



BANK OF ENGLAND

Speech

Brexit and Monetary Policy

Speech given by

Martin Weale, External Member of the Monetary Policy Committee

Resolution Foundation, London

18 July 2016

I am grateful to Ben Broadbent, Kristin Forbes, Alex Haberis, Tomas Key, Jack Marston, Ian McCafferty, Francesa Monti, Kate Reinold and Abigail Whiting for many useful contributions to this speech

Introduction

Thank you for inviting me here for my last outside appearance as a member of the Monetary Policy Committee. I had intended to provide some sort of retrospective assessment of my time on the Committee and an account of some of the major policy-making challenges we have faced. But the result of last month's referendum gives a very real sense that my final few weeks on the Committee are being spent in a world, or at least a country very different from that of my first five years and eleven months.

The Committee will produce a new forecast for the economy in the August *Inflation Report*, produced on the assumption that we leave the European Union, and today I obviously do not know what sort of judgements we are going to make about Britain's future circumstances. I am not going to forecast the forecast. As many people have pointed out, our eventual arrangements will be the outcome of a long negotiation process. But today I would like to draw attention to some of the issues which arise for monetary policy and see how far our previous experience can be a guide as to how it might be sensible to respond.

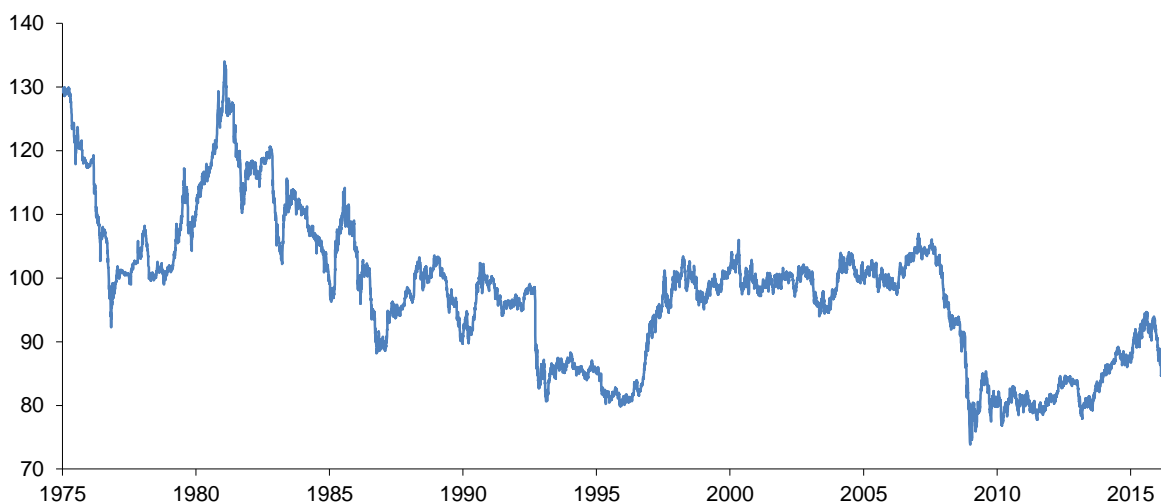
I will first provide a summary of the key economic developments since the evening of 23rd June. I will follow this with some observations about what can be learned from the past. Next I will offer some brief observations on the importance of the work that other parts of the Bank have done to ensure that shocks such as the referendum result can be handled as smoothly as possible. And finally I will offer some thoughts about how the Monetary Policy Committee may address the movements which have taken place. Of course I should stress that these are my own views, and other present and future members of the Committee may see things differently.

Brexit: the story so far

In the Minutes of our May meeting (Monetary Policy Committee, 2016) we observed that the response to a vote to leave would depend on our perceptions of what was happening to demand, supply and the exchange rate. So far, of course, we can observe the exchange rate and other asset prices and we have some indicators of demand. We have not observed anything direct on supply, although movements in investment, an important component of demand, also affect productive capacity and thus have implications for supply as well. I would like to start by reviewing developments to the exchange rate and other key asset prices.

Chart 1 shows the effective exchange rate index since 1975. You can see, at the end of the graph that it has fallen close to its record low which was reached during the financial crisis. The decline since 23rd June has been about eight per cent. This decline has possible implications for inflation which I will discuss later.

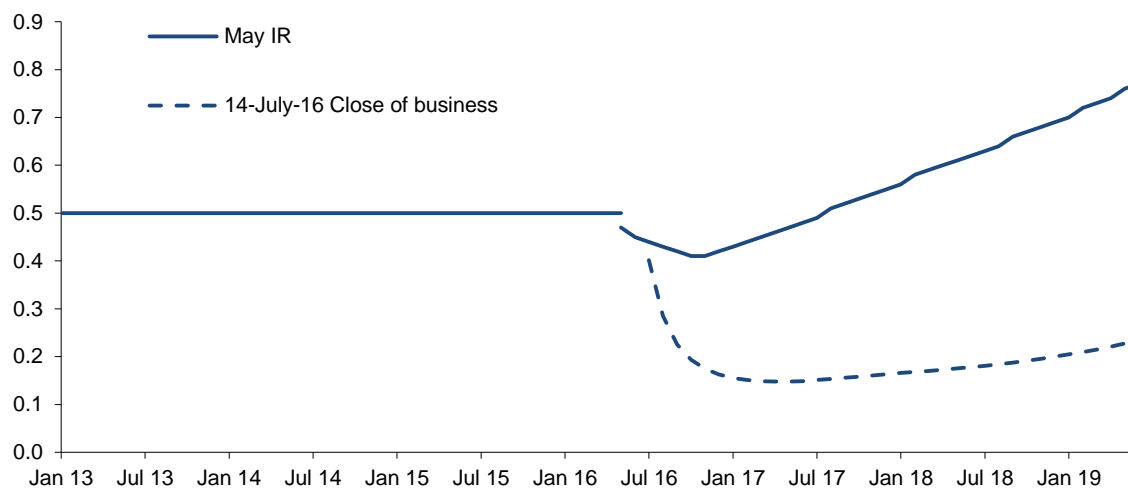
Chart 1: The Effective Exchange Rate Index (Jan 2005=100)



Source: Bank of England

The assumption in markets is that the Committee will respond to Brexit not just by holding the Bank Rate fixed for longer than would otherwise have been the case, but by reducing it sharply. In Chart 2 I show the market's expectations of the path for Bank Rate both at the time we produced our *May Inflation Report* and at the close of business on 14th of July. You can see that in May there was some expectation of a reduction in Bank Rate, certainly not something I saw a need for, but now that markets are expecting Bank Rate to be reduced below $\frac{1}{4}$ per cent later this year. So the market assumption is that, despite the possible inflationary impact of the decline in the exchange rate, the Committee will reduce Bank Rate.

Chart 2: Market-implied Path for UK Policy Rate (Per cent per annum)

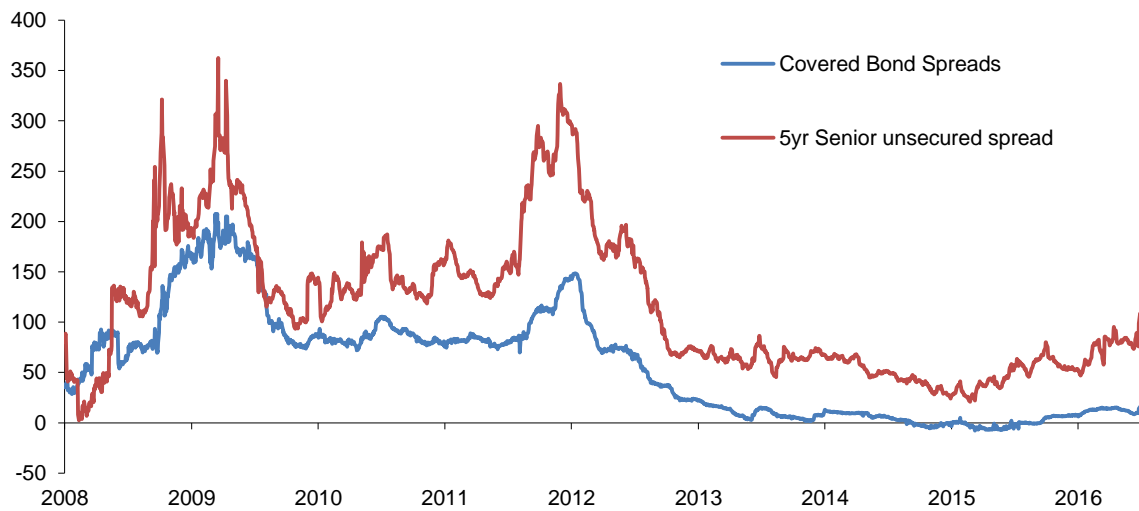


Source: May Inflation Report, Bank of England, Bloomberg

Of course Bank Rate movements are generally described with reference to increasing or reducing the degree of monetary stimulus in the economy. If, however, banks face an increase in their funding costs, then

an offsetting change to Bank Rate may be needed to ensure that there is no increase in the interest rates faced by bank customers. Chart 3 shows two measures of bank funding costs. You can see that spreads on unsecured debt over risk-free rates have risen by about ¼ percentage point, while those on covered bonds have shown scarcely any movement. At the same time both remain appreciably lower than they were during the acute phases of either the banking crisis or the euro area crisis. Increases in funding costs feed through only gradually to retail loan and deposit rates, so the Monetary Policy Committee will need to judge over time whether the movement shown in five-year spread is material.

Chart 3: Bank Funding Costs (Basis Points)

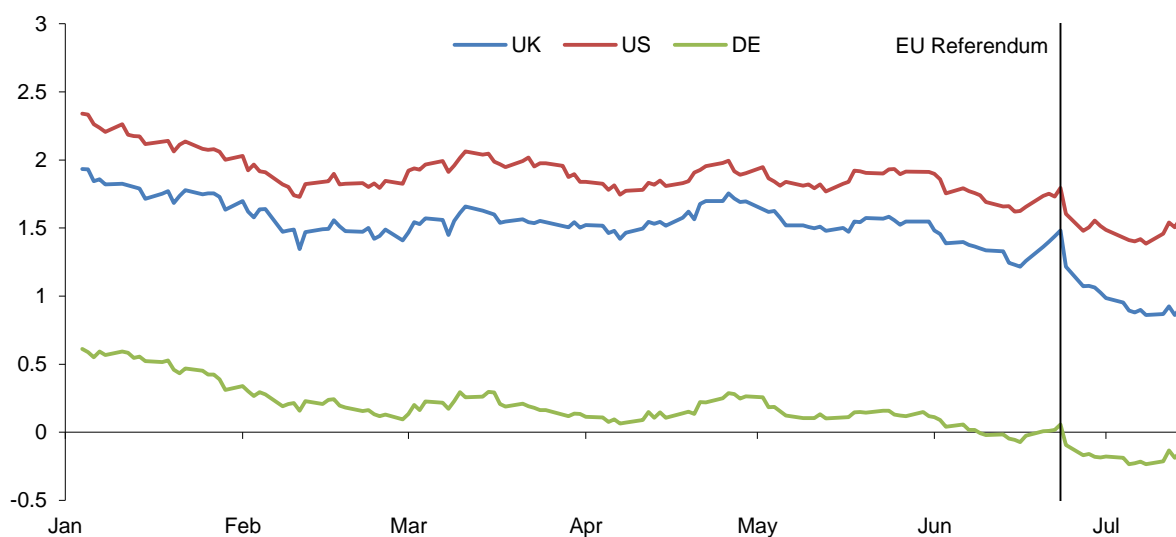


Source: Bank of England

100 Basis Points=1 Percentage Point

The general view is that Britain's decision is unlikely to have a substantial impact on the global economy. Nevertheless, the aftermath of the decision has led to further downward revisions of expected future interest rates abroad as well as at home. Chart 4 shows yields on ten-year government debt in the United States and Germany as well as in the UK. These move in line with, in broad terms, the average of expected future short-term rates over the next ten years. These fell in the winter as concerns about the state of China's economy grew. They showed only a modest recovery as fears about China eased. Since the referendum rates have fallen in all three countries although the decline was most pronounced in the United Kingdom. Perhaps one reason why the referendum is not expected to have much effect internationally is because major central banks are expected to ease policy as a result. Yields in the UK may also be affected by the expectation that the Monetary Policy Committee will make further asset purchases.

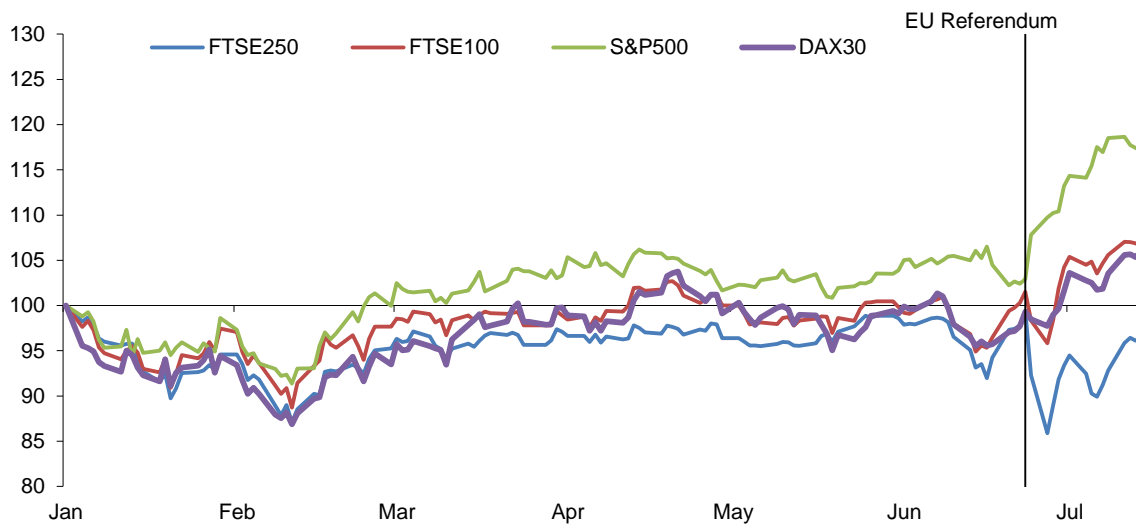
Chart 4: Yields on 10-year Government Debt, 2016



Source: Bloomberg and Bank Calculations

Finally, I would like to turn to stock markets. Chart 5 shows, in sterling terms, share price indices for the United States and Germany together with the FTSE 100 and FTSE 250 indices. The sharp rise in the S&P 500 index reflects the rise in the value of the dollar more than any great strength in the US stock market. It has been widely observed that the FTSE 100 share index includes a large number of international firms which happen to be based in Britain, rather than firms whose performance is very sensitive to the strength of the British economy. Since the referendum it has been more volatile than the DAX30 index of share prices in Germany, but the movements are broadly similar. Both of these have markedly out-performed the FTSE250 share index whose constituent firms are much more sensitive to the fortunes of the UK economy. The latter is now about three per cent below its value just before the referendum despite the support offered by expectations of lower interest rates. It is possible to interpret this as indicating market expectations of weaker economic growth, but I am reluctant to draw any strong signal from this about what Brexit means. The risks of over-diagnosis of stock market movements are all too clear. Rather than try to read the tea leaves of the stock market, I would prefer to consider the possible long-term implications of Brexit by discussing the economic consequences of changes in trading arrangements; that is what I will turn to next.

Chart 5: Equity Indices, 2016



Source: Thomson Reuters DataStream

Long-term effects

My own view is that, despite any savings resulting from a lower contribution to the EU budget, the nation's income, and thus people's incomes, are likely to be reduced as a result of the choice made on 23rd June. International trade allows countries to specialise and take advantage of economies of scale. Depending on the arrangements eventually agreed, we may or we may not be able to retain all the advantages of those economies of scale which have flowed from membership of the single market. A failure to retain them would amount to a worsening of Britain's supply conditions reducing both productivity and household incomes. International competition may also have had the effect of stimulating productivity improvements in domestic firms.

Crafts (2016) has suggested that EU membership had the effect of raising UK GDP by around ten per cent. This estimate relates to the years before the rapid immigration from Central Europe and can be thought of as an increase in income per head. Of the increase, 2 ¼ percentage points are attributed to the increased rate of foreign investment in Britain. Much of the rest may have come from increased competition forcing British firms to become more efficient and increased specialisation, allowing them to become more efficient. Crafts also suggests, however, that the gain may not have been evenly shared across the country; the South may have gained more than the North.

Other work gives a similar account. Dhingra et al. (2016) explore what would happen if the UK were to (re)join EFTA after leaving the EU and so remain in the European Economic Area. They draw on the work of Baier, Bergstrand, Egger and McLaughlin (2008) to infer that trade with EU countries would be likely to fall by about ¼ and, since about half of our total trade is with the EU, Britain's total trade would fall by about ⅛. Feyrer (2009) suggests a strong causative link from trade to income, with a 10% increase in trade increasing

income by around 3% to 10%.¹ This might lead to the conclusion that Brexit will reduce UK income by 3½% to 12½%. Other studies (e.g. HM Treasury 2016a) suggest a smaller effect on UK income, because they assume a weaker relationship between trade flows and national income. Of course if I additionally allow for the uncertainty about our future trading arrangements, then this already-wide range becomes very materially wider

While I do not have any new estimates, I would like to draw attention to some of the factors specific to the circumstances that the United Kingdom will find itself in. It is often suggested that there are costs for firms to establish a presence in foreign markets (Melitz, 2003). Joining a customs union like the EU may increase the benefits once the set-up costs have been met, and thus increase the incentive for firms to meet these one-off costs. The effect may not be completely reversible on departure because the set-up costs cannot be recouped by withdrawing from these export markets.² So trade may decline less than some analyses suggest or the process may be rather slow.³ HM Treasury (2016) in their analysis introduced what inevitably has to be an arbitrary adjustment for this. Crafts makes the point that not all the gains need be lost on leaving.

I noted that a part of the benefit has probably come from a competition effect; outside the EU British firms may face less pressure to be as efficient as possible. Even without EU rules, however, the United Kingdom has one of the most effective competition laws in the world (Alemani, Klein, Koske, Vitale, Wanner, 2013). While I suspect that competition law is more effective than it was forty-five years ago, I am not sure how far that means that these will protect us from the possible consequences of reduced international competition after withdrawal from the European Union. Additionally, there is a risk that producer interests will become more dominant and that the benefits which accrue to households, as consumers, from effective competition law will be reduced.

Should life become harder for the financial sector then, as the obverse of what Crafts observed, that may fall disproportionately on London and the South-East. But, if taxable capacity declines disproportionately as a result, the effects of this on people's incomes will be spread across the country more evenly than the effects on output.

The final outcome will depend on how far trading arrangements suffer and how far the country becomes less appealing as a destination for foreign investment. The fact that EU membership may have been a motor for trade does not mean that things will necessarily revert to the situation which would have arisen if the UK had stayed as a member of EFTA instead of joining the EU in 1973. Additionally I am not sure how far domestic competition law can substitute effectively from the stimulating effects of international competition. All told, I

¹ Dhingra *et al.* (2016) quote a smaller range of 5% to 7.5%. The range that I have provided reflects not only the fact that Feyrer, in Table 7, provides a range of models, but also that the parameters he estimates are uncertain.

² Suppose that there is discounted return from exporting of R and a setup cost of Z . A firm will export if $R-Z > 0$. If an unexpected change to trading arrangements means that R falls to R' , a firm which has already incurred Z will continue exporting if $R' > 0$. On the other hand new firms will enter only if $R'-Z > 0$.

³ Although Feyrer's (2009) study was based on the effects of the closure of the Suez canal from 1967 to 1975 after the war between Egypt and Israel. It might be thought therefore to represent the effects of making trade harder rather than easier as could our departure from the European Union.

think the rather wide range I have suggested is more like a fuzzy upper bound than a best estimate for the effect on GDP in the event of an EFTA-type outcome. The effect of leaving the EU will probably be harmful to our trading arrangements but there is a great deal of uncertainty as to how powerful this effect is likely to be.

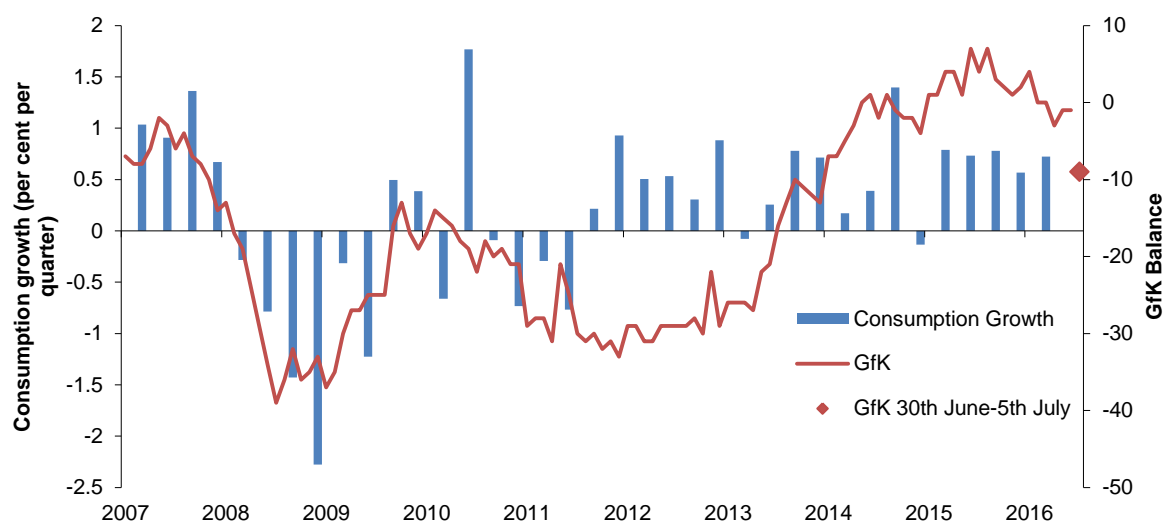
Uncertainty and demand in the short term

The Committee has given considerable space to a discussion of the uncertainty surrounding the referendum, and to the greater uncertainty which would follow from a vote to leave. Carney (2016) develops this, showing that indicators of uncertainty, and particularly those for the UK, have risen. He reminded us that the MPC's best estimate was that uncertainty about the outcome of the referendum, would depress GDP by 0.7 per cent in 2016. This was on the assumption that the country would vote to remain in the EU and that the uncertainty would therefore fade after the referendum.

There is good evidence that uncertainty affects demand. As I have noted previously (Weale, 2016), it is difficult to believe that there are large influences of easily-identifiable uncertainty effects on consumer demand. For example, I showed (Weale, 2012), using a structural model (van de Ven, 2011) which simulates a panel of households over the life cycle, that the uncertainty associated with the movements in unemployment during the last recession and its immediate aftermath raised the savings rate by a peak of 1.5 per cent. Regression estimates which explain saving by unemployment tend to give more powerful effects but it is not clear that these show only the response to increased uncertainty.

We do already have some early indication of the impact that elevated levels of uncertainty might be having on consumer confidence. A GfK survey, conducted between 30th June and 5th July, showed that confidence has fallen sharply since the referendum. However, in Chart 6 I have plotted the GfK confidence series against quarterly consumption growth, and while the two series moved fairly closely together around the time of the financial crisis and initial recovery, the correlation seems to have weakened in recent years. There is some statistical evidence that the measure normally serves as an early indicator of household incomes. I find it, however, difficult to believe that the sharp decline just reported is because household incomes have fallen sharply in response to Brexit. So it is not clear that it provides a useful signal.

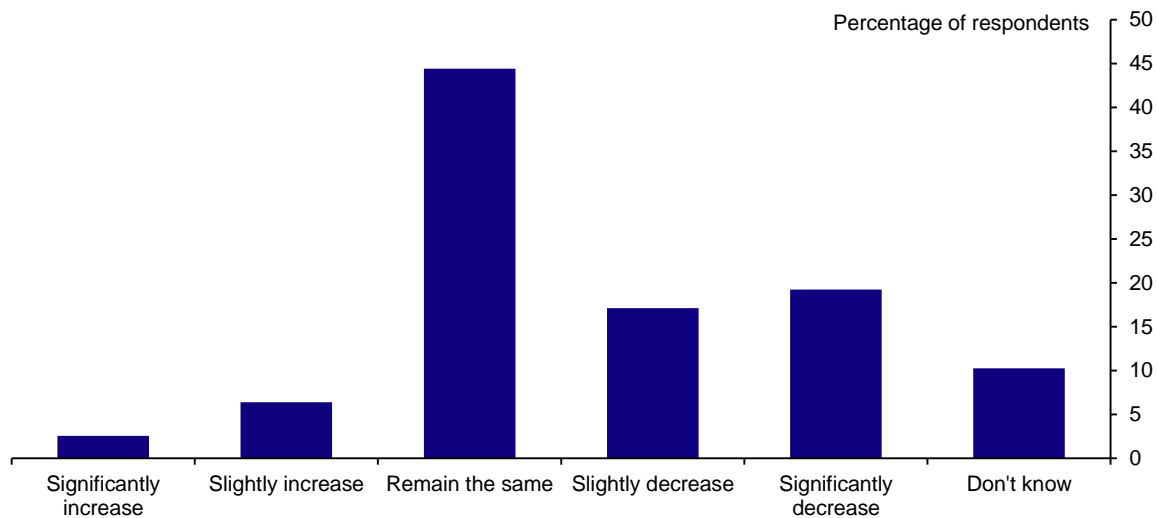
Chart 6: GfK Consumer Confidence



Source: ONS and GfK Survey

The evidence for important effects on investment behaviour is more marked (Bloom, 2009). A study (Abberger, Dibiasi, Siegenthaler and Sturm, 2016) of the effects of the Swiss vote to limit migration shows that business investment was affected by the resulting uncertainty, although interestingly, investment in buildings was affected less than other forms of investment. The most recent expenditure estimates of GDP show that business investment fell in the first quarter of this year. It is possible to attribute that to uncertainty although at the same time it is necessary to remember that early estimates of investment are subject to very substantial revision. In terms of prospects, however, the limited survey evidence we have since the vote does suggest that firms plan to reduce their investment as a response to the outcome of the vote. The Institute of Directors conducted a survey of investment and recruitment intentions shortly after the referendum result, whose results I display in Charts 7a and 7b. They found that a significant proportion of firms planned to cut investment following the referendum result, and almost a quarter stated that they planned to freeze recruitment of new staff. This immediate response may prove to be an overreaction, but it certainly would seem to be a natural judgement in the light of the uncertainty that has been created.

Chart 7a: Institute of Directors Survey, Impact of Referendum on Investment Intentions



Source: Institute of Directors

Chart 7b: Institute of Directors Survey, Impact of Referendum on Hiring Intentions



Source: Institute of Directors

Handley and Limão (2015) suggested that uncertainty might also affect international trade. They, following Melitz (2003), explore the implications of the assumption that firms face fixed costs to setting up as exporters and show that uncertainty about trade arrangements as well as actual trade arrangements can limit trade. Portugal’s exports to the rest of Europe increased sharply after it joined the European Union in 1986 and uncertainty about trading arrangements was replaced by certainty. As with the long-term effects of leaving the EU, the impact of this in discouraging trade is likely to be lower given existing trade networks than it would be if they did not already exist. On the other hand, continental purchasers of UK goods and services may, because of the general air of uncertainty, review their arrangements at an early stage.

While there is a clear statistical relationship between movements in the uncertainty indicator and movements in GDP, they need to be interpreted with care when producing a forecast. It is perfectly possible that some of

the impact of uncertainty is already reflected in other variables, such as asset prices, which are inputs into the forecast. Thus, in producing our August Inflation Report we will need to be awake to the risks of double-counting. I do not doubt, however, that the increase in uncertainty since the referendum will have some depressing effect on demand. Early indicators collected in the immediate aftermath of the referendum may, nonetheless, over-state the eventual magnitude of the increase in uncertainty. In particular it is possible that the early appointment of a new Prime Minister will have gone at least some way to restore confidence.

In addition to any uncertainty effects, demand may fall because of the long-term supply effects that I discussed. A widespread view among economists is that, if consumers anticipate lower incomes in the future, then they will want to reduce their spending in anticipation of this. As a result, in the short term output will fall below potential output and the resulting spare capacity in labour and goods markets will lead to a slower recovery in inflation than we have been forecasting hitherto.

Taken together, these observations suggest to me that the combination of increased uncertainty and a degree of anticipation of the likely effects on supply mean that demand is likely to be weak in the near term. At the same time, however, I note that past recessions have typically been precipitated either by the cash flow effects of high interest rates, as in 1979 and 1990, or declining availability of credit, as in 2008. Since neither of these influences is present, it is possible that weakness of demand will be paced more gradually than in these recessions. Collectively, of course, the MPC will come to some judgement on this in preparing the *August Inflation Report*.

The exchange rate

In terms of our own remit, keeping inflation close to its target of two per cent, there is, however, another material factor. As I mentioned a moment ago, the exchange rate has fallen sharply since the referendum. The experience of the period from 2008 to 2013 was that the effects of this on inflation were both more protracted and larger than the Committee had expected at the time. Forbes, Hjortsoje and Nenova (2015) have suggested that the pattern of “pass-through” depends on the factors behind the fall in the exchange rate.

So what lies behind the fall of the exchange rate? Obviously the immediate answer is the vote, but I still need to ask what economic features of the vote have led to the depreciation. There are a number of possible candidates and I do not think it is possible to say how important each one is at this stage. Most economists would say that the current value of the exchange rate adjusts so that, on its expected future path the country is solvent – that is that the value of its existing net assets plus the expected discounted value of future income at least equals the expected discounted value of future consumption plans. Since the future is unknown, this relies on a large degree of speculative judgement, and it is not surprising that movements in expectations about the future can lead to large movements in the actual exchange rate.

One answer can be obtained by thinking through the consequences of a lower path for future productivity. If the estimates of a lower path for GDP are assumed to arise from this lower path for productivity, then it follows that real wages should be expected to be affected *pari passu*. The adjustment in real wages can, however, be achieved by slower growth in money wages, with growth in prices unchanged, by faster growth in money prices, with money wages changing as they would have done in any case, or by some combination of these two, and it is not clear what the balance will be. One observation I can make from the experience of the last six years is that the Committee has not found a stable means of drawing inferences about movements in nominal variables such as the inflation rate from developments in real variables such as the terms of trade, output and unemployment. Perhaps that is because there is not one to be found.

Anyway, to the extent that sterling prices are higher as a result of a required adjustment to real wages, then the exchange rate will have to be lower to offset the international effects of this. The relative fall in GDP resulting from Brexit might then be thought to set an upper limit to the decline in the real exchange rate which would result from Brexit.

There is, however, a good reason for thinking that, even within the confines of this analytical model, the impact on the exchange rate will be larger. To the extent that the productivity effects work through reduced competition, then those are likely to be in the sectors of the economy most exposed to foreign competition – i.e. in the sectors of the economy producing internationally traded goods. If, say, half of our economic activity produces internationally tradable output and the productivity effect were actually limited to the tradeable sector, then the overall loss in productivity there would be twice as large in the economy as a whole. And, since the real exchange rate needs to ensure that our internationally tradeable goods are competitive, the adjustment to the real exchange rate would need to be twice as large as if the loss were spread evenly across the economy.

Seen from this perspective, an expectation that income will grow more slowly in the future is, to my mind, an obvious factor behind the fall of the exchange rate. I am, however, not sure that it is the dominant influence. As you know, Britain runs a large external deficit. Early estimates for the last quarter of last year and the first quarter of the current year put this at about seven per cent of GDP. Why have people been willing to lend to us? Smith (1776) offers an answer. He wrote:

“But man has almost constant occasion for the help of his brethren, and it is in vain for him to expect it from their benevolence only. It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest.”

The foreigners who finance our external deficit, either by lending us money or buying up British businesses are not doing so out of their kindness but because of the return that they expect to get. I am very doubtful that, at the exchange rate in place on 22nd June, Britain would have found it possible to finance the current account deficit indefinitely. The outcome of the referendum may have simply focused people's minds on this issue. While the fall of the exchange rate has undone the rise since early 2013, the effective exchange rate

is still, as Chart 1 shows, not at a record low level. Of course, the experience of the 2008 depreciation was that net exports rose by rather less than the MPC had expected, and I would not like to judge the impact of the recent fall on our trading position.

Beyond these general effects there is a specific feature about Brexit which may affect our external position and thus the exchange rate. As you know financial services are an important British export. Our surplus on exports of financial services (including insurance) with the rest of the EU amounted to £18.5bn or one per cent of GDP in 2015. If changes to our relationship with the remaining EU make exports of financial services less straightforward, or result in some operations moving to the euro area, then there may be a further specific effect tending to increase the balance of payments deficit and, presumably needing to be offset by an adjustment of the real exchange rate.

With this back-drop I would like to turn to the matter of how the Committee has handled policy in my first five years and ten months as a member.

Policy before 23rd June

For many years economists have found it helpful to consider policy settings with reference to policy rules. Nevertheless, I think it is fair to say that policy feedback rules started to receive widespread attention in the early 1990s following an article by Taylor (1993). He suggested that the American central bank, the Federal Open Market Committee (FOMC), could be seen as setting the interest rate with reference to the inflation rate and the output gap, the difference between the actual volume of output and full-capacity output. His analysis suggested that the FOMC raised the interest rate by about 1 ½ percentage points for every one point increase in inflation, and increased it by about half a point for every one percentage point by which actual output rises relative to potential output. He suggested that this could be seen as the outcome of a process whereby policy makers aimed to minimise a loss function which combined the square of the deviation of inflation from a target value and the square of the deviation of output from its notional long run level, the output gap.⁴

Of course the fact that statisticians cannot measure potential output raises questions about practical implementation which I discussed eighteen months ago (Weale, 2014). But the principle of setting the interest rate with reference to inflation and the output gap has provided a useful reference point for economists since Taylor's original study.

Most studies (e.g. Hofman and Bogdanova, 2012) have, nevertheless, shown that monetary committees, the Monetary Policy Committee included, seem sluggish about making interest rate changes. This phenomenon can be represented by including the square of the change in the interest rate as an additional term in the loss

⁴ Such a loss function is represented as:

$$L = (\pi - \bar{\pi})^2 + \mu(y - \bar{y})^2$$

where π is the actual interest rate, $\bar{\pi}$ is the inflation target, y is log of actual output, and \bar{y} is the log of potential output (with $y - \bar{y}$ the output gap). μ is the importance given to output deviations relative to output deviations; a value of 1 would give them equal weight.

function, which expresses a dislike of changes in Bank Rate in either direction. Woodford (2003) points out that if people are forward looking, a reluctance to change rates will mean that changes, when they do happen have more impact than if policy-setters were fleet of foot but that, in itself, does not justify a policy of gradual change. During my time on the Monetary Policy Committee I have, as you may know, been more prepared to change Bank Rate than some of the other members. Nevertheless, if I look back over my record, I find myself wondering whether I should have been still more willing to vote to adjust Bank Rate notwithstanding that, if a majority of the Committee had followed suit, there would have been more policy reversals.

Anyway, the Bank's COMPASS model shows a great deal of interest rate persistence. The interest rate rule that it identifies is:⁵

$$r_t = 0.09\{1.66 \times (\text{Inflation} - 2\%) + 1.16 \times \text{Output Gap}\} + 0.91r_{t-1} \quad (1)$$

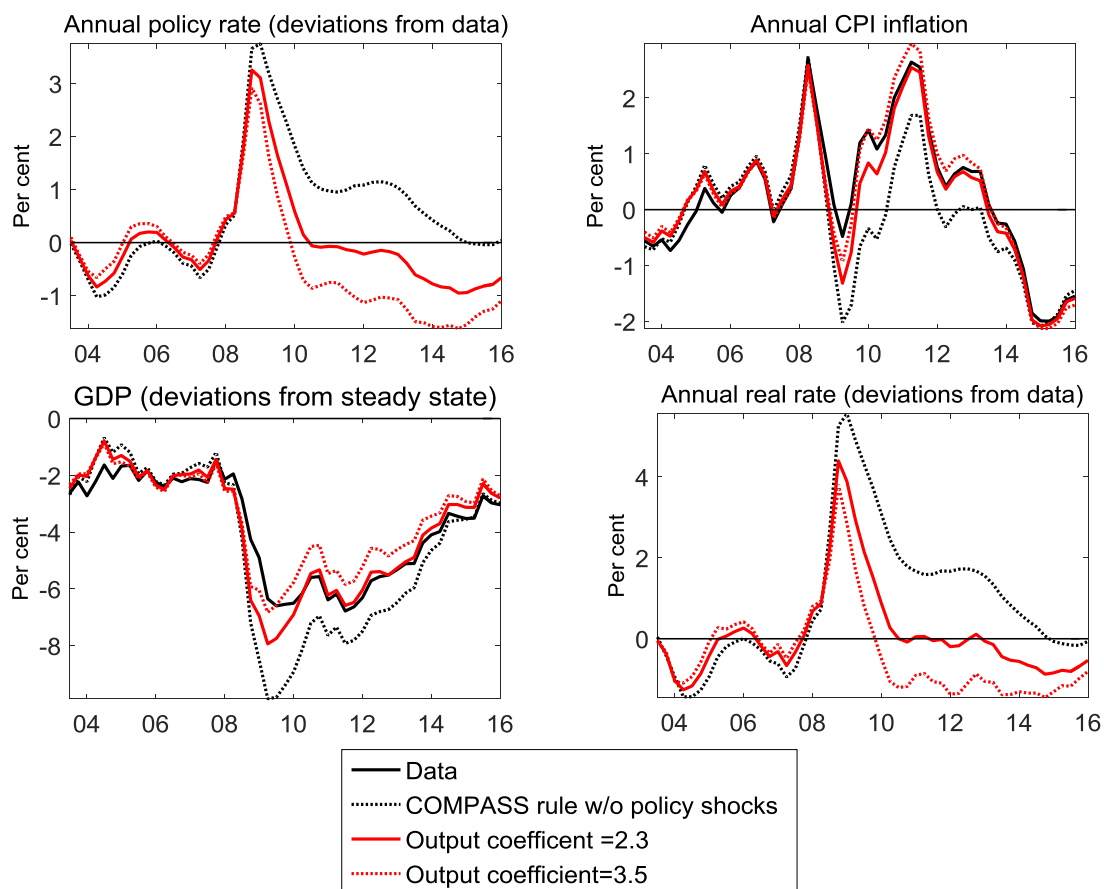
The most striking feature of this is its slow response. Only nine per cent of the gap between the actual and the long-run interest rate is closed in each quarter. But the long-run response to the output gap is also powerful. Yellen (2012) describes a coefficient of 1 on output and 1.5 on inflation, close to what is shown here, as a “balanced- approach rule” which she contrasts with Taylor's original policy rule with its coefficient of 0.5 on the output gap.

In the top panel of Chart 8 the dashed black line shows the interest rate path that the policy rule implies, measured relative to the actual decisions that the Committee took.⁶ You can see that, from 2009 onwards, the interest rate would have been materially higher, by over three percentage points in 2009-2010, with the excess falling to just over one percentage point and then fading away in 2015; a much bigger difference than the quarter point change that I voted for in 2011. You can see, in the top right-hand panel, that this policy would have delivered inflation closer to target. But the cost, shown in the bottom left panel, would have been an appreciably sharper slump with output falling about four percentage points further than it by late 2009 and remaining about one percentage point more depressed from 2011 to 2013. You might well be pleased that the Committee used its judgement rather than sticking to a rule, even one of the type that Ms Yellen described as a balanced approach, but that of course is a judgement of hindsight.

⁵ This equation is estimated as part of the overall estimation of the model for the period 1997-2013. The equation shown measures the interest rate relative to “equilibrium”. It is unclear how far the estimation method adequately deals with the fact that equilibrium interest rates seem to have fallen during the estimation period (Hofman and Bogdanova, 2012). Thus there may be omitted variable bias present.

⁶ Of course, the Bank Rate was reduced to 0.5 per cent in March 2009. But monetary policy was eased both then and subsequently by means of asset purchases. The analysis assumes that these can be converted to an interest rate equivalent and that therefore the interest rate floor does not provide a constraint.

Chart 8: Policy Rules over the Period 2003-2016



Source: Bank Calculations. The Policy Rate is adjusted for the Effects of Asset Purchases

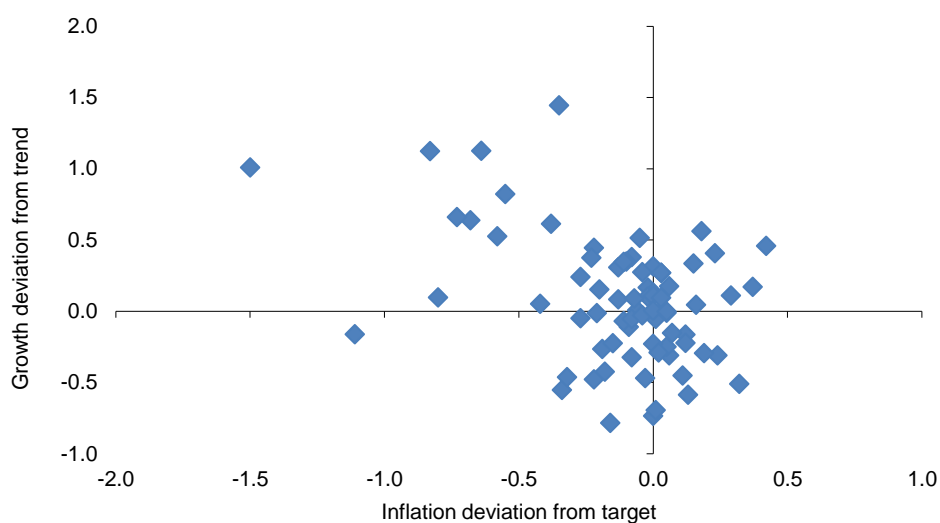
Rather than seeing this outcome as judgement, it could be seen as a different policy rule. The two red lines in the charts illustrate two such possibilities. The solid red line shows the effects of a coefficient of 2.3 on output (double the 1.16 coefficient in the equation above) while the dashed red line shows the effects of an even more powerful response, where the Committee in the long run adjusts the interest rate by 3.5 points (three times the value in the equation) for every one point short-fall in output. Of course, these effects are still damped in the short term by inertia, a reluctance to move rates sharply. You can see, however, that after an initial tightening in response to the inflationary surge, the Committee would have then brought rates lower than they were, delivering outcomes for both output and inflation much closer to what actually happened. So a reasonable interpretation of at least the first half of my time on the Committee is that we paid very much more attention to output than was implied by my predecessors' behaviour during the years before the crisis⁷. Interestingly, looking at things from a rather different perspective gives a similar conclusion. Bean (1998) studies the implications of the preferences of the MPC for the way in which it responds to shocks to output and inflation. In a much simpler model, and one which was estimated on data from 1953 to 1996, he suggested that a situation where the Committee puts a weight of 1 to 3 on deviations of output from its steady state relative to deviations of inflation from target (the coefficient μ in footnote 3) the outcome will be a

⁷ If a policy rule is estimated only for the years before the crisis the coefficient on output is only 0.6.

Taylor rule with a coefficient of 1¼ to 2 on inflation and 2½ to 3 on output; his model does not, however, have an interest rate term.

What evidence do we have on μ ? In chart 9 I plot the MPC's forecasts of growth at a two-year horizon, as a deviation from trend, against the forecast deviation of inflation from its target at the same horizon. In a simple framework the slope of the line through these points represents the minus the slope of the Phillips curve- the extent to which supply conditions make it possible to trade off deviations of output growth from trend against deviations of inflation from target, divided by the MPC's preferences as represented by the value of μ .

Chart 9: Inflation and Growth Deviation (percentage points, December 1997 to May 2016)



Source: *Inflation Reports* and *Bank Calculations*

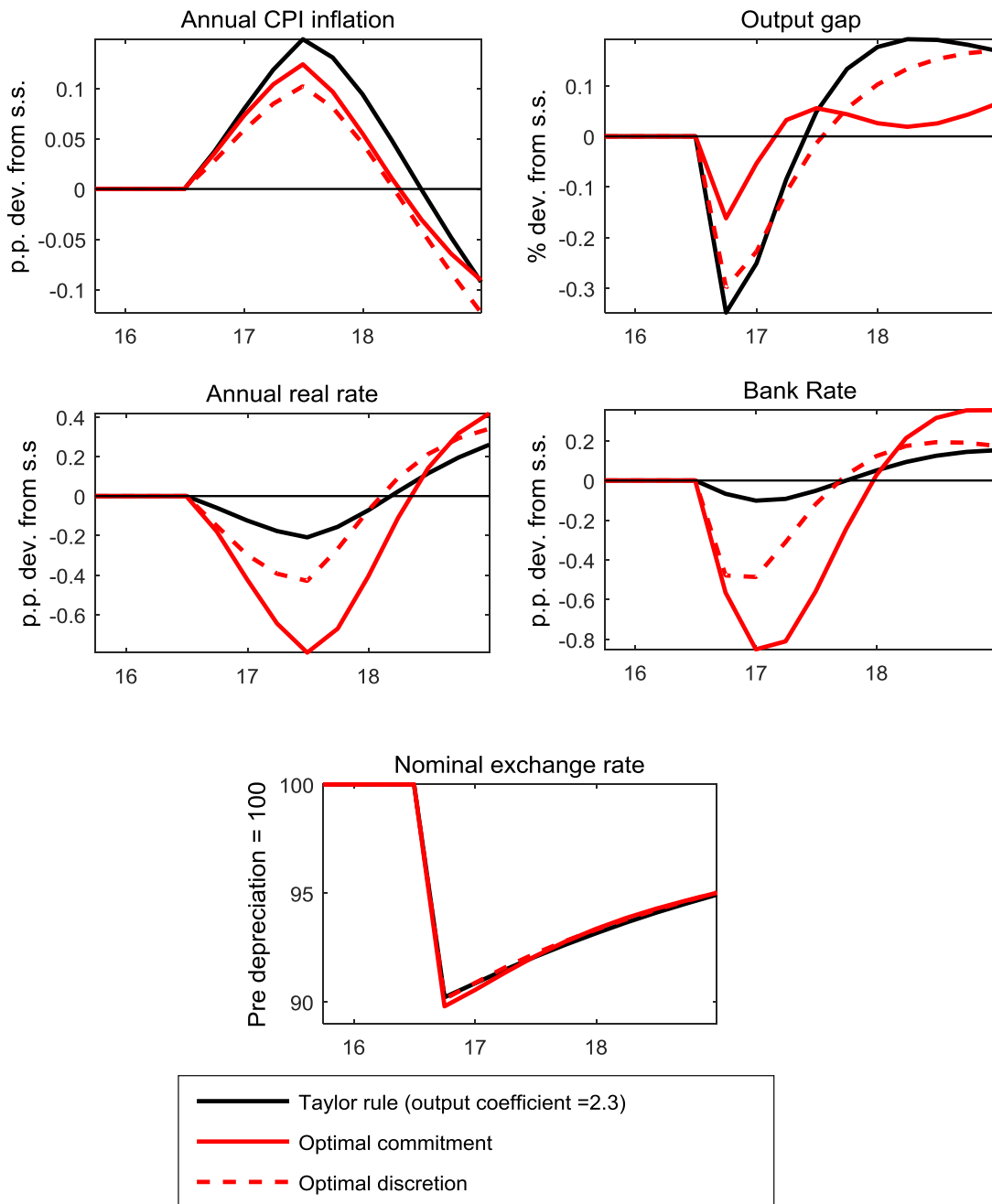
I estimate this slope using a median regression, a robust approach which mitigates the influence of outlying observations and find a slope coefficient of -0.67 (-0.48 to -0.88).⁸ If I use a value of ½ to 1 for the slope of the Phillips curve, my central value of -0.67 implies a value of μ between 0.75 and 1.5. So in very broad terms both these results and my exploration of the Taylor rule are consistent with the idea that the Committee gives approximately equal weight to inflation deviations and output deviations. My own sense is that, given the primacy of the inflation target (HM Treasury, 2016b) it is appropriate to give less weight to output deviations than to inflation deviations. I should stress that this is my interpretation of the remit and not a personal preference. It has the implication that if inflation is overshooting towards the end of the forecast period, while output is below potential, I would choose a policy so as to deliver a smaller absolute overshoot in inflation than the absolute size of the undershoot of output.

A lower exchange rate

⁸ Estimating the reciprocal by reversing the regression does give a lower coefficient. However, I think the case for looking at the inflation deviation as explaining the growth deviation stems from the primacy of the inflation target. Looking only at the period from 2008, the coefficient falls to -0.83 a range of 0.6 to 1.2.

This experience offers some guidance as to how the MPC might react to the fall of the exchange rate since 23rd June. That said our model was not designed to represent the combination of factors which might lead to a permanent fall of the exchange rate. What I show is the impact of a rise in the perceived riskiness of sterling which leads to a fall of ten per cent in the exchange rate that gradually fades. So in Chart 10 I show, with the black line, the implications of an economy which experiences this and to which the policy makers respond using a policy rule like that of equation (1), but with the coefficient on the output gap doubled to 2.3.

Chart 10: The Response to an Exchange Rate Fall



Source: Bank Calculations

Although there is a rise in inflation it is relatively subdued, and certainly much smaller than I would expect to be the case if there were no policy response. A negative output gap initially develops because the rise in prices which arises from the fall of the exchange rate reduces spending power ahead of the stimulus to demand through increased exports. This then closes and output rises above trend. As with inflation, the effect would be much more marked if policy were not responding. The strong importance given to the output gap means that the MPC initially reduces Bank Rate, or eases policy in some other way, rather than raising it

as an immediate response to the depreciation; there is, however, an eventual increase. I would expect the Committee to consider such a policy only if felt confident that maintaining or cutting Bank Rate would not aggravate the factors that had led to the rise in the risk premium in the first place; separately, of course, the policy would have to be appropriate given other developments in the economy.

The chart also shows two paths in red computed on the assumption that the Monetary Policy Committee is equally concerned about three things, the deviation of inflation from its target, the output gap and the change in the interest rate from one period to the next.⁹ There are two cases of interest. In the first case (the dotted red line), the MPC is assumed to follow an optimal discretionary policy. In this case it is assumed to set policy on a period by period basis, minimising the sum of the squares of the deviations of inflation from target, the output gap and of the change in the Bank Rate while taking private sector expectations as given. Other players work out what the MPC will do and output and inflation follow trajectories which reflect their expectations of the MPC's future choices as well as its current choice. You can see that in these circumstances the Bank Rate is reduced initially rather more than is implied by the policy rule but inflation is nevertheless marginally lower and the overshoot to the output gap is also lower. This is a consequence of the private sector believing that policy will eventually be a bit tighter than the rule implies.

The second red path (the solid red line) shows the effects of optimal policy with commitment. In this case the MPC is assumed to optimise not period by period but over the whole of the future, once and for all. Since the MPC is assumed not to optimise again, in essence this means that it commits to a set of future actions in performing that initial optimisation. For the purposes of the simulations, this commitment is assumed to be credible. The consequence of this credible commitment is that the MPC can draw on the credit provided by promising future actions. It allows them to have an appreciably lower Bank Rate in the short term.

The conclusion I would draw from this is that the path followed with a policy rule that shows a strong response to the output gap is not very different from the optimal discretionary policy. An optimal policy with commitment would deliver less volatility in output but much the same path for inflation. In particular the contraction which follows immediately as the depreciation eats into people's spending power would be less marked.

This analysis is no more than a guide. Taylor (2012) has argued that economic performance (of the United States) is better during periods when a policy rule is followed than when policy-makers depart from such a rule. Like Bernanke (2015) I do not find this convincing. Since the weight on output (value of μ) is set to one in the simulation, it does, however, suggest to me that, after a sharp fall in the exchange rate a weight on output deviations (value of μ) materially below one would imply that, even if I do not need to raise Bank Rate immediately, I would probably not rush to reduce it without other good reasons for thinking that inflation needed additional support in the medium term.

⁹ Formally, there is a single-period loss function:

$$L = (\pi - \bar{\pi})^2 + (y - \bar{y})^2 + \Delta i^2$$

where π is the actual interest rate, $\bar{\pi}$ is the inflation target, y is log of actual output, \bar{y} is the log of potential output (with $y - \bar{y}$ the output gap) and Δi is the change to the Bank Rate from the previous period.

The value of the Bank's reputation

Before I discuss the issue of policy in the near term I would like to mention one important factor which has given the Committee time over which to come to a balanced judgement and is therefore a proximate influence on policy. The immediate aftermath of the referendum has passed with less financial disturbance than might have been feared. Despite unprecedented exchange rate movements, I have not seen any visible signs of questions about the ability of financial institutions to manage their affairs. There has been nothing like the banking crisis of 2007-9 of which Northern Rock was an early casualty.

In my view an important reason for this is the sea change which has taken place in the regulation and oversight of our financial system since 2009. Banks are now required to hold much more capital than was the case in the period before the crisis and arrangements are in place to ensure that they can obtain the liquidity that they need. Indeed, the Financial Policy Committee felt able, at its July meeting to reduce the counter-cyclical buffer from 0.5 per cent to 0 per cent of banks' UK exposures, increasing banks' lending capacity by up to £150bn. On top of this, a consequence of the Monetary Policy Committee's asset purchases is that the banks hold many times more reserves than they did in 2008. In itself this reassures lenders that banks can meet their obligations as they fall due.

While I do not intend to contribute to any discussion on the details of regulation I would make one simple point. Having experienced what happens to an economy in which the financial sector is lightly regulated, it was in 2008, we should not doubt that proper regulation is valuable. Obviously businesses do not like it; the purpose of it is to stop them doing things that they would like to do. And this has served us well in the last month. In turn it has meant that the Monetary Policy Committee has not felt any need to make an urgent change to monetary policy because of conditions in financial markets.

Conclusion: Policy in the Near Term

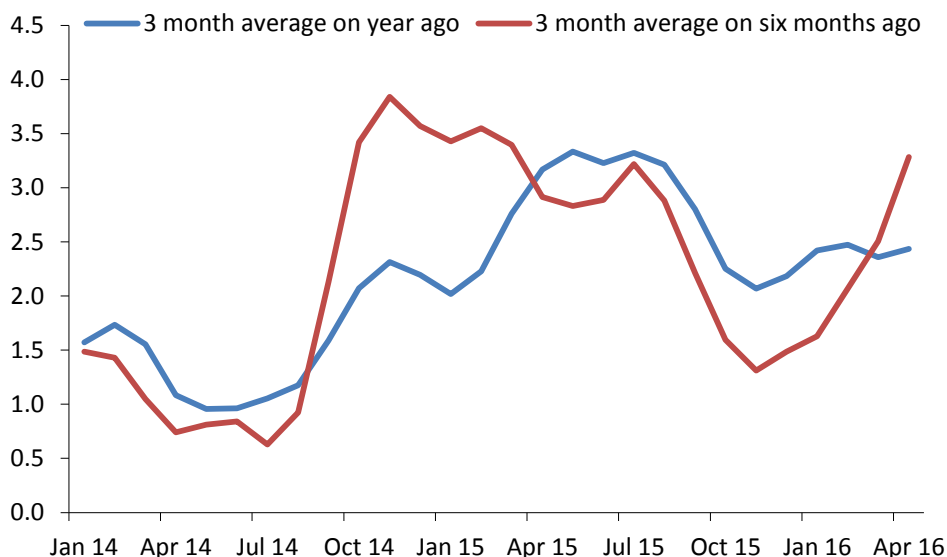
You will have seen that the Committee voted in July to keep Bank Rate and asset holdings unchanged. I said at the start of this talk that I was not going to forecast the forecast and since my final vote will depend on that forecast I cannot say now, either to you or to myself, how I will vote in two and a half weeks. My vote will, of course, depend not only on the collective judgement of the Committee but also on how far I agree with that. My own views will of course be influenced by my colleagues' opinions as they should be.

I have tried to set out the very high degree of uncertainty surrounding estimates of the long-term implications for Britain of leaving the European Union. From the perspective of monetary policy a weakening of supply conditions which runs ahead of a weakening of demand would tend to add to inflation while if demand weakens ahead of supply the reverse may be true. With the uncertainty about our long-run arrangements, it

is possible that people will reduce their spending, partly because they expect to be poorer in the future, but also because they have become more uncertain about future arrangements and thus future incomes. On the other hand, following the appointment of a new Prime Minister at least some of the immediate sense of uncertainty which followed the vote may have dissipated, and consumers may be more influenced by this than by the technicalities of future trade agreements. Similarly, the appointment of a new government may have left businesses more confident than they were in the immediate aftermath of the vote.

This uncertainty points to the argument that we should wait for firmer evidence before making any policy change at least in the absence of any strong arguments for an immediate change. The argument in the other direction is that, while I am very uncertain about the magnitude of the effect, it does seem to me quite likely that demand will weaken more than supply in the near term. So is there a case for a stitch in time? In considering the case for this I need to take into account other influences on inflation. As I showed earlier, a fall in the exchange rate could imply, other things being equal, an early reduction in Bank Rate which my successors would start to reverse early next year. One argument against adopting this sort of fine tuning is, however, given by recent developments in average earnings. As you can see in Chart 11, these have grown at an annual rate of three and a half per cent over the last few months, while underlying productivity growth probably remains weak. I do not think that that would, without the vote to leave, on its own have created a case for an increase in Bank Rate in August. Nevertheless, it certainly becomes an argument for not making the reduction shown in Chart 2 and has to be balanced against the evidence we have on weaker demand.

Chart 11: Average Weekly Earnings Growth, Private Sector Regular Pay Seasonally Adjusted. Per cent per annum



Source: ONS

Looking two to three years ahead, I will, at my final meeting of the Monetary Policy Committee, try to assess any overshoot of inflation beyond its target, whatever their cause, against possible shortfalls in GDP, relative to the way I see the supply capacity of the economy. I have set out how far I think it reasonable to trade off one against the other but I do not yet have my own estimates of the relative magnitudes that I will need to

trade off. For there to be a case for easing policy I will need to expect weakness in output to be large enough more than to compensate for any overshoot in inflation on the assumption that policy is unchanged in the near term.

I would like to mention two arguments I have heard for a rate reduction to which I give little weight. This is that markets would be disappointed were there to be no easing in August. The Old Lady of Threadneedle Street is not a nurse to markets. People who trade in markets know that the Monetary Policy Committee sets policy month by month in the way that its members think appropriate. It does sometimes, as we did in our July meeting, give an indication of where policy may go in the future. But that is no more than the best judgement at the time and not in any sense a commitment; the public understand that. A second argument to which I give little weight is the argument that early action is needed to reassure people. In contrast to the experience of 2008, I do not have any sense that either consumers or businesses are panic-struck and, as I observed, there have been no material signs of financial panic.

The Monetary Policy Committee is committed to taking whatever action is needed to support growth and return inflation to target over an appropriate horizon. The most useful contribution that we, as individual members of the Committee can make to doing this, is to assess the evidence as best we can, and vote accordingly. I have tried to do that throughout my tenure and in that sense I will vote, when I discharge for the last time the duty and privilege of membership of the Monetary Policy Committee, in the same way that I have on the previous seventy-two occasions.

References

- Abberger, K., A. Diabiasi, M. Slegenthaler and J-E Sturm (2016).** "The Effect of Policy Uncertainty on Investment Plans: Evidence from the Unexpected Acceptance of a Far-Reaching Referendum in Switzerland." CESIFO Working Paper No 5887
- Alemani, E, C, Klein, I, Koske, C, Vitale and I, Wanner. (2013).** "New Indicators of Competition Law and Policy in 2013 for OECD and non-OECD Countries". *OECD Economics Department Working Papers No 1104*.
- Baier, S L, J H, Bergstrand, P, Egger and P A, McLaughlin. (2008).** "Do Economic Integration Agreements actually Work? Issues in understanding the Causes and Consequences of the Growth of Regionalism". *The World Economy. Vol 31. Pp 461-497*.
- Bean, C R. (1998).** "The New Monetary Arrangements: a View from the Literature". *Economic Journal. Vol 108. Pp 1795-1809*.
- Bernanke, B. (2015).** "The Taylor Rule. A Benchmark for Monetary Policy."
<http://www.brookings.edu/blogs/ben-bernanke/posts/2015/04/28-taylor-rule-monetary-policy>
- Bloom, N. (2009).** "The Impact of Uncertainty Shocks". *Econometrica. Vol 77. Pp. 623-685*.
- Carney, M. (2016).** "Uncertainty, the Economy and Policy". Bank of England. 30th June.
<http://www.bankofengland.co.uk/publications/Documents/speeches/2016/speech915.pdf>
- Crafts, N. (2016).** "The Impact of EU Membership on UK Economic Performance". *The Political Quarterly. Vol 87. Pp 262-268*.
- Dhingra, S, H, Huang, G, Ottaviano, J, Pessoa, T, Sampson and J, van Reenen (2016).** "The Costs of Benefits of Leaving the EU: Trade Effects". *Centre for Economic Performance. London School of Economics*.
http://cep.lse.ac.uk/pubs/download/brexit02_technical_paper.pdf
- Feyrer, J. (2009).** "Trade and Income: exploiting Time Series in Geography". *NBER Working Papers 14910*.
- Forbes, K, I. Hjortsoje and T. Nenova. (2015).** "The Shocks Matter. Improving our Estimates of Exchange Rate Pass-through". External MPC Unit Discussion Paper No. 43.
<http://www.bankofengland.co.uk/monetarypolicy/Documents/externalmpc/extmpcpaper0043.pdf>
- Handley, K and N, Limão (2015).** "Trade and Investment under Policy Uncertainty: Theory and Firm Evidence". *American Economic Journal: Economic Policy. Vol 7. Pp 189-222*.
- HM Treasury (2016a).** "The Long-run Economic Impact of EU Membership and the Alternatives".
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/517415/treasury_analysis_economic_impact_of_eu_membership_web.pdf
- HM Treasury. (2016b).** Remit for the Monetary Policy Committee.
<http://www.bankofengland.co.uk/monetarypolicy/Documents/pdf/chancellorletter160316.pdf>
- Hofman, B and B, Bogdanova. (2012).** "Taylor Rules and Monetary Policy: a Global 'Great Deviation'?". *BIS Quarterly Review September. Pp 37-49*.
- Melitz, M. (2003).** "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity". *Journal of Econometric Society Vol. 71 Issue 6 Pp 1695-1725*.
- Monetary Policy Committee. (2016).** "Minutes of the meeting ending on 11th May 2016".
<http://www.bankofengland.co.uk/publications/minutes/Documents/mpc/pdf/2016/may.pdf>
- Nikolsko-Rzhevskyy, A, D H, Papell and R, Prodan. (2014).** "Deviations from Rules-based Policy and their Effects". *Journal of Economic Dynamics and Control. Vol 49. Pp 4-17*.

Smith, A. (1776). *The Wealth of Nations. Book I Chapter 2.*

Taylor, J B. (2012). "Monetary Policy rules Work and Discretion doesn't: a Tale of Two Eras." *Journal of Money, Credit and Banking. Vol 44. Pp 1017-1032.*

Taylor, J. (1993). Discretion versus Policy Rules in Practice. *Carnegie-Rochester Conference Series on Public Policy. Vol 39. Pp 195-214.*

Van de Ven, J (2011). "A Structural Dynamic Microsimulation Model of Household Savings and Labour Supply". *Economic Modelling, Vol. 28, Pp 2054-2070.*

Weale, M.R. (2012). From Retailer's Paradise to Shopper's Strike: what lies behind the Weakness in Consumption? *Dean's Lecture. Cass Business School. 2012.*

Weale, M.R. (2014). "What to do when we don't know. Policy-making when Spare Capacity is Uncertain". JSG Wilson Lecture. Hull. October.

<http://www.bankofengland.co.uk/publications/minutes/Documents/mpc/pdf/2016/may.pdf>

Weale, M.R. (2016). "What's Going On? Uncertain data and uncertain outcomes" . University of Liverpool. <http://www.bankofengland.co.uk/publications/Pages/speeches/2016/907.aspx>

Woodford, M. (2003). Optimal Interest Rate Smoothing. *Review of Economic Studies. Vol 70. Pp 861-886.*

Yellen, J. (2012). "Perspectives on Monetary Policy. Speech at the Boston Economic Club Dinner". 6th June.