Reflections on operating inflation targeting

In this speech,[1] Paul Tucker, Executive Director for Markets and a member of the Monetary Policy Committee (MPC) — sets out some reflections on the operation of an inflation-targeting regime after four years on the MPC. Addressing the key objectives of modern central banking and how they may be met, the central role of anchoring medium to long-term inflation expectations is emphasised. On the second element in the conduct of policy — stabilisation of the path of demand and output, to help meet the inflation target and as worthwhile in its own right — he argues that 'rough tuning' is a more feasible objective than attempts at fine tuning, in the face of limited knowledge about structural change in the economy and inevitably imperfect data. Turning to four issues of strategy for modern policymakers, he offers some comments on whether central banks should publish an expected policy path; on whether there is a time-consistency problem in their operation of stabilisation policy; on whether price-level targeting could make stabilisation policy more effective; and on how central banks should respond to asset prices. A thread running through the speech is that the successful operation of policy requires straightforward communication by central banks about policy objectives and the conduct of policy, without glossing over uncertainties and risks.

Next month will be the fourth anniversary of my appointment to the Monetary Policy Committee. It is time to draw together some of my thoughts on operating an inflation-targeting regime. Very much from the perspective of a practitioner, but engaging with some of the academic literature on our mission and, in particular, policy strategy.[2] At the outset, I should make it absolutely clear that these are my own personal views, and do not necessarily represent those of individual colleagues on the MPC or those of the Committee as a whole.[3]

Scene setting

The United Kingdom was not quite the first country to adopt inflation targeting — Canada and New Zealand got there before us. But it has certainly taken off since our conversion, in 1992. It is now the explicit framework of over 20 countries, including more than 15 in the emerging market world. And the IMF recently reported[4] that another 20 have sought technical assistance on introducing it.

The spread of inflation targeting has coincided with a period — pretty well everywhere in the developed world, except Japan — of low, stable inflation, and well-anchored inflation expectations. The Great Moderation cannot plausibly be attributed to inflation targeting narrowly defined, because the biggest monetary systems — the United States and the euro area — are *not* explicit inflation targeters. But some commentators do attribute the Great Stability — as it gets called in the United Kingdom, since we have enjoyed stable growth as well as low inflation — to shared ideas about the conduct of monetary policy, ideas that are embodied in inflation targeting.

Is all this too good to be true? Are there no challenges facing us? Or have central bankers finally cracked how to do monetary policy after around a century of managing fiat money?

A simple story of what central bankers do

As background, I am going to work within the framework of what has become the most commonplace stylised

(1) Delivered at the Chicago Graduate School of Business on 25 May 2006. The speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2006/speech274.pdf.
(2) Some of the points made here were prefigured in my written submission to the House of Commons' Treasury Select Committee ahead of a confirmation hearing on my reappointment to the MPC. See 'Treasury Committee Questionnaire ahead of appointment hearing for Mr Paul Tucker', The Monetary Policy Committee of the Bank of England: appointment hearing, First Report of Session 2005–06, Volume II.
(3) My thanks for comments to Peter Andrews, Alex Brazier, Roger Clews, Spencer Dale, Paul Fisher, David Walton and Anthony Yates. For comments and background work to Damien Lynch, Richard Harrison, Tim Taylor and Fabrizio Zampolli. And for secretarial support to Katherine Bradbrook and Michelle Wright.
(4) 'Inflation targeting and the IMF', International Monetary Fund, March 2006.

account — ie in simple models — of what central banks do.

Society and/or central bankers are assumed to care about deviations of inflation from a target, and of the level of output from potential, typically represented by a quadratic loss function. That is equivalent to wanting to ensure that inflation will not on average be biased away from the target, and to avoid a volatile inflation rate; and similarly for the 'output gap'.

Given that objective, the determinants of aggregate demand, and a short-run trade-off between output and inflation, the monetary policy maker is assumed to proceed by setting interest rates in the light of the outlook for demand relative to supply and for inflation.

The central bank decides a *nominal* interest rate, which it establishes in the money markets.(1) As the prices of many goods and services are sticky, this has the effect of enabling the central bank to move around the actual short-term *real* rate of interest relative to the 'natural' or 'neutral' real rate(2) that would prevail in the absence of those frictions.

Broadly, another consequence of prices and wages being sticky, together with some inertia in inflation, is that when shocks hit the economy, the central bank cannot get inflation to return to target instantly. So the central bank needs to take account of the infamous long and variable lags in the transmission of monetary policy decisions to the things it cares about.(3) In other words, in today's vernacular the central banker has to be forward looking, in particular about the outlook for inflation. That, essentially, is why some economists refer to central banks as undertaking inflation-*forecast* targeting.(4)

Under this regime, the central bank needs to form judgements on some big things. On the current and prospective pressure of demand on the supply (or productive) capacity of the economy; on the implications for the outlook of any cost shocks (eg oil price rises); and on whether medium to long-term expectations of inflation are well anchored to its (explicit or implicit) target.

Having done that and so formed a view on the outlook for inflation, the central bank may have to decide how quickly to bring inflation back to target, in the light of how much weight it gives to containing volatility in output.(5) It then needs to decide whether it should set policy so as to restrain or stimulate aggregate demand, or to be neutral. And it therefore needs to judge whether the current level of interest rates is, in fact, likely to deliver its desired degree of stimulus or restraint.

Underlying those 'big picture' judgements are, at least implicitly, views on some fundamental economic variables. Notably, on the supply capacity of the economy and its prospective rate of growth; on the rate of unemployment below which inflation is liable to increase; on the natural (or neutral) real interest rate. Those judgements are, in truth, formidably difficult to make, because they need to be regularly updated given structural change in the economy; and because each of the variables is unobservable!

Perhaps understandably, that leads some policymakers(6) to the conclusion that these concepts may be useful as just that — concepts — but not at all in practical decision taking. While not wanting to deny their unobservability, I do not take quite that view. For example, the natural real rate may be unobservable, but there is no ducking the fact that a policymaker needs to form a view on whether its policy stance is stimulating or restraining demand, which amounts to broadly the same thing.

Against that background, I can return to a central bank's objectives. To maintain inflation in line with a target over the medium term. And, typically with less priority, to stabilise the path of output in the face of cyclical shocks; in the UK Government's mandate to the Bank of

(1) A completely new framework for doing so in the United Kingdom was introduced last week (18 May). See 'The Framework for the Bank of England's Operations in the Sterling Money Markets' (the 'Red Book'), May 2006.
(2) Wicksell, K (1898), *Interest and prices*, London, Macmillan, 1936. Translation of 1898 edition.
(3) A classic reference, in the context of the relationship between money and inflation, is Friedman, M (1961), 'The lag effect in monetary policy', *Journal of Political Economy*, Vol. 69, No. 5.
(4) For example, Svensson, L E O (1997), 'Inflation forecast targeting: implementing and monitoring inflation targets', *European Economic Review*, Vol. 41, Issue 6.
(5) See Batini, N and Nelson, E (2001), 'Optimal horizons for inflation targeting', *Journal of Economic Dynamics and Control*, Vol. 25, Issue 6–7.
(6) A recent example in relation to r^* is Weber, A A (2006), 'The role of interest rates in theory and practice — how useful is the concept of the natural real rate of interest for monetary policy?', G L S Shackle Memorial Lecture 2006, Cambridge.

England,[1] that is expressed in terms of, *inter alia*, the MPC avoiding 'undesirable volatility in output'. I shall say something about both, before going on to discuss some issues concerning monetary policy strategy that have featured in recent academic commentary.

Medium-term inflation expectations, forecasts, and models: nominal stuff

In terms of the primary objective of delivering stable inflation, it has helped the United Kingdom to have a clear target. In contrast to many inflation-targeting countries,[2] we have a point target: 2% on the consumer prices index. That leaves no room for debate in our (one person-one vote) committee about what the target is, and that it is symmetric. And there should be no uncertainty among households, firms and participants in financial markets about the steady-state rate of inflation being targeted. In other words, a point target makes communication somewhat more straightforward.

Of course, that is not the same as saying that we can guarantee to deliver inflation outturns consistently in line with the target over an economic cycle. Shocks, and even policy mistakes, will cause inflation to deviate from target. Explaining such deviations matters.

Especially when being reappointed for a further term, MPC members are typically asked by the House of Commons' Treasury Select Committee whether the MPC has made any big mistakes.[3]

In response, we often talk about luck, diligence etc. But I think that the best test — perhaps the only important test — is whether *medium to long-term* inflation expectations have been dislodged from the target.

In the United Kingdom, expectations have generally been in line with our target since the Bank was given operational independence. But as the recent slight tick-up in some measures illustrates, we have to be constantly vigilant. By contrast, an uncomfortable amount of commentary — academic and in the media — proceeds as if that particular battle is won for all time; the 'death of inflation' school of thought.

Indeed, seductively, these days 'victory' tends to be inscribed in to the economic models used by central banks as an input to their forecasts. Reflecting the achievements of this university, our models have a well-defined steady-state equilibrium for the real economy; well-defined steady-state *nominal* properties, typically an inflation rate; and forward-looking rational expectations, that is to say model-consistent expectations. The second of these characteristics means that a nominal target is always achieved in the medium to long run. And the third means that the model's agents know that; ie they know *now* and behave — set wages and prices — accordingly, so that in these mainstream models the target is achieved over cyclical frequencies too.

Typically, nominal things enter via inflation expectations, and they are pinned down in the stylised, model economy by a policy rule of the kind I sketched earlier, expressed in terms of an official interest rate (the price of base money). But just in case it were thought that the 'problem' of models promising the policymaker success stems from the crime of ignoring money quantities, I should make it clear that that is not so. It would not make a fundamental difference in policymakers' modern-macro models if nominal stuff entered via a money quantity, with the policy rule being specified as a money-supply growth rate. So-called velocity shocks to the demand for money would cause deviations from an inflation target in the short run, but everything would ultimately settle down nicely — because that assumption would be built in to the model's long-run properties (in this instance via a demand-for-money equation that was imposed as stable over the long run).

I'm exaggerating a bit. Forward-looking models can be set up in ways where things go wrong for a while. In particular, by allowing agents to learn more or less gradually that the monetary authority really does mean it about achieving its target for inflation (or some other nominal variable).[4] Everything still turns out okay eventually, but the route can be a bit bumpy.

Experiments of that kind can help policymakers to think through, in a disciplined way, what might happen if inflation expectations were to become dislodged. But, so

(1) 'Remit for the Monetary Policy Committee', letter from Chancellor of the Exchequer, the Right Hon. Gordon Brown, to Mervyn King, Governor of the Bank of England, on 22 March 2006. Available at www.bankofengland.co.uk/monetarypolicy/pdf/chancellorletter060322.pdf.
(2) For example Australia, Canada and New Zealand.
(3) For example, 'Treasury Committee Questionnaire ahead of appointment hearing for Mr Paul Tucker', The Monetary Policy Committee of the Bank of England: appointment hearing, First Report of Session 2005–06, Volume II.
(4) Erceg, C J and Levin, A T (2003), 'Imperfect credibility and inflation persistence', *Journal of Monetary Economics*, Vol. 50, Issue 4.

far, they do not do much to help us know what to look for in identifying *whether* inflation expectations are in the process of becoming dislodged. We do not know enough about how households and firms form their expectations — how much forward looking, how much backward looking — to be able to model the process rigorously. That is not part of the 'information set' of policymakers in today's world.

What this underlines is that policymakers may well not be able to rely on their models to help them terribly much when the stakes are highest; ie when our credibility may be fragile. They are tools to help us think. But they don't tell us the answers. Crucially, we have to make *judgements* about whether medium-term inflation expectations are, in fact, securely anchored. We need to resist falling into the trap of thinking that the nominal side is now, and forever, nicely looked after by some miracle of credibility.

Notwithstanding the extent to which analysis of *real* economic variables seems to dominate the pages of most central banks' published analysis, including the Bank of England's, maintaining *real* aggregate demand in line with supply is not a sufficient condition for achieving an inflation target; indeed, it would be consistent with any level of inflation. We absolutely have to attend to indicators of medium-term *nominal* trends. That is why central bankers like me look at measures of inflation expectations from as many sources as we can: bond markets, surveys etc. And it is why the ECB and others, including at the Bank of England, track the monetary aggregates as a cross-check, a potential amber light alerting us to medium-term risks.

Stabilisation policy and the impracticalities of fine tuning: real-side stuff

That brings me to the second element in the conduct of policy: stabilisation of the path of demand and output, in order to keep inflation in line with the target over the cycle, to underline the commitment to medium-term stability, and as something desirable in its own right.

Well-anchored inflation expectations *do* make stabilisation policy 'easier'. When a *credible* central bank cuts its interest rate to offset the adverse effects of a shock to demand, it will not be perceived as trying to raise demand and employment in the short term (say over the next year or so), at the expense of higher inflation down the road. Rather it will be understood as trying to avoid deficient demand: as trying to stimulate demand a bit in the short run in order to bring it back to the economy's supply capacity and so, precisely, to maintain inflation *in line* with its target.

For at least this policymaker, however, there is a risk of commentators overstating our capacity to stabilise demand — understandably perhaps following, in the United Kingdom, more than a decade of fairly steady growth since inflation targeting was introduced.

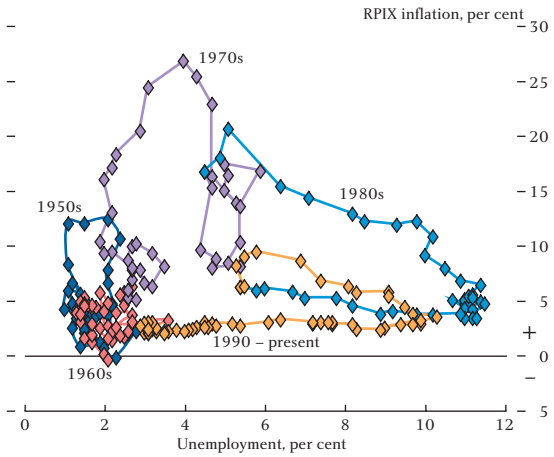
To be clear, I *do* believe that we should be able to put behind us the self-inflicted economy-wide boom and bust that, miserably, characterised the UK economy for a few decades until the early 1990s.(1) All too frequently in the past, aggregate demand was allowed to get out of control, bringing with it, variously, a credit boom, an asset-price bubble and, sooner or later, runaway wage and consumer price inflation. Belatedly, the monetary authority would slam on the brakes, tipping the economy into recession. Inflation would then slow.

But that we no longer neglect the inflationary consequences of excess demand does not mean we can nicely fine tune demand to ensure uninterrupted growth. Why?

I will mention just two reasons. First, we just do not know enough about the underlying structure and properties of the economy. Quite apart from the change in monetary regime, the extent and variety of the structural change underway in the real economy is profound: for example, labour market reform domestically, and the opening up of labour markets across the European continent, which has materially increased inward migration to the United Kingdom; the new technology and the price transparency it brings; China and India. In consequence, in the United Kingdom for the moment we do not really know whether the short-run trade-off between excess (or deficient) demand and inflation has changed; whether the short-run Phillips curve has become flatter (Chart 1).

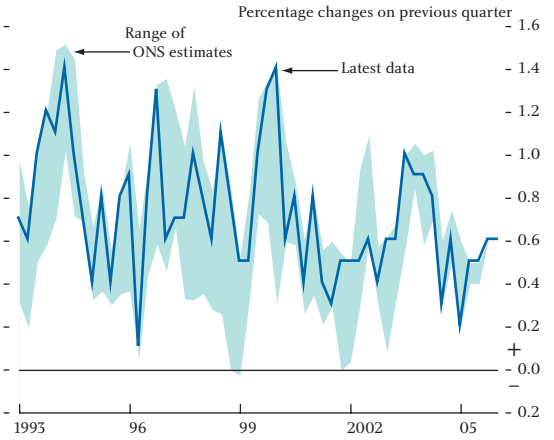
(1) Balls, E and O'Donnell, G (eds), 2001, 'Reforming Britain's economic and financial policy: towards greater stability', HM Treasury, page 10: 'Although there are many reasons for the UK's poor inflation record in recent decades, one key factor was poor institutional arrangements. Monetary policy, if set correctly, should be a stabilising force for the economy. However, serious mistakes were made, which often meant that inflation was higher and more volatile than it would otherwise have been. This, in turn, created substantial economic instability that harmed the long-term performance of the UK economy. Many of these policy mistakes were made because the aims and procedures of monetary policy were not properly defined'.

Chart 1
Unemployment and inflation



Second, the data we use give us an unavoidably imperfect read on what is going on. Not infrequently in my experience we debate the various possible explanations for some puzzle in the data, only to find that a year or so later the data have been revised and, as it turned out, there was no puzzle (Chart 2). For that reason, the Bank of England is putting considerable resources into researching data uncertainty.(1)

Chart 2
Official estimates of GDP growth



Where does that leave us? I should like to say that we can 'rough tune' but not fine tune. Rough tuning *is* important, as we do need to keep aggregate demand and supply broadly in line as a condition for maintaining stable inflation. But that does not mean that we can always smooth out quarter-to-quarter, or even year-to-year, fluctuations in demand and output to the extent some commentary implies. In terms of the political economy of monetary policy making, it is important for the central banking community to get that across and accepted. If we fail in doing so, and the public believes that central banks can deliver more than is realistic, there will at some point down the road be disappointment, conceivably putting in jeopardy the real achievements of monetary policy in delivering price stability.

Of course, these strictures apply most of all to ourselves. We try to discipline ourselves not to claim too much credit for stable growth. And in forecasting, we have to attend to the uncertainties around our projections of the central outlook. Some numbers may serve to underline that. The MPC's projections are published as fan charts. The fan chart standard deviation of output growth at around one year is a little under 1 percentage point; and of inflation at around two years, roughly 0.5 percentage points. This is not a world in which one should get carried away by fine judgements that alter the central projection for demand by 0.1 or 0.2 percentage points. Yet, as the Bank has documented,(2) assuming that credibility is maintained, the effect of a *surprise* change in the official interest rate is judged to be small; maybe less than 0.1 percentage point on the annual rate of inflation two years after a 25 basis point surprise change maintained for one year. Of course, we are not in fact in the business of aiming to make surprise changes in our policy rate. Against a background of credibility, a lot of practical monetary policy making is not about forestalling major lurches in the economy and inflation via large, abrupt changes in the policy rate. Instead, it has to involve careful analysis of the conjuncture, with transparency to the market. But these numbers do perhaps illustrate the importance of our not getting drawn into absurd degrees of detail, and the risk of signalling that we think we can precisely fine tune demand conditions.

How can we maintain and underpin credibility? The following seem to be ingredients. Being very publicly committed to anchoring medium-term inflation expectations in line with a clear target, above all else. Inflation outturns being, on average, in line with the target. And being seen to be committed to the essentially technical job of professional economic analysis of conjunctural conditions and the underlying structure of the economy. Typically moving our policy rate in steps of 25 basis points seems to have been useful in conveying the break with the past. Perhaps because it

(1) For example, Lomax, R (2004), 'Stability and statistics', speech to the North Wales Business Club, *Bank of England Quarterly Bulletin*, Winter, pages 495–501.
(2) Harrison *et al* (2005), *The Bank of England Quarterly Model*, pages 128–32.

conveys that things are 'under control'. The counterpart to that is being understood to be ready to do whatever it is necessary to maintain well-anchored inflation expectations.

Policy strategy, risk management and communication

If the key tasks are anchoring inflation expectations and, with less weight, stabilising demand conditions, how do central banks go about their policy job?

At the Bank of England, in both our published projections and our policy decisions, we emphasise the risks around the 'central outlook'. And although some of the presentation is different, that is on the same page as what former Chairman Greenspan called the 'risk management' approach to policy.

In my experience, it is not sensible to respond to all possible risks, even some that would have a big impact if they crystallised. Take, for example, global imbalances. If they were to unravel abruptly, with a big fall in the dollar against the euro, aggregate demand in the euro area might fall for a while. Depending on what had happened to sterling's bilateral exchange rates, the United Kingdom would not be immune from spillovers, as the euro area is by far our largest trading partner. For some time, therefore, global imbalances have been a real source of risk to the United Kingdom as well as to the global economy. Should I have been voting to cut interest rates to head off those risks? I don't think so. It would not have made sense to try to anticipate the effects of a shock that had not yet occurred and over which we had effectively no influence. A number of external 'tail risks' are rather like that.

How does that fit with 'precautionary' or 'insurance' policy settings. Individual policymakers differ on the usefulness of this concept. I find it quite useful. But on my view of what it means, it has to be subject to some quite stringent conditions in practice.

Remembering that we have a highly imperfect line of sight of what is going on in the economy, assume as a thought experiment that some indicators are flashing the possibility that there has been a *material* shock to demand. For example, imagine that there has been a bit of bad news but that there are signs that consumer confidence may be ebbing away by more than we would have guessed was proportionate. So maybe spending will fall materially. The probability is thought to be low, but tangible. In other words, most likely the outlook is fine, but it might not be. A cut in rates might be warranted in order to guard against the consequences if the risk has, in fact, crystallised. The policymaker could wait for more evidence, but by waiting they risk being too late to avoid some deviation of output from 'potential' and of inflation from target. This is not a free lunch. In keeping with the insurance metaphor, a premium will have to be paid: in the form of accepting a slightly higher probability of inflation rising above target in the near term if the (insured-against) risk has not, in fact, crystallised. In other words, the policymaker faces a trade-off, based on a judgement of probabilities and costs.

But, in my view, there is more to it than that. Communication matters too. If the policymaker takes out the insurance, they need to be clear (with themselves) about the conditions under which it would be withdrawn, ie the cut reversed. And that state-contingent policy analysis needs to be communicated to the market too.

Some economists do not like the idea of 'insurance' policy settings, and ask, reasonably, how they square with the type of objective (loss) function I set out at the beginning of my remarks. Alternatively, it is argued that they are so obviously consistent with a 'standard' loss function that it does not really add anything to talk about 'insurance' or 'precautionary' settings as a way of framing policy analysis and decisions. These are both fair points! Possible responses run as follows. First, maybe we (society) are more averse to fairly bad events than to risks that take us just a little distance from target/potential; eg maybe preferences would be better approximated by a loss function with a 'higher power' than a quadratic.(1) Second, maybe what is going on can be thought of in terms of how heavily or not we discount future deviations from target/potential relative to very near-term deviations; ie a policymaker may accept the price (premium) of risking slightly higher/lower inflation in the nearish term in order to reduce (insure against) the risk of a bigger or more persistent deviation of inflation from target a little down the road.

What the insurance/risk management metaphor does illustrate is that a policymaker has to think beyond the immediate policy decision. Indeed, it would be odd not

(1) For a discussion of some implications of different loss functions, see Vickers, J (1998), 'Inflation targeting in practice: the UK experience', *Bank of England Quarterly Bulletin*, November, pages 368–75.

to. In the great scheme of things, fixing the overnight rate for the next month (in the United Kingdom) — or 45 days or so (in the United States) — seems neither here nor there.

Of course, on both sides of the Atlantic, we have recent examples of policymakers making their strategy clear, albeit in subtly different ways. In the most recent cycle, the Bank of England's rate troughed at 3.5%. Some of us made it clear that, so far as our *individual* decisions were concerned, we expected, other things being equal, to vote for a gradual withdrawal of monetary accommodation if/as demand recovered and the slack in the economy was gradually absorbed.(1) Crucially, those statements were state contingent.

Some policy strategy issues

Against that background, I should like briefly to review, without reaching firm conclusions on, four issues that feature in the recent literature. Whether central banks should publish an expected (optimal) path for their policy rate. Second, whether stabilisation policy is subject to a bias, meaning that a central bank will find it optimal not to deliver on promises and that, in consequence, its policies to offset shocks will be less effective than they could be if it could commit itself. Third, whether stabilisation policy could be more effective if the central bank targeted a path for the price level rather than an inflation rate. And, fourth, how central banks should respond to asset price inflation.

(a) Should central banks publish an expected policy path?

Among others, Lars Svensson(2) and Michael Woodford have argued that central banks should publish the path they expect for the policy rate or the near-term path of inflation they are aiming for. The Norwegian and New Zealand central banks have been publishing policy rate paths for a short while.(3) The Bank of England does not. What do I — let me stress, personally — think about that?

As others have pointed out,(4) managing a scheme for voting by nine members on a path of rates would be pretty complex. Proposals have been made (eg for deriving a median path from individual members' paths),(5) but they seem to entertain the possibility of shifting majorities for different parts of the resulting path (or implied money market curve). That may add an extra complication to explaining policy.

Indeed, more broadly, there would probably be a challenge in the area of communication. A single path for rates would, of course, be a misleading statement of the policymaker's intentions; of its 'reaction function'. The path policy takes will depend, very obviously, on the shocks that hit the economy in the future. But not only on that. Also on whether, even in the absence of new shocks affecting households and firms, the economy evolves on the path the central bank expected, including agents' responses to past policy decisions and shocks. On any changes in view about how the economy works (about the 'model'). And it will depend on whether the central bank's beliefs about agents' inflation expectations are (broadly) accurate. In other words, the outlook for policy is unavoidably state contingent, and those contingencies include the possibility of the policymaker discovering that it had not been as credible as it had assumed. Communicating that state contingency in the form of a series of interest rate paths would be formidably difficult. It is not obvious to me that a fan chart for the interest rate delivers this(6) unless accompanied by a clear explanation of what states of the world would take the central bank's rate to different parts of the fan. So the question boils down to how the policymaker's reaction function can best be conveyed.

At the Bank of England, we have tackled this by publishing as complete an account as we can of our analysis of the economic outlook, including the risks. In the minutes of our meetings, we describe how those risks feature in our policy judgements. And individually, we explain the reasoning behind our decisions and our view of the outlook in Select Committee appearances,

(1) For example, Tucker, P M W, speech at the National Association of Pension Funds Annual Investment Conference, March 2004, *Bank of England Quarterly Bulletin*, Summer 2004, pages 234–40; and 'Bank's market man is ready for rate rises', P M W Tucker interview by D Smith, *The Sunday Times*, 25 April 2004.
(2) Svensson, L E O (2006), 'The instrument-rate projection under inflation targeting: the Norwegian example', presented at Banco de Mexico conference 'Stability and Economic Growth: the role of the Central Bank', Mexico City.
(3) For examples, see Chapter 1 'Monetary policy assessments and strategy', *Norges Bank Inflation Report*, 3/2005, November 2005, and Section 1 'Policy assessment', *Reserve Bank of New Zealand Monetary Policy Statement*, March 2006.
(4) For example, Goodhart, C A E (2001), 'Monetary transmission lags and the formulation of the policy decision on interest rates', *Federal Reserve Bank of St. Louis Review*, (July/August), pages 165–81.
(5) Svensson, L E O (2005), 'Optimal inflation targeting: further developments of inflation targeting', prepared for Central Bank of Chile conference on 'Monetary Policy under Inflation Targeting', Santiago, October 2005, page 8.
(6) For an example of such a fan chart see Chapter 1 'Monetary policy assessments and strategy', *Norges Bank Inflation Report 3/2005*, November 2005.

speeches, etc. The underlying question here is whether a more effective communication policy is based on explaining the underlying analysis or on providing what many might wrongly perceive to be the 'answer' in the form of a path for rates. In a world where attention to our analysis is limited, it may be preferable to keep our 'audience' focused on the MPC's analysis of the outlook for output and inflation.

Sometimes that analysis lends itself naturally to a contingent statement, by individual members, of a possible path for policy. I have already referred to one such example around the end of 2003/beginning of 2004.

In a similar vein, circumstances may arise where we explained the broad path for inflation we were trying to deliver. For example, a shock to the economy might be sufficiently nasty that returning inflation to target on the usual timetable would threaten undesirable volatility in output. We might then want to set policy in a way that accepted deviations from the inflation target for a period, while committing to achieve the target in the medium run. Related to that, our mandate makes specific provision for communication if inflation outturns were to miss our target of 2% by more than 1 percentage point. In those circumstances, the Governor of the Bank would be obliged, as part of the Committee's public accountability, to write an open letter to the Chancellor of the Exchequer explaining why inflation had deviated from target, the Committee's plan for returning to target, and its time horizon for doing so. Such circumstances have not yet arisen, but they illustrate that provision is made for the Committee to explain what commentators would call its strategy.

The debate is certainly interesting, and it should go without question that, like policymakers everywhere, I am very much in learning mode over these issues.

(b) Is there a stabilisation bias?

Inflation targeting has been characterised as 'constrained discretion' in the sense that the central bank makes policy choices, but choices disciplined by a clear objective.(1)

Exploring the implications of discretion, Michael Woodford and Lars Svensson have argued, in a series of papers,(2) that optimal policy suffers from a stabilisation bias, arising from time inconsistency. Any central banker's ears will prick up at this, given the importance of an earlier literature — associated with Kydland and Prescott, Barro, Fischer(3) — in helping to explain the inflation problems of the past and to make the case for central bank independence.

The 'old' problem was about the incentive of a monetary authority to cheat, or renege on promises, by generating surprise inflationary booms in order to secure an increase in output and jobs. This was, indeed, pretty tempting for politicians when they had their hands on the interest rate lever. In a rational world, the result was no permanent increase in jobs but a higher-than-desired steady-state rate of inflation. And the solutions variously offered by the academy included appointing a 'conservative central banker' more averse to inflation than society at large, or writing a 'contract' that incentivises the monetary authority to do the right thing.(4)

In practice, the solution has amounted to a combination of central bank independence, clear goals, and transparency. These real-world central bankers care about ensuring that nominal magnitudes do not distort economic decision taking, and they care about their reputations. But they are not 'conservative' in the sense of being 'inflation nutters'. Rather they are 'dutiful' in the sense of sticking to a clear, symmetric mandate. That, many would argue, has been a necessary condition for achieving credibility.

(1) Bernanke, B S and Mishkin, F S (1997), 'Inflation targeting: a new framework for monetary policy?', *Journal of Economic Perspectives*, Vol. 11, No. 2; and King, M A K (2004), 'The institutions of monetary policy', The Ely Lecture 2004, at the American Economic Association Annual Meeting, San Francisco.

(2) Woodford, M (2003), *Interest and prices: foundations of a theory of monetary policy*, Princeton University Press, Chapter 7; Dennis, R, 'Time-inconsistent monetary policies: recent research', *Federal Reserve Bank of San Francisco Economic Letter*, April 2003, No. 2003–10; and Svensson, L E O and Woodford, M (2005), 'Implementing optimal policy through inflation-forecast targeting', in Bernanke, B and Woodford, M (eds), *The inflation-targeting debate*, University of Chicago Press.

(3) Kydland, F and Prescott, E (1977), 'Rules rather than discretion: the inconsistency of optimal plans', *Journal of Political Economy*, Vol. 85; Barro, R and Gordon, D (1983), 'Rules, discretion and reputation in a model of monetary policy', *Journal of Monetary Economics*, Vol. 12; Fischer, S (1994), 'Modern central banking', in Capie, F, Goodhart, C, Fischer, S and Schnadt, N (eds), *The future of central banking, the Tercentenary Symposium of the Bank of England*.

(4) For example Rogoff, K (1985), 'The optimal degree of commitment to an intermediate monetary target', *Quarterly Journal of Economics*, November, Vol. 100, No. 4; and Walsh, C E (1995), 'Optimal contracts for central bankers', *American Economic Review*, Vol. 85, No. 1.

But now it is argued that a monetary authority does, after all, still have an incentive to cheat. This time, not on its delivery of price stability in line with a target over the medium to long run, but rather in how it stabilises shorter-run fluctuations in demand and inflation in the face of shocks.

As I understand it, broadly the argument runs as follows. Assume that a shock to costs hits the economy; the oil price rise over the past couple of years might be the kind of thing. In the short run, demand and output will be pushed below the economy's 'trend' path, and inflation above the authority's target. In the story, to bring inflation back to target, the central bank raises its policy rate *and* announces that it will keep it higher for a while. Because it is believed, near-term inflation expectations drop back in line with the target. That being so, in order to avoid 'lost' output, it is *now* optimal for the central bank to reduce its policy rate back to where it was, ie *not* to leave it higher. The central bank has therefore not done what it said it would do; it has been time inconsistent. And, reflecting rational/model-consistent expectations, agents allow for this, so that central bank stabilisation policy is not as potent as it could be if credible commitments were feasible.

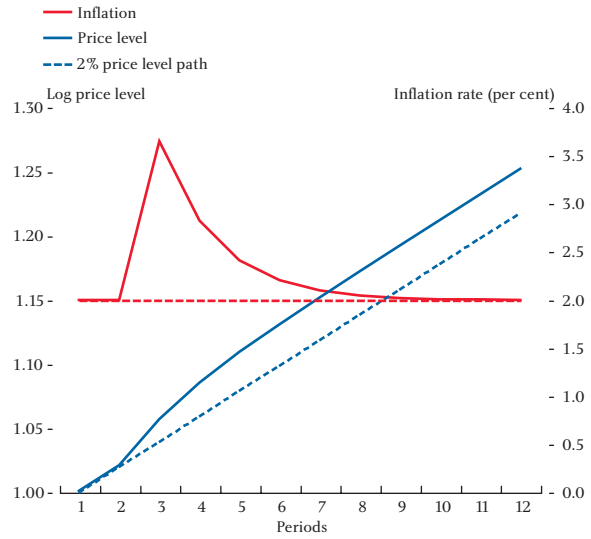
For this practitioner at least, the story does not sound very much like reality. Unlike the inflation problems of the past, it is not obvious to me that we are going about breaking promises about how we conduct cyclical policy. I do not mean that in the trivial sense that we do not publish an intended path for rates, and so there is no promise to break. Rather, I do not believe that we have published analyses of the economic outlook that, notwithstanding the absence of news, we have subsequently deliberately junked — and so abandoned as an input to our policy judgements — when it suited us in order to secure a 'better' path for output. For example, I have mentioned how in late 2003/early 2004, some MPC members explained that, *if* the economy continued to recover, we expected to vote for a gradual withdrawal of monetary accommodation. If the economy had been knocked off course, speaking for myself I would not have had any difficulty in referring back to my earlier statements and explaining how things had changed. It would have been the obvious thing to do. That would not have involved breaking a promise; and I do not think it would have been misunderstood.

Perhaps more important than that, the model world in the stabilisation-bias story seems to be better than reality in one key respect, and therefore to miss something rather central to the policymaker's job. In the face of a major cost (or supply) shock, the big question is whether, as well as a temporary upward impetus to inflation, there will be 'second-round' effects via wage earners trying to recover lost purchasing power. In other words, the big issue is whether *medium-term* inflation expectations will remain anchored; or more graphically, whether the central bank will 'lose control'. I think we can see that in the statements of central banks from a whole host of countries over the past year or so. The statements amounted to saying: *'if* it looks as though second-round effects are occurring, and creeping into rising medium-term inflation expectations, then I shall have to — and believe me, I shall — tighten policy'. If the central banker's commitment to do so is believed — ie if it is credible — then it does not have to tighten policy for that reason. It is a state-contingent policy stance. And the central bank behaves time consistently.

Unless we are passing each other in the night, a possible explanation for the difference between my practitioner's view and the time-consistency problem in the model economy is that the latter *assumes* model-consistent expectations. In the model economy, the monetary authority's ability to deliver, and its will to stick to, its inflation target over the medium run is never in any doubt. Whereas what it feels like, at least to me, is that that kind of credibility needs to be earned and re-earned, over and over again. That does not make us 'inflation nutters': the target is symmetric. But maintaining well-anchored medium-term inflation expectations is not guaranteed. And, therefore, credibility is not to be taken for granted in the way we seek to stabilise the path of the economy in the face of shocks. At its broadest, in a world where medium to long-term inflation expectations are anchored principally by virtue of the central bank conducting policy consistent with the declared regime, the policymaker has little incentive to 'cheat' on stabilisation policy. That is because developing a reputation for being time inconsistent on that part of its task would risk a perception that it would be time inconsistent on achieving the inflation target over the medium run. In other words, it would risk undermining the credibility of the regime.

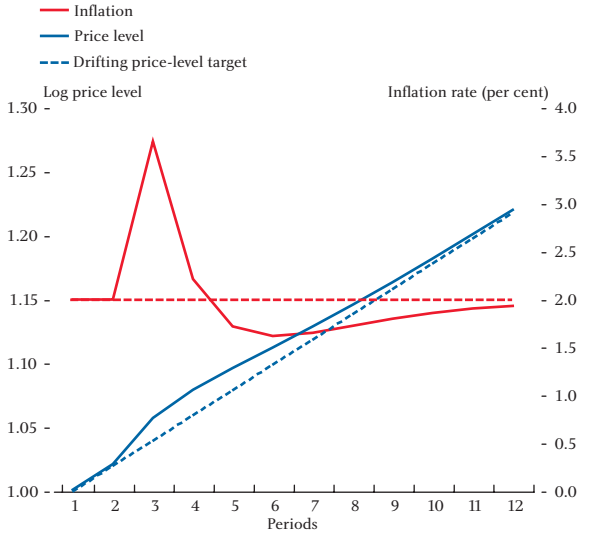
A potential area for research is whether a 'stabilisation bias' problem would reappear in models that combine central bank discretion with persistent deviations of medium-term expectations from target stemming from

Chart 3
Inflation targeting



Source: Illustrations based on Bank of England estimates.

Chart 4
Price-level targeting



Source: Illustrations based on Bank of England estimates.

imperfect or gradual learning by households and firms about the authority's long-term objectives and its commitment to them.

(c) Would price-level targeting make stabilisation policy more effective?

It is occasionally argued that stabilisation policy would be more effective if central banks targeted the price level rather than a rate of inflation (Charts 3 and 4). That need not mean a flat price level. It might mean that the central bank committed to deliver a path for the price level with a positive rate of inflation on average. The difference from today's inflation targeting would be that bygones would not be allowed to be bygones. A period of overshooting would be followed by a period of undershooting, and *vice versa*.(1)

Assuming complete credibility, this would mean that following an adverse demand shock, households and firms would expect sufficient policy stimulus to plug the gap left by deficient demand and, on top of that, to generate a little excess demand in order to raise inflation above its average and so bring the price level back to its targeted path. The consequent rise in near-term inflation expectations would, it is argued, make the job of offsetting the initial adverse shock somewhat easier.

I wonder, though, whether price-level targeting might, in fact, endanger credibility by the extra complication it would bring to the formation of inflation expectations. When asked about what rate of inflation we are trying to deliver over the long run or cyclical horizons, the MPC's answer is virtually always the same: 2% on the CPI (potentially departing from that only on rare occasions when, after a major supply/cost shock, we wanted to get inflation back to target more gradually than usual). With price-level targeting, the *de facto* near-term target would regularly vary according to (recent) inflation outturns and the time horizon for offsetting them.

That might confuse households and firms about the long-term objective, making it more difficult for the central bank to maintain credibility. By repeating an unchanging and simple message about the inflation rate we are aiming at (2%), we may make it easier for households to learn about our aims.

(d) How should central banks respond to asset prices?

Others argue that whether the central bank targets consumer price inflation or the price level, they should also target asset prices. On this question, I subscribe to much of the current orthodoxy.(2)

(1) A short or a long horizon could be set for 'correcting' deviations from the targeted path for the price level. See King, M A (1999), 'Challenges for monetary policy: new and old', Symposium on 'New Challenges for Monetary Policy', Federal Reserve Bank of Kansas City at Jackson Hole, Wyoming.

(2) For a variety of positions, see Cecchetti, S, Genberg, H and Wadhwani, S (2002), 'Asset prices in a flexible inflation targeting framework', *NBER Working Paper no. 8970*; Bernanke, B and Gertler, M (2001), 'Should central banks respond to movements in asset prices?', *American Economic Review*, Vol. 91, No. 2; Issing, O (2004), 'Financial integration, asset prices and monetary policy'; and Posen, A (2006), 'Why central banks should not burst bubbles', *Institute of International Economics Working Paper 01/2006*.

Of course, changes in asset prices feed into policymaking as they are an important influence on demand conditions, through households' wealth, firms' cost of capital, and the price (exchange rate) at which we trade with other economies.

But I do not believe we should use interest rates to target asset prices alongside consumer price inflation. In the first place, we just do not know enough about the determination of asset prices — especially of risk premia — to have much of an idea about what price to target. Big moves in asset prices *do* occasionally occur because of changes in the underlying economic fundamentals. We could not be relied upon to distinguish between those benign changes and bubbles. But even if we could, I don't see how in practice we could use our single instrument (the overnight interest rate) to *target* both consumer price inflation and asset prices — especially when one remembers that there are lots of different asset prices and that questions of disequilibria about them may run in different directions.

Having said that, there is no denying that asset prices can be a serious complication for monetary policy. And I think I would want to register just a slight qualification to a strong version of the proposition that the central bank should simply — as if it could be simple — 'mop up' after a bubble has burst. Policymakers need to take care that the measures they take to offset the impact on aggregate demand of one type of imbalance unravelling do not themselves create or exacerbate imbalances elsewhere in the economy, including in other asset markets. In other words, policymakers need to guard against one imbalance leading to another.

That view is, I believe, quite consistent with inflation targeting. The simple set-up I described in my introductory remarks had two relevant features. First, the policymaker's objective (or loss) function was set as a quadratic in inflation and output. And as I described, that can be unpacked as caring about both systematic biases from the target and the volatility of inflation.

Second, the policymaker cares not just about today (or tomorrow) but about the future.

Putting these two features of the objective function together, the policymaker places some weight on the prospect of unusual volatility in inflation down the road. This is not just hypothetical. In 2002–03, some of us on the MPC voted to maintain an unchanged policy rate rather than cut partly on the grounds that, by stoking the embers under household debt and house prices, too great a risk would be taken with *future* output and, most important, inflation variability.(1) Speaking for myself, that was directed at avoiding policy settings that, on balance, could have increased uncertainty about demand conditions and inflation in the future, and complicated the operation of policy down the road, not on some spurious aspiration of steering asset prices along some (unknowable) equilibrium path.(2)

Maybe that would be one way, consistent with focusing on a single objective, to construe the thought-provoking papers that have come out of the Bank for International Settlements in recent years.(3) Certainly this is an area where policymakers still have lots to learn.

Summary

It is next to certain that my views on many of the issues covered in these remarks will continue to develop as the MPC confronts new challenges. It would be hard to be serious about policymaking without learning.

But for the time being, two key threads run through what I have said. The first is the absolutely vital task of anchoring medium to long-term inflation expectations in line with a clear target. That just cannot be taken for granted. The second is the importance of clear and clean communications about objectives. On that front, we should not kid ourselves that households and firms are studying our every utterance or examining in detail the economy in which they live and work. That points, I think, to keeping things as straightforward as possible, without glossing over uncertainties and risks.

The two threads are intertwined. We have a better chance of keeping inflation expectations anchored to the target if the target is simple to communicate; and if we do not over elaborate, or slip in to being overly ambitious about, our conduct of cyclical policy.

(1) For example, the MPC *Minutes* February 2002, December 2002 and February 2003.
(2) So this view is not quite the same as that set out in Kohn, D (2006), 'Monetary policy and asset prices', remarks at 'Monetary policy: a journey from theory to practice', a ECB colloquium held in honour of O Issing.
(3) For example, Borio, C and Lowe, P (2002), 'Asset price, financial and monetary stability: exploring the nexus', *BIS Working Paper no. 114*.

Annex
A common model for monetary policy

Policymakers are often characterised as aiming to minimise an objective of the following kind:

$$E_t\left\{\sum_{t=0}^{\infty}\beta^t\left[(\pi_t-\pi^T)^2+\lambda(y_t)^2\right]\right\},$$

where π denotes inflation; superscript T refers to 'target'; y is a measure of the percentage deviation of the level of real output from its natural rate (the rate that would obtain if prices were flexible); β is a discount rate applied to the future; λ is the weight given to stabilising output relative to stabilising inflation; and E_t is the expectations operator.

Both the inflation and output parts of the objective function can be broken down. For example, for an undiscounted quadratic loss function for inflation, one can obtain:

$$E\left\{\sum_{t=0}^{\infty}\left[(\pi_t-\pi^T)^2\right]\right\}=\sum_{t=0}^{\infty}\left[Var(\pi_t)+(bias(\pi_t^e))^2\right]$$

meaning that the policymaker wants to avoid inflation being expected to diverge from target on average (a bias) and also wants to minimise expected future volatility of inflation.

Policy seeks to minimise this objective subject to how the structure of the economy affects inflation and the output gap. That consists of:

(1) a Phillips curve:

$$\pi_t=\alpha_1\pi_{t-1}+\alpha_2E_t\pi_{t+1}+\alpha_3y_t+\varepsilon_{\pi,t},$$

where the mean-zero shock term $\varepsilon_{\pi,t}$ is sometimes described as a 'cost push' shock;

and (2) an equation for aggregate demand:

$$y_t=\gamma_1y_{t-1}+\gamma_2E_ty_{t+1}+\gamma_3(i_{t-1}-E_{t-1}\pi_t)+\varepsilon_{y,t},$$

where i is the central bank instrument, the short-term nominal interest rate; and $\varepsilon_{y,t}$ is a mean-zero demand shock that could be, for example, a shock to household preferences over consumption.

The stylised representations of demand and the inflation process are typically derived from studying price-setting by firms and households, who are taken to try to maximise profits and utility respectively. There is uncertainty, reflected in the literature, about the relative importance of the forward and backward-looking terms in both equations; and about whether the expectations denoted by the operator E are model-consistent or not.

Central bank policy is often discussed with reference to the following kind of equation:

$$i_t=r^*+\pi^T+\delta_1(\pi_t-\pi^T)+\delta_2(y_t),\quad \delta_1>1,$$

where r^* denotes the natural real rate of interest, the real rate of interest that would obtain if prices were flexible and there were no shocks in the system. For some model economies within the class above, a simple instrument rule that more or less approximates the optimal rule that would result from maximising the objective of policy could be written like this.

In practice, uncertainty about the structure of the economy (variable and uncertain lags in the transmission mechanism for example) and the need for a forward-looking dimension in monetary policy mean that inflation-forecast based rules provide for alternative stylised descriptions of central bank policy, for example:

$$i_t = \delta_1 i_{t-1} + (1-\delta_1)\ [r_t^* + \pi^T + \delta_2\ (E_t\pi_{t+n} - \pi^T) + \delta_3(y_t)],$$

where the lagged nominal interest rate term allows for potential interest rate smoothing by central banks.