



BANK OF ENGLAND

Speech

What to do when we don't know: policy-making when spare capacity is uncertain

Speech given by

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Could I say what a great privilege and pleasure it is to give the 2014 JSG Wilson Lecture. Professor Wilson, of course, wrote a number of key texts on money and banking. Alas it is only in the aftermath of the banking crisis that we have all learned of the importance of studying money, money markets and banks with the sort of care that Professor Wilson devoted to the issue. Ahead of the crisis many economists and policy-makers thought that they need pay no attention to what financial institutions were up to because things were going well; indeed some perhaps thought that the “Great Moderation” was a consequence of their policy prescriptions being followed. Hindsight may judge it to have been no more than an extended run of good luck.¹

Today I would like to talk about a more general issue which the crisis and its aftermath have certainly underlined – the perils of thinking that we know too much. One of the things which continues to surprise me is the way in which some economic commentators, from time to time, talk as though they know things which are inherently unknowable – such as what is going to happen to inflation in two years’ time, or how much the economy is going to grow next year. I can never make out whether they think their intended audience is incapable of realising that such matters are unknowable or whether they actually believe what they say. Neither interpretation is, however, reassuring.

Of course the Monetary Policy Committee does its best to explain the uncertainties that we face. Today I would like not simply to explain that things are uncertain but to make some suggestions about how policy-making can adapt to the key uncertainties that we face. If we cannot be sure what is going on, we can at least do our level best to think about ways of alleviating the risks associated with getting things wrong.

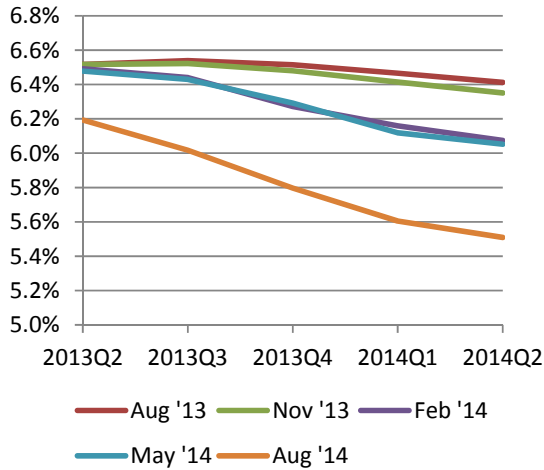
I would like to focus on two key sources of uncertainty. The first, not surprisingly, is uncertainty about the degree of spare capacity in the economy. As the Committee has explained, there is a wide range of views on the matter. Additionally, members of the Committee might admit that they are uncertain about the degree of spare capacity (see e.g. Miles (2014)). Figure 1 displays the way in which the MPC has changed its view of the full-capacity level of one component used in the calculation of labour market slack: the level of unemployment that is consistent with steady wage growth given the effects of persistent spells in unemployment on the ability of workers to find jobs. A variable which changes in this way could hardly be regarded as certain.

The second area of uncertainty concerns the normal or equilibrium rate of interest; the rate at which supply and demand are in balance, with inflation close to target. Figure 2 provides an indication of the uncertainty that financial markets have about future interest rates. This fluctuation again suggests that the normal interest rate must be uncertain or at least should be regarded as such.

¹ Whether the apparent stability in this period was due to good luck, or good policy, is the subject of debate – see, for example, Benati and Surico (2009).

To explore these issues further I would like to consider the problem of policy-setting using first a very simple framework and secondly the Bank of England's model of the economy. I will then discuss a range of important practical considerations which are not present in this more formal analysis.

Figure 1: Revisions to the medium-term equilibrium unemployment rate since August 2013



Source: Bank of England

Figure 2: Five year on Five-year Forward Interest Rates (% p.a.)



Source: Bloomberg and Bank calculations

A Simple Analysis of Inflation and the Interest Rate

Let me begin by providing a purely illustrative account of policy-making, but one which serves to demonstrate the importance of knowing the normal rate of interest r_0 . Suppose that, in the short term, the gap between the rate of inflation, π_t , and its target, π_0 , depends on its past value relative to target, $\pi_{t-1} - \pi_0$, on the previous interest rate, r_{t-1} , measured relative to its normal² value, r_0 , and on a random term, u_t :

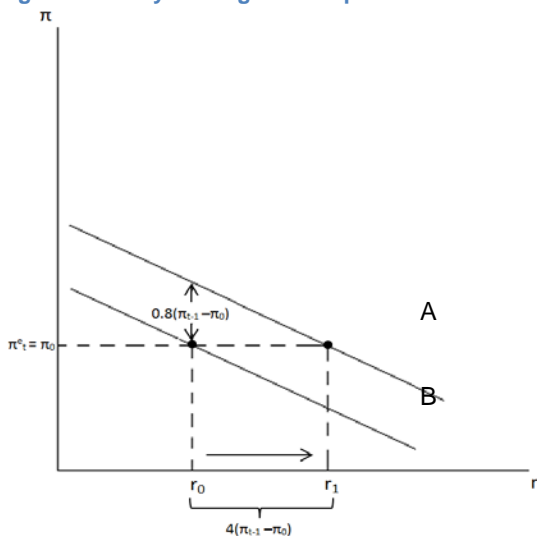
$$\pi_t - \pi_0 = 0.8(\pi_{t-1} - \pi_0) - 0.2(r_{t-1} - r_0) + u_t$$

I leave the long run relationship between inflation and the interest rate as something to worry about when it comes.³

² This normal value is equal to the sum of the steady state value of Wicksell's natural real rate of interest and the inflation target.

³ Which inevitably must mean that high inflation is associated with a high interest rate.

Figure 3: Policy-Making in a Simple Framework



The Monetary Policy Committee can set the interest rate to keep inflation close to target. But it does not know the random term, u_t , when it does this. So the most that it can do is set the interest rate to offset the effect of any deviation of the past inflation rate from target. If it sets:

$$r_t = r_0 + 4(\pi_t - \pi_0)$$

then it is using the interest rate to offset fully the effects of past inflation, and the only source of disturbance to the actual inflation rate is the random shock. It is, in effect, setting the interest rate to keep the expected inflation rate π_t^e on target.

Figure 3 illustrates how this works. Line A shows the trade-off between the interest rate and the expected inflation rate when the previous period's inflation rate was on target. Line B shows how this changes if the inflation rate was off target in the previous period, and also how adjusting the interest rate can be expected to bring inflation back to target. The price of reasonably stable inflation is, however, a volatile interest rate.

More generally, we might consider a policy rule of the form:

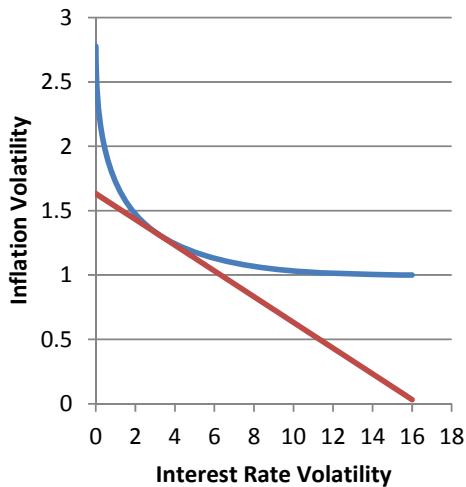
$$r_t = r_0 + \theta(\pi_t - \pi_0)$$

If $\theta=0$, then policy is inactive; nothing is being done to keep inflation close to its target. If, however, $\theta=4$, then inflation is being kept as close as possible to target, but at the cost of a very volatile interest rate. Thus, through choice of θ , the policy-maker is able to trade off volatility in inflation, measured by the expected value of squared deviations in inflation from target, $E(\pi_t - \pi_0)^2$ against volatility in the interest rate, measured by the expected value of squared deviations from the normal interest rate, $E(r_t - r_0)^2$. Figure 4 shows, as the blue line, the range of combinations available to a policy-making body. This body might also have some view about the relative importance of inflation stability as compared to interest rate stability. Suppose, for example, that the policy-maker was concerned about both, but was only 1/10 as concerned about interest rate volatility as they were about inflation volatility. Then they would want to choose a combination of the two which gave the lowest possible value of:

$$L = E(\pi_t - \pi_0)^2 + E(r_t - r_0)^2/10$$

The resulting line indicating the policy-maker's preferences is shown in red and this is just tangent to the set of possible combinations of interest rate and inflation volatility. As in so many cases in economics, this point of tangency delivers the best possible outcome. The solution is delivered by setting $\theta=1.6$, well short of the value of 4 which keeps inflation volatility to a minimum.

Figure 4: Policy Choices in a Simple Framework



Policy-makers may value interest rate stability for its own sake, but they are also likely to be attentive to its implications for output. I am sure it was considerations of this kind which led to the remit to the MPC (HM Treasury, 2014) stating

“The framework is based on the recognition that the actual inflation rate will on occasion depart from its target as a result of shocks and disturbances. Such factors will typically move inflation away from target temporarily. Attempts to keep inflation at the inflation target in these circumstances may cause undesirable volatility in output due to the short-term trade-offs involved,

and the Committee may therefore wish to allow inflation to deviate from the target temporarily.”

This model is no more than a very simple introduction to the issue of policy-setting and some of the choices policy-makers can face. As I have noted, even in this very simple story I have to know what is the normal rate of interest; if I am wrong about that, then inflation will be away from target more than the analysis here suggests. It is not easy to represent sensibly how policy might evolve in such a situation. If the true normal interest rate in Figure 3 were r_0 while policy-makers persisted in believing it were r_1 then inflation would be permanently off-target. In reality, of course, even policy-makers learn from their past mistakes and it would be likely they would follow some sort of learning process of the type illustrated by Bray and Savin (1986). This would not be enough to prevent possible errors about the normal rate of interest from being an important influence on the outcome, and it would still raise the question whether the risk of this sort of error affects the nature of the appropriate policy framework.

Policy-making when output and inflation matter

You might also think, quite correctly, that more complicated dynamics would entail more complicated policy choices, as would indeed be the case if policy-makers were also concerned directly about deviations of output from some steady state value.

Taylor (1993) suggested that a policy rule of the form:⁴

$$r_t = \pi_t + 0.5(y_t - y_t^*) + 0.5(\pi_t - \pi_0) + (r_0 - \pi_0)$$

where y_t measures the log of output and y_t^* the log of trend output, so that $y_t - y_t^*$ is a measure of spare capacity in the economy, broadly described the behaviour of the US Federal Open Markets Committee. Since then, other authors have used a rule of this kind to describe policy in many central banks around the world.

This rule suffers from a practical problem, however. To apply rules of this type it is necessary to know the trend path of output, in order to calculate spare capacity, and also the normal rate of interest, r_0 . Orphanides and van Norden (2002) showed that, in the United States, errors in estimates of spare capacity tended to be as large as the estimates of spare capacity themselves. These errors arose not so much because statistics were revised as because views on the trend path of output changed with the benefit of hindsight. Even if spare capacity is measured by the deviation of unemployment from an equilibrium rate, it is necessary to know what that equilibrium rate is. Figure 1 showed how the Committee's estimates of this have changed recently.

The August *Inflation Report* (Monetary Policy Committee, 2014) noted:

“Not surprisingly, there is a wide range of views on the Committee about the likely extent of spare capacity in the economy. In the Committee's best collective judgement, however, the degree of slack has narrowed somewhat, and the central estimate is now broadly in the region of 1% of GDP”.

Underlying this statement are two points. To the extent that we can, individually, form judgements about the range of possible spare capacity, those ranges are probably fairly wide. Separately, however, the central points of these ranges are probably different for different members. It is certainly not true, as some journalists have stated, that the Committee believes there is spare capacity in the economy equal to, say, 1% of GDP. Uncertainty is not confined to the degree of spare capacity, particularly in the labour market. There is also uncertainty about what components of spare capacity have a material influence on inflation (Weale, 2014a and b) and thus which components the Committee should take into account.

Even small differences in the estimate of spare capacity can be important in this framework. If the coefficient on capacity utilisation were only 0.5, someone who believed the degree of slack was ½%, say, would choose an interest rate 0.25pp higher than if they believed that slack was equal to 1%. On top of this, any divergence of view about the normal interest rate would be transmitted one for one into a divergence of view about the actual interest rate. In a central bank like the Bank of England, where policy is set by voting and where we have historically discussed quarter-point increments to the Bank Rate, it is easy to see that a

⁴ With an inflation target of 2 per cent per annum and a natural money rate of interest of 4 per cent per annum.

relatively narrow range of views about the degree of spare capacity could translate into material differences about the appropriate interest rate. Of course, in practice a whole range of other considerations come into play, so differences are not as stark as a simple rule suggests.

Estimates of the natural rate of interest may be thought to be less error-prone than estimates of spare capacity, because financial markets provide fairly precise estimates of expected future rates into the almost indefinite future. Even here, however, there is bound to be some uncertainty. Just because market traders have a view it does not mean that they are right; views of the distant future are, at least from time to time, surprisingly sensitive to short-term developments. While the Committee has tried to provide guidance about the future path of interest rates, this is not intended to indicate that it knows. The Minutes of our September meeting also make clear that

“The Committee’s guidance on the likely pace and extent of interest rate rises was an expectation, not a promise”

The issue of setting policy when we don’t know either the output gap or the normal rate of interest is, to say the least, a pertinent one.

A policy framework robust to uncertainty about capacity and the natural interest rate

Consider a structure slightly different from that of the Taylor rule:

$$r_t = \theta_1([y_t - y_{t-1}] - [y_t^* - y_{t-1}^*]) + \theta_{21}(\pi_t - \pi_0) - \theta_{22}(\pi_{t-1} - \pi_0) + r_{t-1}$$

This specification always considers the interest rate relative to where it was in the previous period, rather than relative to the normal rate of interest. It says, in effect, that the interest rate should be changed in proportion to changes in capacity utilisation and also with reference to the current and lagged inflation rate. If I represent changes by the letter D, then I can write the same rule as:

$$Dr_t = \theta_1(Dy_t - Dy_t^*) + (\theta_{21} - \theta_{22})(\pi_t - \pi_0) + \theta_{22}D\pi_t$$

This rule is, in the language of Philips (1954) proportional in spare capacity, because the change in the interest rate is proportional to the change in spare capacity. It is both proportional and integral with respect to inflation; the interest rate is changed in proportion to the change in the inflation rate. But the interest rate is also adjusted whenever inflation is off-target; the level of the interest rate cumulates up, or integrates, deviations of inflation from its target. In turn this ensures that the interest rate will be stable only when inflation is on target and thus, if the rule steers the economy to a unique steady state, it will be one in which

inflation is on target.⁵ The rule still involves measurement of the rate of growth of spare capacity and, as I have noted, this is uncertain and thus remains a possible source of policy error.

Orphanides and Williams (2002) and in a succession of subsequent papers study this issue further. They suggest a policy rule like that above, but with $\theta_{22}=0$:⁶

$$Dr_t = \theta_1(Dy_t - Dy_t^*) + \theta_2(\pi_t - \pi_0)$$

They suggest that such a rule performs little worse than the Taylor rule when spare capacity and the normal rate of interest are known, but substantially better when they are not known. Their studies suggest that this is a fairly general finding, and not just one specific to simple two-equation models. In particular the rule seems to be helpful even when there is forward-looking behaviour, i.e. when people's decisions are influenced by expectations of the future. So now I would like to see whether that is the case if I use the Bank's model of the UK economy.

An exploration using COMPASS – the Bank's model as a guide to policy-making

Like all economic models, the Bank's model, COMPASS, is a simplification rather than a complete representation of everything that matters in the economy.⁷ It leaves out many issues which we know are important in practice for the very good reason that we have no satisfactory way of modelling them, and it offers nothing more than a guide to the MPC. Nevertheless it represents a coherent organising framework that allows the MPC to prepare and analyse its quarterly forecast.

A key feature of COMPASS, in common with most macro-economic models in use nowadays, is that it assumes people respond to expectations about the future as well as to past experiences. Of course people can expect anything they like; the model makes the simplifying assumption that people have "rational" expectations, in other words that their expectations are consistent with the forecasts generated by the model.

I would like to use COMPASS to explore the role of uncertainty and policy rules, in a model of the economy more realistic than those I studied above. In this model I introduce uncertainty about the amount of spare capacity by assuming that firms, households, and indeed the policymakers themselves, have difficulty distinguishing between temporary and longer-lasting shocks that hit the economy. In practice, they can all observe that a shock has happened; but are initially unsure about its persistence, learning about this only gradually. This generates persistent misperceptions of the future evolution of spare capacity.

⁵ Professor Ron Smith has pointed out that changing the interest rate with reference to the rate of inflation is equivalent to setting the interest rate with reference to the price level. That does not mean that such a policy rule is equivalent to price-level targeting.

⁶ Orphanides and Williams use the change in the unemployment rate, which is related to the change in spare capacity; I use the latter, to be consistent with my earlier discussion, and the discussion below.

⁷ The Bank introduced a new forecasting platform, including a new model called COMPASS in 2011. COMPASS stands for 'Central Organising Model for Projection Analysis and Scenario Simulation'; see Burgess *et al* (2013).

I consider the two rules I outlined above: the Taylor rule, and the Orphanides and Williams rule. With each, I look for the parameters that deliver the smallest expected loss, given the shocks that are likely to hit the economy. I put equal weight on expected squared deviations of inflation from target, and spare capacity from its steady state (zero), together with one-tenth of this weight on expected squared changes in the interest rate. This allows me to compare the loss in each case.

Table 1: Optimised coefficients with alternative policy rules

Rule	Parameter values				Loss
	Inflation	Spare capacity		Lagged	
	Current	Current	Change	Policy rate	
Taylor rule: $r(t)$	2.22	0.38	n.a.	1.00	0.498
Orphanides and Williams, without lagged inflation: $Dr(t)$	1.96	n.a.	0.89	n.a.	0.414

Note: The term for inflation measures the deviation of quarterly inflation from the MPC's target;⁸ and the measure of spare capacity most suited to the model captures the difference between the actual level of value added, and the level that would prevail if all prices and wages were free to adjust completely.

Table 1 shows the results of this exercise with the loss calculated on the assumption that the shocks hitting the economy are similar to those which have affected it historically and also that neither the people whose behaviour is being modelled nor the policy-maker can distinguish between temporary and persistent disturbances except gradually through the sort of learning process I mentioned briefly earlier.

In exploring these rules my colleagues kindly examined whether the Orphanides and Williams rule could be improved by the inclusion of an additional term in the change in inflation. Rather to my surprise, and in contrast to what Phillips (1954) suggests, no material improvement was possible.

Interestingly the Taylor rule finds that the optimised coefficient on the lagged interest rate is 1. This means that the choice of interest rate in the current quarter is a combination of what it was in the previous quarter, plus the influence of current inflation and spare capacity. This feature is often found in models in which forward-looking behaviour is important, in particular expectations of future interest rates. If it is understood that the interest rate is set with reference to its previous value, the impact of expectations about Bank Rate in the future can be exploited to influence the economy today (Woodford, 2003). In COMPASS, therefore, the distinction between the two rules becomes a question of whether Bank Rate should be changed with reference to the change in the margin of spare capacity or with reference to its absolute level; in both cases the interest rate is being changed with reference to the level of inflation and the level of the normal rate of interest is not an issue.

⁸ Since the inflation target is specified in terms of an annual CPI inflation rate of 2%, the equivalent rate expressed in terms of quarterly growth is 0.496% per quarter.

While the results are illustrative and not a policy prescription, the rule suggested by Orphanides and Williams performs better than the simple Taylor rule. This suggests that it offers a greater degree of robustness, in this particular model setup. It is also worth noting that in both cases the coefficient on inflation is large. Brainard (1967) suggests that uncertainty about the impact of a change in Bank Rate is a reason for being less responsive than this analysis suggests.

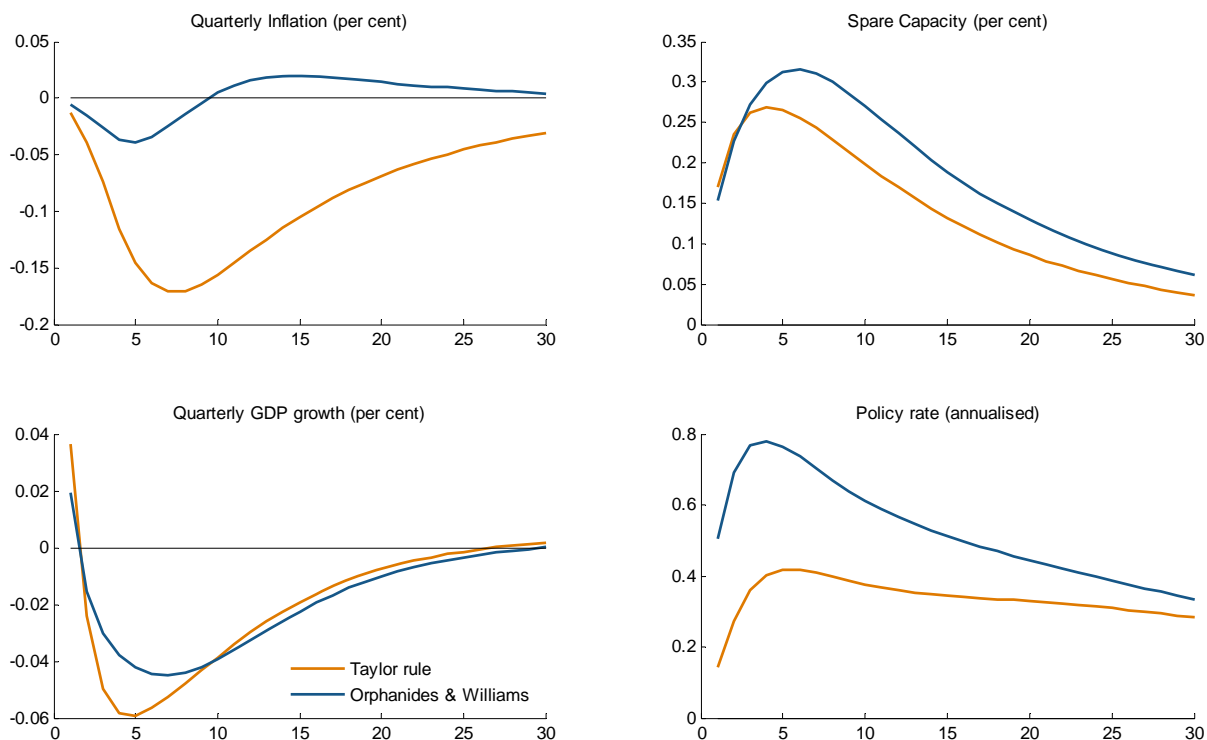
I can now illustrate the performance of the rules in two specific cases. In the first case there is a very persistent, but not permanent, fall in the risk premium. This acts as a wedge between Bank Rate and the rates of interest typically faced by businesses and households. Thus, because the economy is influenced by the rates of interest that people actually face, rather than by Bank Rate, a reduction in the risk premium requires a higher value for Bank Rate. The second example is provided by a permanent increase in the supply capacity of the economy. I can compare the outcomes in the economy depending on whether the policymaker follows the rule suggested by Taylor, or by Orphanides and Williams.

The results can be shown graphically, by tracing the response of important variables – such as inflation, capacity utilisation and GDP growth – following each shock, as determined by the model. We can compare the paths of these variables, and see the differences between policies suggested by each rule. Although I allow for uncertainty around the persistence of the shocks that hit the economy, I must still assume that everyone in the economy understands its structure, including the rule that is used by the policymaker. The shock that I simulate is persistent in reality, but I assume that people believe a temporary shock is much more likely than a persistent one. This way, as their expectations are not met, they learn with each passing period that the shock is more persistent than they had previously believed.

This is again illustrative; in practice the economy is constantly being hit by many different shocks at once. I cannot use the model to tell me which shock is hitting at any one point in time. But it provides another perspective on the comparisons of expected loss I discussed above.

Figure 5 shows the effects of the risk premium shock and the economy's response to it. This narrows the gap between the policy interest rate and the cost of borrowing faced by households and firms by 50bps, which stimulates demand, which in turn is likely to push inflation above its target rate. In response, both the Taylor, and Orphanides and Williams rules imply that the policy interest rate should rise, although the latter suggests a much sharper tightening. In both cases, this succeeds in curbing the inflationary pressure, although under the Orphanides and Williams rule, inflation remains much closer to target. This offsets the penalty from having a slightly wider output gap than under the Taylor rule.

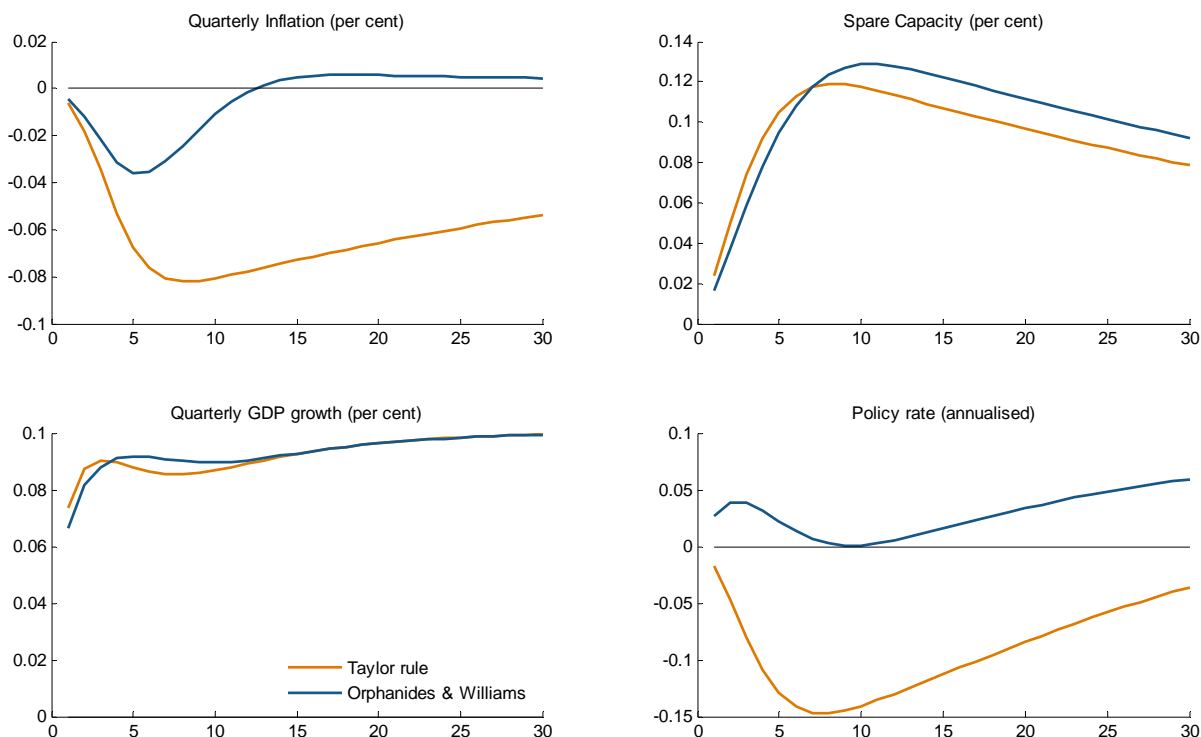
Figure 5: The Response to a fall in the Risk Premium



Secondly, I examine a positive shock to supply in Figure 6. There is a jump in the growth of labour productivity, and although this growth effect eventually dissipates, it leaves the level of labour productivity permanently higher. There is uncertainty over the persistence of the boost to growth, with people at first believing it to be temporary, and learning only gradually that it is more persistent. Once again, the Orphanides and Williams rule leads to a more stable path of inflation, albeit at a cost of a slightly wider output gap. The response of the interest rate differs between models – the Taylor rule suggests policy should loosen, while the Orphanides and Williams rule points to a slight tightening, but in both cases the size of changes is small.

In looking at these simulations one important thing has to be borne in mind. If the economy is not influenced by expectations, then it makes sense to talk, for example, of interest rates responding to inflation. In a forward looking model, however, inflation is also responding to future interest rates and expected future inflation; for practical purposes they are therefore jointly determined.

Figure 6: The Response to an Increase in Supply



In both these examples the Orphanides and Williams rule delivers better control of inflation with a similar path for GDP and spare capacity. One should not assume that such clear out-performance of the Taylor rule is typical, although the loss shown in Table 1 is materially lower for this rule. Nevertheless these examples do illustrate how there can be benefits to setting policy with reference to the change in, rather than the level of, the margin of spare capacity.

Policy and an interest rate floor

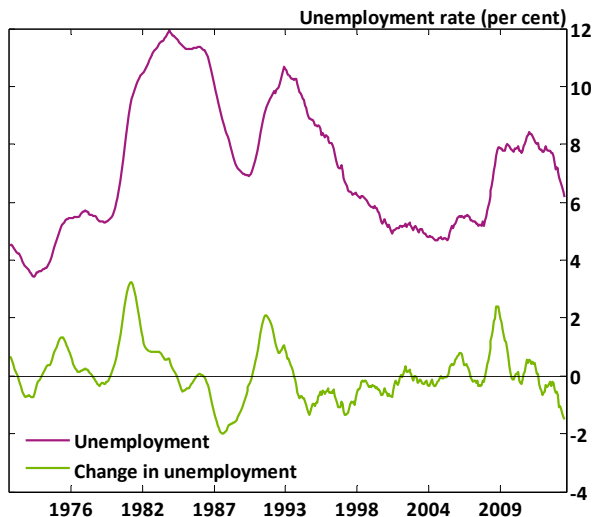
The previous analysis has been carried out on the assumption that the interest rate is fully flexible. Of course, over the last five years Bank Rate has been at what for all practical purposes, is a floor of ½ per cent per annum and you might ask whether or how far this makes a difference.

Suppose that there were a large margin of spare capacity. This might be the outcome of a situation in which policy-makers had reduced the interest rate to its floor, and had been unable to reduce it further. A policy rule which related the change in Bank Rate to the change in the margin of spare capacity would suggest that a start should be made with policy tightening immediately the margin of spare capacity started to decline.

Such an approach is, to say the least, not very appealing. If policy-makers would have liked to reduce the interest rate further as the margin of spare capacity widened, but were unable to do so because of the interest rate floor, it would not be sensible to start raising Bank Rate immediately the margin of spare capacity started to diminish. Rather policy-makers would judge, as best they could, when the situation had improved to such an extent that they no longer wanted the interest rate to be below its practical floor, before thinking of setting policy with reference to the change in the margin of spare capacity.

At this point it is important to make a careful distinction between different types of policy rule. Brendon, Paustian and Yates (2013) analyse the hazards of setting out a policy in terms of the rate of change of spare capacity in a situation where the zero lower bound is material. They find that, in some circumstances, a policy of setting the level of the interest rate with reference to the change in the margin of spare capacity can lead to self-sustaining stagnation. Essentially people anticipate the effects of a tightening of policy as the economy recovers from its stagnation and anticipation of this tightening strangles the recovery. They address, however, a situation different from that I have considered above. As I mentioned, they relate the *level* of the interest rate to an indicator of the *change* in the margin of spare capacity; this is very different from the approach I have described here of relating the change in the interest rate to the change in the

Figure 7: The Unemployment Rate and its Change over 12 Months

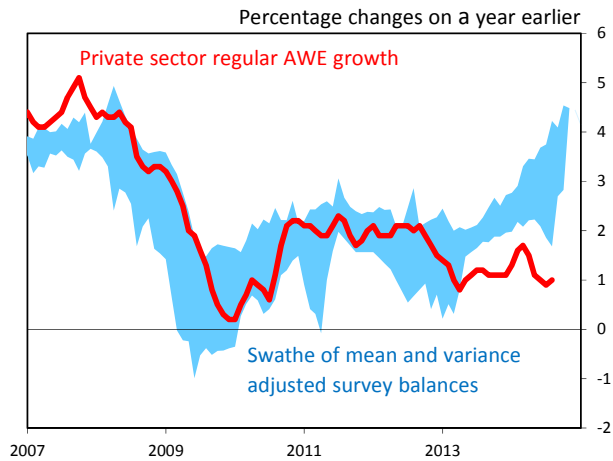


Source: ONS and Bank calculations.

margin of spare capacity. Thus it is not clear how far that is relevant to the situation that I have discussed here; one of the points which emerges from their work is, however, that the situation is much more likely to arise when the response to the change in the margin of capacity is strong rather than when it is weak.

My simulations with the COMPASS model, like the earlier analysis, are illustrative. But I hope that the discussion has explained why I think it may be sensible for policy-makers to give some attention to the rate at which spare capacity is being used up, and not to focus solely on estimates of the amount of spare capacity.

Figure 8: Average Weekly Earnings and Survey Indicators of Pay Pressures



Source: ONS and Bank calculations

Policy influences in practice

My own sense is that the margin of spare capacity is now small and it is currently being used up rapidly. In addition the uncertainties surrounding the likely margin are now large, relative to the best estimate of the level. Against this backdrop, I would like to turn to some factors that have affected my policy decision in practice.

Spare Capacity and Earnings Growth

In *Monetary Policy Trade-offs and Forward Guidance* (2013) the Monetary Policy Committee set out reasons why it thought it was sensible to use unemployment as an indicator of spare capacity, at least in the labour market.⁹ Since

then there have been questions raised about the role of under-employment (Weale, 2014a) and also about the movement in labour force participation as discussed in the August *Inflation Report* (Monetary Policy Committee, 2014). Here I will focus on unemployment.

As Figure 7 shows, the rate at which unemployment has fallen over the last year is unusually rapid. It is true that it was falling faster in the late 1980s, but this was from a higher starting point. In any case most people, looking back, would think that in that period monetary policy should have been tighter than was actually the case. While we cannot be certain about the margin of excess capacity in the labour market, it is clear that it is being used up rapidly.

The main argument adopted to suggest that there is more spare capacity than might have been thought say six months ago is that wage growth, measured by Average Weekly Earnings has been very weak (Weale, 2014b, Broadbent, 2014). Figure 8 shows the divergence which has developed between Average Weekly Earnings and a range of other indicators of pay growth over the last year or so. Most of the businesses I talk to discuss settlements in the range of two to three per cent, and the Bank's Agents report that businesses say that the labour market is tightening and recruiting is becoming harder. That is not to say that AWE is wrong. One factor behind the weak growth in earnings may be that, after a fairly long period in which newly-employed people had spent a disproportionate length of time in education, recently those going back to work, have spent fewer years in education and in consequence are paid less than the average. With a

⁹ An important part of the argument for using this was that it was robust to uncertainty about future productivity.

very rapid growth in employment such as we have seen over the last fifteen months or so, this depresses the rate of average pay growth.¹⁰

That is not to say that I think underlying pay is already growing faster than is compatible with the inflation target. Rather it is that, the tightening of the labour market means that, instead of waiting to see wage growth pick up, I think it is appropriate to anticipate that wage growth. The margin of spare capacity is shrinking rapidly and all logic suggests that that ought to lead to an increase in inflationary pressures over the two to three year horizon which concerns the Committee. An increase in Bank Rate of ¼ point would be unlikely to slow that process to a halt immediately but there is a risk that, if the increase were delayed, inflation would be pushed above target or a rather sharper increase in Bank Rate would be needed subsequently.

The Current Rate of Inflation

The policy rules that I have presented also have some role for the current rate of inflation. As you know, that is currently at 1.2%, well below target; these rules imply that a low rate of inflation might offset the impact of a rapidly diminishing margin of spare capacity as an influence on appropriate policy.

My sense is that the current inflation rate has been significantly depressed by the recent rise of the exchange rate and falling commodity prices. During the period after the exchange rate fell in 2008 the Monetary Policy Committee said, rightly in my view, that it was looking through the direct effects of the exchange rate and the prices of imported commodities on the domestic price level; it did not respond to the fact that higher import prices had a direct influence on the inflation rate. Both at the time and with hindsight I have thought that that was the right policy.

A rise in the rate of VAT, say, in January, raises prices in January. This affects the rate of growth of the Consumer Price Index over a twelve-month window until the following December. Nevertheless by February the Monetary Policy Committee cannot influence, in any way, the movement of prices in January and it makes obvious sense to look through this rather than to impose a squeeze on the economy in subsequent months. The longer that exogenous price movements, such as commodity price changes or those arising from exchange rate changes, take to pass through the supply chain, the more practical it is for monetary policy to try to influence them. Even so, unless they start to affect purely domestic costs it can still be argued that their effects will eventually die away; on those grounds the Committee looked through the first-round effects of the exchange rate fall in 2007/8 and the effects of the subsequent rises in oil and other raw material prices.

How far should this argument apply on the downside, as the exchange rate rises or commodity prices fall? There is a risk that, if inflation falls to very low levels, it might then be difficult to respond by means of cutting

¹⁰ The number of employees has grown by 1.7 per cent over the last year

interest rates, because there is an effective floor of ½ per cent to the Bank Rate. As price falls feed through the supply chain after a downward shock to commodity prices the real interest rate is increased. If the Bank Rate is already at its floor it cannot be reduced to offset any impact of this on demand. Thus, to ensure that the impact on expected inflation is the same in both cases, it might be necessary to look through price changes less than fully on the downside; the extent to which there is any asymmetry of behaviour must depend on a judgement of the risks involved. The key is to ensure, as best we can, that there is no asymmetry in terms of the expected impact of such shocks on inflation. Of course if one takes the view that, when Bank Rate is at its floor, there are other tools by which the inflation rate can be supported, then the Committee should look through first round effects on the upside and downside equally.

The August *Inflation Report* (p. 32) suggested that, although the impact of the exchange rate change is not yet as large, it was expected to build up to about ½ per cent or so at the end of next year. On top of this, as I have noted there are other influences on the current inflation rate from cheaper petrol and falls in prices of other raw materials. While we will explore in the November forecast round the impact of these on prospective inflation, my current sense is that they account for an important part of the gap between current inflation and its target.

The Relationship to Setting Policy with Reference to Forecast Inflation

Finally I should add that none of the issues I have raised here are meant to suggest that the Monetary Policy Committee should depart from its framework of setting Bank Rate with reference to inflation as forecast in two to three years' time. Rather, I have been exploring the very practical problem that the Committee faces, setting policy while being uncertain about the margin of spare capacity and thus about the implications of future economic growth for future spare capacity and future inflationary pressure. For reasons of simplicity I have looked at policy rules specified in terms of actual inflation and the change in spare capacity, but it is also possible to specify them in terms of forecast inflation. Indeed, in a forward-looking framework that may well work better than does current inflation. As the discussion above implies, depending on how this is done, it might also go some way to addressing the issue of distortions to the current rate of inflation arising from price level effects.

Conclusions

Professor Wilson (1986, p.394) argued that a central bank “should cushion the economy against the effects of fluctuations in the national income”. I think that the MPC's current mandate requires us to do that within the overall envelope of the inflation target and I hope that Professor Wilson would regard the framework I have set out here as consistent with that.

No one would want to follow the signal from a policy rule of the sort that I have presented here to the exclusion of all other considerations and I am not proposing that.¹¹ In voting at our monthly meetings I will continue to consider a wide range of issues including, of course, what is happening on the continent and more broadly to the international economy as well as what is going on at home. Policy-setting needs to react to these and meeting frequently means that we can react in a timely fashion. The point I do want to make, however, is that, when forming my view on the appropriate setting of Bank Rate, I am looking at, among other indicators, the speed with which the margin of spare capacity is declining as a guide to prospects for wage pressures in the second half of next year. The best indicator of this is probably the rate at which unemployment is falling. Underlying the analysis is the implication that the rate of change of spare capacity can be informative about expected future inflation and therefore that policy-setting should pay *some* attention to this.

¹¹ Miles (2014) draws attention to the risk that, if the rule is precisely defined, people may assume that it will be followed come what may

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