flatter than anticipated. All else equal, that would weigh on consumption growth. That said, to the extent that the unexpected flatness of the saving ratio over the last few quarters relative to the declines projected in the August 2014 *IR* was related to the windfall from unexpected strength of real income growth – ie reducing the need for consumers to run down savings rates to help fund spending growth – it might contain less of a signal for the forecast.

Chart 23: Saving rate projections [(a)]



(a) Given methodological changes to the saving rate in the 2014 Blue Book, the levels of the saving rate at the time of the August 2014 *IR* and the current vintage are not directly comparable.

2. **Risks to the import and export projections:** We have consistently over-estimated import penetration over the past three years. While the November 2015 Benchmark projection is flatter than that in August 2014 IR (**Chart 13**), it still slopes upwards somewhat, with the appreciation of sterling over the last few quarters expected to impart some upward pressure. The broadly flat path of import penetration over the last three years could suggest some downside risks to that.

   There are two-sided risks to the export projection. The November 2015 Benchmark forecast incorporates a sharper fall in export market share than in the August 2014 *IR* projection, reflecting the

higher path of sterling. It is possible that the broadly flat export share over the past year could suggest a smaller impact from appreciation.

But there could similarly be downside risks to our export projections. Our November 2015 Benchmark forecasts for the world economy have been revised down since the August 2015 *IR* – an issue which will be discussed further in the Key Issues meeting on Thursday.

3. **Upside surprises to productivity growth could suggest that our projection is too cautious**: Despite the stronger than expected outturns in recent quarters, the profile for growth in productivity per **hour** in the November 2015 Benchmark forecast is weaker than in the August 2014 forecast (**Chart 24**). The recent upside news in actual productivity growth has not been fed through fully into potential productivity growth, reflecting the judgement in August 2015 (which has also been applied in the November Benchmark forecast) that some of the most recent pickup in productivity growth is unlikely to persist, as it could reflect the strength of cyclical factors such as a pickup in capacity utilisation. But there is a risk that we have been too conservative and not taken enough of a signal from the strength in productivity growth in recent quarters.

4. **Downside errors on average hours could suggest downside risks to our profile for equilibrium average hours:** Actual average hours worked are currently notably below our estimate of equilibrium, and the Bell & Blanchflower measure of desired average hours has fallen back somewhat since the start of the year (**Chart 25**). There are corresponding risks that equilibrium average hours could be somewhat lower than our current projections. Those risks could go hand in hand with the risks to potential productivity discussed above, with opposing effects on the composition of the output gap.

Chart 24: Productivity (per hour) growth projections

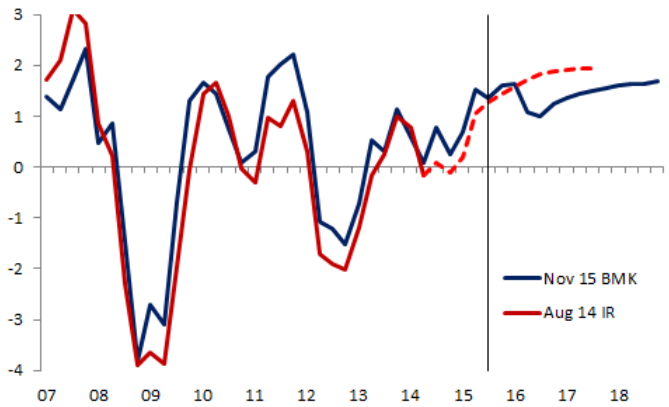
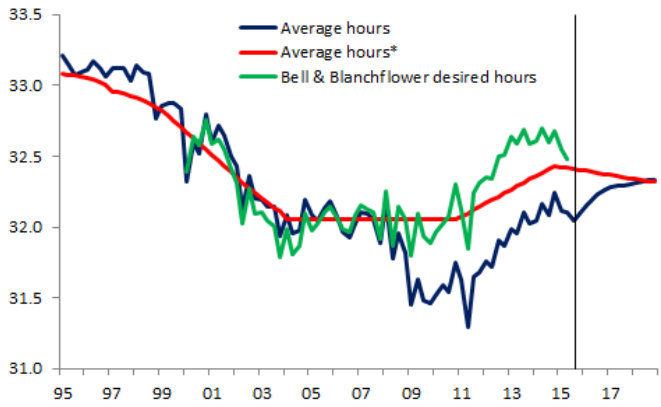


Chart 25: Nov 15 BMK average hours projections

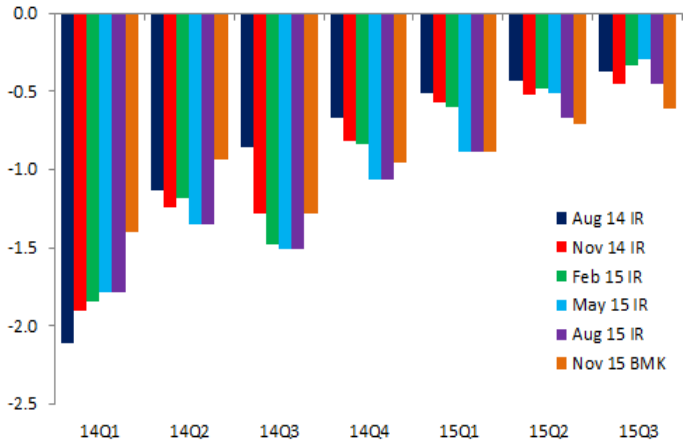


5. **Exchange rate pass-through has already been revised down:** given the unexpected resilience of import prices in the face of the marked appreciation of sterling since Spring 2013, the pass-through from changes in the exchange rate to non-oil import prices was revised down from around 85% to around 60% in the August 2015 *Inflation Report*. Work undertaken by SEAD since then has added further statistical and academic evidence to support that judgement.

6. **Reconciling wage growth, unit labour costs and the output gap**: Ideally, investigating the errors in our August 2014 IR wage growth and unit labour cost growth forecasts would provide some cross-check of the revisions to our output gap estimates over the last few quarters. At face value, stronger than expected growth in wages and unit labour costs in recent quarters relative to the August 2014 projections might contrast with our estimates of the output gap, which have been revised wider over the same period (**Chart 26**).

There are various caveats to that, though. For example, one of the factors which has accounted for some of the firming in wage growth most recently - compositional effects in employment - should be broadly neutral for unit labour costs, as it pushes up productivity growth too. Moreover, the adjudged composition of slack in the economy has also been different to expectations in the August 2014 *IR*: the unemployment gap - which previous work has found to be most relevant for wage growth - has been narrower than anticipated, but set against that, the average hours gap is estimated to be wider.

Chart 26: Successive IR output gap estimates



And the volatility in unit labour cost growth over the last few quarters relative to the August 2014 *IR* projections - influenced heavily by changes in non-wage labour costs (and data revisions) - makes interpretation of those moves more difficult. Overall though, our output gap estimates are not based upon any single indicator: they are based on a range of evidence, not least our top-down and bottom-up output gap measures, which also incorporate feedback from a variety of wage and price data.