
REVIEW OF THE MONETARY POLICY COMMITTEE'S FORECASTING CAPABILITY

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Presented to the Court of the Bank of England

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A review of the MPC's forecasting capability

Introduction

This report was prepared at the request of the Court of the Bank of England. I was asked by the Court to focus my review on the forecasting capabilities, the forecasting processes, the forecast-related analysis, and the forecasting performance of the Monetary Policy Committee (MPC). In preparing this review, I studied the materials provided to the MPC in the development of the forecast, and I attended the key meetings held by the staff and MPC during the production of the forecast for the August Inflation Report. Understandably, I did not attend the meeting at which the MPC reached its policy decision. For this review, I interviewed all of the current members of the MPC and all former members who served on the Committee over the period since 2007. Similarly, I interviewed many members of the staff of the Bank of England. Outside of the Bank, I consulted with individuals from the academic community, financial institutions, private consulting firms, and official institutions. I also reviewed external studies of the forecasting record of the Bank of England. And, I consulted previous reports commissioned by the Court that reviewed the policy process and forecasting apparatus employed by the MPC.

I gathered most of the information for this report during two separate visits totaling about nine weeks on-site at the Bank. During this time, I received full cooperation from Bank management and staff and benefited greatly from their candor and insights. Likewise, I received a great deal of thoughtful feedback on and analysis of the Bank's forecasting performance and procedures from individuals outside the Bank, who were uniformly generous with their time.

In conducting my analysis and presenting some options for change, I took as given the existing monetary policy framework embedded in the laws governing the Bank of England and the Monetary Policy Committee. I did not consider issues surrounding the inflation target, the composition of the MPC, or the frequency of MPC meetings or Inflation Reports. An examination of actual policy decisions was also beyond the remit of my report.

Needless to say, the past five years have been exceedingly challenging for economic forecasters. The advanced economies experienced a major financial shock that caused steep declines in output around the world. In the United Kingdom, the financial shock was accompanied by a substantial depreciation of the sterling exchange rate. More recently, the banking and sovereign debt crisis in the euro area has had repercussions for trade and financial markets that have likely impaired the performance of the UK economy. The extent to which any of these key developments were foreseeable and the degree to which they have influenced economic outcomes remain an active area of debate within the economics profession. But the fact of the matter is that, on the whole, neither official nor private sector forecasters anticipated the size or timing of the shocks that hit the global economy in recent years. Likewise, the propagation of these shocks into economic activity and inflation was widely underestimated in magnitude and duration.

However, the observation that forecasting errors were widespread during this period does not obviate serious introspection on the part of economic forecasters and policy making institutions about what went wrong and what lessons might be learned to limit the probabilities of making

similar errors in the future. That obligation is especially pressing for central banks; the forecasts of central banks provide key underpinnings to policy decisions that can have profound consequences for economic outcomes. That process of introspection is under way at the Bank of England. This report aims to make a further contribution to the internal and external dialogue surrounding the Bank's forecast—its development, its accuracy, its role in the monetary policy process, and its communication to the broader public.

Fundamentally, the forecast process and the associated forecasting tools employed by the Bank in support of its monetary policy decision making are sound. MPC deliberations about the forecast are focused on the important issues and the debate and discussion is rigorous. That said, the shocks and stresses experienced by the UK economy in recent years have revealed some weaknesses in the forecasting and policy processes that may have been difficult to detect or were of little consequence during more tranquil times. In this review, in addition to noting some considerable strengths, I point out some of the weak points in the processes, not all of which are unique to the Bank of England. A period of nine weeks of study is too short to develop a full understanding of exactly what lies behind all of the forecasting procedures, tools, and meetings that are currently in place. But, I do feel that I gained sufficient exposure and insight to offer a range of options for changes to the forecasting process that have at least the potential to improve its support of monetary policy decision making. I set out my high-level conclusions in an Executive Summary, and I present the options for change in more detail in the final section of this report, discussing their pros and cons. Some of the options for changing the forecasting process would be significant and consequential, and as such, would require thorough deliberation by the Bank and by the members of the MPC before their undertaking. Others concern matters of internal organization and could be implemented at the discretion of Bank management, with advice and counsel from the staff.

One obvious difficulty that I encountered in developing the options for change outlined in this report is that I simply do not have sufficient information and insight to judge all of the costs and benefits that will need to be weighed in deciding how to move forward. Most notably, some of the options that I put forward would likely require additional resources. I have little perspective to offer on how the benefits of additional resources would stack up against other pressing claims on the public purse. Similarly, some of the resources might be garnered by a reallocation of effort within the Bank—but again, I feel unqualified to assess the shadow costs associated with alternative distributions of the Bank's limited resources. As a consequence, the approach that I took in developing options for change was to put forward only those options that I viewed as likely to surmount a reasonable benefit-cost test or those where that calculation might be a close enough call so as to at least warrant serious consideration. I did not put forward any options where I felt the benefit-cost test would clearly not be met.

The Court will need to consider how to move forward with the observations and options for change that are outlined in this report. In doing so, the Court should know that there are no flaws in the process, as it currently exists, so serious that urgent action is required. Many of the options will require careful deliberation and consultation to consider whether they should be implemented. And, if a decision is taken to go forward, some time for planning will be needed before implementation. Of course, allowing time and space for such deliberation and planning should not be seen as an opportunity to “kick the ball into the long grass” if I understand correctly the meaning

of the phrase. The Court should expect the Bank to confront the issues raised in this report and to make appropriate adjustments when warranted.

As this report will lay out, there is scope for making changes to the forecasting processes and procedures that I believe offer the potential for improvement in forecast accuracy, transparency to the public, and the effectiveness of monetary policy decisions. But that potential for improvement should not be read as an indictment of the current forecast process of the Bank of England and the MPC. During my stint at the Bank, I encountered serious people grappling with serious issues. The members of the MPC engage each other and the staff in vigorous debate and discussion of policy-relevant issues. And the staff work exceptionally hard to support the MPC in the conduct of policy. That differences of opinion exist as to how best to execute the mission of the Bank should come as little surprise in an institution populated with many economists. However, whatever those differences, policy makers and staff clearly share a strong common commitment to public service in support of the mission of the Bank of England.

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Executive summary

1. The Bank of England and the Monetary Policy Committee (MPC) have been well served by the forecast process that has been in place since the MPC was established in 1997. The analytical apparatus that supports the forecast compares favorably with that employed at other major central banks; the MPC's deliberative process is impressive in its rigor and energy; and, the MPC and the Bank provide considerable information to the public about their view of the outlook for the economy.
2. But there are reasons why a thorough examination of the forecast process might be warranted at this juncture. First, forecasting tools and monetary policy processes have been put through a severe "stress test" by the events of the past five years. Those events have revealed some vulnerabilities in both economic models and in deliberative processes that were not readily apparent in more tranquil times. Second, some other central banks have pushed farther forward with actions to make their economic forecasts and the policy expectations accompanying those forecasts more transparent to the public. In addition to enhancing transparency and accountability, those efforts have, in some cases at least, likely increased the effectiveness of monetary policy. In light of these developments, the Bank and the MPC may benefit from a reassessment of the current organization and communication of the economic and policy outlook.
3. As set out in Section 1 of this report, the forecast process at a central bank can serve three functions: to present and analyze the macroeconomic outlook; to provide a vehicle for considering monetary policy tactics and strategies; and to communicate the outlook for the economy and for monetary policy to the public. Section 2 considers the first of these functions, and asks how the MPC's forecasts have performed. Sections 3 and 4 examine and evaluate the forecast processes at the Bank. In those sections, I raise a number of issues that are worthy of consideration by the Bank, and which give rise to a number of options for change. Those options, and their key benefits and costs, are presented in Section 5.

The forecast performance of the MPC

4. The MPC's recent forecast performance has been noticeably worse than prior to the crisis, and marginally worse than that of outside forecasters. The forecast errors of the MPC have been characterized by persistent over-prediction of output growth and persistent under-prediction of CPI inflation. The Bank has set out a narrative to explain those errors. The explanations of the over-prediction of the growth in real output center on tighter-than-expected credit conditions, surprisingly weak productivity, downward pressure on real incomes from the increase in global commodity prices, and adverse developments within the rest of the world affecting volumes of net trade. As for inflation forecast errors, the Bank narrative leans heavily on higher-than-expected prices for oil and other commodities, a larger and more rapid than expected pass through of the depreciation of the sterling exchange rate into consumer prices, and increases in the value added tax rate. In broad terms, I find these explanations to be persuasive. But the narrative offered by the Bank may not fully explain the serial persistence of their recent errors; that persistence could simply

reflect a string of bad luck, but it also could reflect some inertia imparted by the forecast process or point to problems with the paradigm underlying the Bank's forecasts. Furthermore, the lack of systematic, detailed quantitative analysis undertaken by the Bank to interrogate its forecast errors makes assessing the completeness and balance of their explanations for those errors difficult. There should be no illusions that the Bank could develop a single and complete "accounting" of its forecast errors. Our knowledge of how large modern economies operate, and thus our ability to identify with any precision the "sources" of our forecast errors, evolves only slowly (and as the crisis revealed, the evolution of knowledge in the economics profession has not always been reliably in the forward direction). That said, I suggest that the Bank and the MPC need to introspect more deeply and more systematically about the lessons that can be gleaned from episodes of large forecast errors.

The forecast process at the Bank

5. Staff at the Bank play a central role in supporting the production of the MPC's forecasts. The material they produce is of high quality, and staff are energetic and committed to the mission of the Bank. But there are some challenges for the Bank in this area. First, there may be too few incentives and opportunities for staff to seriously challenge the MPC about some of the key issues surrounding the forecast. Management of the Bank have recognized this issue and put in place vehicles to better allow staff to surface alternative views. But more work may be necessary. Second, staff lack experience, both absolutely and relative to members of the MPC, in part reflecting their rapid rotation through positions within the Bank. Surmounting these challenges would require some structural changes—most significantly, if the Bank were to consider the production of a staff forecast as a key input into the forecast process of the MPC. In addition to requiring additional resources, that, along with other options aimed at cultivating and embracing a more assertive and experienced staff, would likely require some cultural changes at the Bank.
6. Turning to the tools employed in the development of the forecast, staff use a wide array of statistical and econometric models that compare favorably to those used by central banks elsewhere. But there is always additional work to be done. The financial crisis exposed virtually all major macro models as being woefully ill-equipped to understand the implications of this type of event, and the Bank's current forecast model—Compass—has very limited financial detail. The Bank will need to decide whether to enrich the financial specifications of its central model, or, if the costs in terms of increased model complexity of that are deemed too high, to ensure it devotes adequate attention to further developing, monitoring, and reporting on satellite models to address this issue.
7. I also examine the MPC's forecast process and deliberations. The process that I observed has considerable coherence and integrity. I found the MPC's discussions and debates to be vigorous, analytical, and well informed, with MPC members engaging in productive discussions of the key issues driving the outlook. I observed no deep structural problems with the process currently in place.

8. Nonetheless, there are some issues concerning the process that deserve further examination. The forecast process of the MPC, organized as it is around reaching a “best collective judgment,” has some considerable strengths. Policy makers struggle together with difficult economic issues in an effort to reach consensus on the forecast. Beyond the deliberative value of that collective effort, the resulting consensus forecast has the virtue of simplifying the message of the MPC. Nevertheless, the financial crisis highlighted just how wrong the consensus view can be at times. There could be potential gains from encouraging and considering more fully views that diverge from the consensus. The current focus on best collective judgment may round off differences of view that, if brought into sharper focus, could help the MPC better understand the vulnerabilities in its outlook for the economy and its policies. Surfacing those differences more visibly and systematically could also provide valuable perspective to the public about key areas of dispute in the policy debate.
9. As a practical matter, virtually all regular economic forecasting exercises exhibit a degree of inertia, and that is the case with the forecast of the MPC. Some of that inertia is procedural; the starting point for a forecast round relies heavily on a staff update of the MPC’s previous forecast for incoming data and news. But some of the inertia exhibited by forecasts simply reflects the slowness with which forecasters spot deeper structural problems with the stories underlying their forecasts. In the MPC’s forecasting process, there are few mechanisms capable of acting as a trigger for a fundamental reassessment of the outlook. Some of the options presented in this review are intended to create more “speed bumps” in the forecast process that might disrupt its natural inertia—for example, the possible development of a staff forecast and an even greater engagement with external researchers and scholars.

The forecast and monetary policy decisions

10. The forecast process, as it is currently organized, is an under-developed vehicle for undertaking and discussing analysis of how the outlook bears on monetary policy options and strategies. The forecast is conditioned on a simple assumption that Bank Rate follows market expectations. This raises some practical problems in terms of producing an internally consistent, forward-looking set of projections. But more importantly, the overall policy process could be improved by introducing analysis that more directly connects the central forecast and its accompanying risks to policy options and strategies.
11. Although it is beyond the specific remit of this review¹, a forecast-related issue that will need attention not too far in the future is the interaction of the forecast process, the monetary policy process, and the financial stability policy process. The crisis made clear that the development of the economic forecast and the conduct of monetary policy could likely benefit from the intelligence gathered and the analysis prepared as part of the efforts to monitor and respond to emerging financial stability concerns. Likewise, understanding vulnerabilities to the financial system is likely to be closely linked in many instances to the outlook for the domestic and global economies. Considering the best mechanisms for promoting productive integration of these efforts should likely be high on the agenda in the period immediately ahead.

¹ The full terms of reference for the Review are set out in the Annex, p.59.

Communication and transparency

12. The Bank of England was among the early pioneers in developing and promoting central bank transparency, and many practices that are now considered routine at other central banks had their origin at the Bank. But some central banks have pushed farther forward in increasing the quality of their transparency and communications, and the Bank may wish to take stock of its communications strategy in light of its own considerable experiences and those of its peers.
13. The fan charts remain a valuable tool in communicating the probabilistic nature of a forecast exercise. But some amendments to the fan charts—such as reducing the gradations within the charts, and producing cumulative density functions—deserve consideration. In addition to possible changes to the charts themselves, the use of alternative scenarios could help to illustrate how sensitive the forecast is to different critical judgments.
14. One common view expressed by outside forecasters is that the MPC provides too little detail in support of their forecasts, making it difficult for observers to understand the key drivers of the forecasts, and to audit and interrogate the forecasts over time. The Bank and the MPC may wish to consider developing an efficient vehicle for providing more quantitative texture to its forecast. The options might range from providing a full forecast of the expenditure and income components behind the consensus forecast to providing forecasts of some of the key analytical variables underpinning the forecast, such as the output gap, household saving rate, and the like.
15. Another area worth some exploration by the Bank would be to report some summary of the individual forecasts of the MPC. While this could risk detracting from the central message of the forecast, it would provide greater transparency as to the range of views held by MPC members. The value of that information might be especially large when risks were mounting sharply and different views were emerging among members of the Committee.
16. Finally turning to policy communications, some central banks have taken large steps toward greater transparency by offering explicit guidance about the expected path of the policy rate. That provides both greater transparency, and another tool for the central bank to influence financial conditions. It remains too early to declare those efforts a success. As a consequence, the MPC may wish to study these innovations before deciding whether to move in this direction, and, if so, how.

Options for consideration

17. In Section 5, I offer an array of options for making adjustments to the forecasting process that respond to many of the issues raised by my evaluation. These are options for further consideration rather than firm recommendations, and, in Section 5, I set out the rationale for each option. In addition, I present issues that would need to be considered before making a decision about whether to adopt that option, including, importantly, some of the drawbacks or costs associated with each of these options. But below, I simply set out the options themselves, grouped into three functional areas: 1) options related to improving forecast

capabilities, process, and organization; 2) options that could raise the support offered by the forecast process to the conduct of monetary policy; and 3) options to enhance the forecast as a device for communication, transparency, and accountability.

18. An over-arching theme that cuts across many of the options offered below is the objective of increasing the number of “entry points,” both internally and externally, for alternative points of view about economic developments and their relation to the forecast and to policy. I doubt that the implementation of any or all of these options six years ago would have materially increased the probability that the Bank of England, or any other central bank, could have fully foreseen the intensity of the impending financial crisis. But given the experience of the past six years, the greater objective should be to make changes, when warranted, that improve the efficiency, robustness, and transparency of forecasting and policy processes. By doing so, the Bank could increase the probability of detecting and responding in a timely manner to emerging economic and financial developments.

Options related to forecast capabilities, process, and organization

1. Further expand efforts to increase the detail with which the financial sector is incorporated into the forecast and the models that support the forecast.
2. Support even greater engagement with the academic community on forecast technology.
3. Hold four “special issues” meetings each year that would be used to explore topics relevant, directly or indirectly, to the forecast but that need greater attention than can be devoted under the meeting constraints of the forecast round. To create time for MPC members to attend, these meetings could replace four pre-MPC meetings.
4. Produce a staff forecast and present that forecast to the MPC prior to each Inflation Report.
5. At some point in the forecast process, canvass individual MPC members for their forecasts of real GDP growth and inflation.
6. Develop richer and more systematic internal processes for evaluating outturns against the forecast.
7. To promote a more assertive and experienced staff, increase the participation and influence of specialists within the Monetary Analysis Directorate of the Bank in the forecast process.
8. To the extent possible, consider increasing the number of staff allowed to witness forecast presentations.
9. Contemplate encouraging longer tenure in positions and less rotation.

Options related to better integration of the forecast and monetary policy analysis

10. Analysis of monetary policy options and strategies could be included routinely in the background materials and briefings prepared by the staff for every forecast round.

11. Consider creating a forecast with an extended horizon beyond the current three-year period—a horizon of sufficient length to allow consideration of the development and likely unwinding of major economic and financial imbalances.

Options for improving communication and transparency of the forecast

12. Consider publishing some alternative scenarios.
13. Provide greater detail about the consensus forecast.
14. Expand the forecast evaluation exercise currently published in the Inflation Report to include a fuller discussion of how outturns have differed from expectations.
15. Consider publishing a summary of the individual forecasts of the MPC members as a supplement to the fan charts in the Inflation Report.
16. Consider increasing communication about the outlook for policy as part of the forecast process.
17. Consider publishing a vote by MPC members on the forecast in addition to a vote on the policy decision.
18. Outsource to a reputable and impartial research organization the responsibility to organize once- or twice-a-year meetings of the MPC with leading researchers and scholars, focused on difficult or controversial issues. This outside group would set an agenda based on what they think the MPC should hear, including views that would challenge prevailing conventional wisdom at the Bank.
19. Consider changes to the fan charts. The Bank could reduce the fine gradations of the fan chart and add a line for the mean and/or modal forecast. And, some consideration should be given to moving away from a continuous quarterly projection and providing projections for half years or years.
20. Consider the creation and publication of cumulative density functions for inflation, the growth rate of real GDP, and the level of real GDP for a couple or few specified dates.
21. Publish the supplementary data with the quarterly detail and the probability distribution parameters underlying the fan charts at the time of the release of the Inflation Report rather than a week later.

Section 1: The functions served by a central bank forecast and forecast process

19. The forecast produced by a central bank can serve several mutually supporting functions. This is not to say every central bank produces a forecast that serves all possible functions; that is not the case. But understanding these functions provides a useful point of departure for assessing the forecasting framework and procedures currently employed by the Bank of England and the Monetary Policy Committee. In brief, I see three key functions being served by a central bank forecast: 1) to present to policy makers an economic outlook and associated risks, and to do so in a structured process designed to encourage focus on and debate of the key issues and vulnerabilities surrounding that outlook; 2) to provide a vehicle for considering monetary policy strategies and tactics that best respond to the expected economic environment and the associated risks; and, 3) to communicate that economic outlook and its implications for monetary policy to the public in a manner that promotes transparency and accountability.

1.1 Presenting the economic outlook and associated risks

20. The first function noted above focuses on the development of the economic forecast and its discussion by policymakers. There are two important components to this function, which can be stated in simple terms as “numbers” and “analysis.” Much external attention to the forecasting enterprise is often focused on the numbers. And, indeed, the numbers are relevant and important. Some of the numbers involve a “point” forecast, where the point forecast might be a modal forecast—the most likely outcome, or a mean forecast—a weighted average of all possible outcomes. But most policymakers at central banks would likely agree that point forecasts alone provide insufficient information on which to take decisions. The risks surrounding the point estimates and how those risks are changing over time are also relevant considerations to policy decisions. In effect, forecasts of greatest value to policy makers can best be thought of as probability distributions, which embed not only a point forecast, but also ranges of outcomes with varying probabilities. At the risk of some oversimplification, the size of those risks can be characterized by the variance of the distribution of outcomes (how wide the distribution is) and the balance of the risks associated with the outcome can be characterized by the skew of the distribution (how probability mass is distributed above and below the mode).
21. Of course, a good forecast process extends well beyond the production of point estimates and probability distributions for a few key variables. A central bank forecast process should also provide a vehicle for policymakers to discuss and debate the factors shaping the economic outlook. A good forecast process is likely to involve filtering much high-frequency information to gain some purchase on where the economy has been recently and where it might be headed in the near future. The incoming information is also important because it provides clues as to whether developments are evolving in the manner previously expected, and if not, whether there are more serious challenges emerging about the basic story underlying the forecast. Because there is always considerable uncertainty about the

interpretation of this incoming information, a good policy process should encourage policy makers to challenge their own views and those of their colleagues in a constructive effort to understand often-conflicting data.

22. As one looks further out on the horizon, the incoming data become less determinative of the outlook, and the forecast is typically guided by the broader economic forces thought to be operating on the economy. For most central bank forecasts, the manner in which those broader economic forces manifest themselves in the outlooks for activity and inflation is captured by an economic model or a collection of economic models. The models provide intellectual frameworks that enforce discipline on discussion and debate. In general, models used in the forecasting process should be forced to confront the data and should provide policy makers with reasonable assurance that the models are capable of replicating the types of dynamic responses to shocks that have been observed historically. Of course, all models are gross simplifications of a very complex and evolving reality, and any model's ability to provide accurate forecasts over long forecast intervals is severely limited.
23. Because our knowledge is, in fact, so limited, one key objective of a central bank forecast process should be to focus policymakers' attention on the key issues and vulnerabilities surrounding the economic outlook. In other words, while the process is about the development of a coherent story for the outlook, it should also work to understand the many ways in which that story might be wrong.

1.2 The forecast as a vehicle for considering policy strategy

24. This leads to a second function that can be served by a central bank forecast process—its use as a device for discussing monetary policy tactics and strategies. Even when policy instruments are held fixed in the forecast process, as at the Bank of England and some other central banks, the resulting forecast can convey useful information about the economic outlook and the likely direction in which policy will need to be moved in order to achieve stated objectives.
25. But the process can alternatively involve greater integration of the setting of an expected path for policy within the development of the economic forecast. In particular, the path of policy can be endogenized in the forecast process—an approach taken by some other central banks. For example, forecasts can be developed that incorporate a policy rule that adjusts policy instruments in response to changes in other variables or that incorporate some type of “optimal” policy. Using this approach, a policy path is determined simultaneously with the forecast of other economic variables. Especially for a committee where policy preferences may vary within the context of the broader policy remit, the consideration of economic outcomes and policy paths from a variety of rules and “optimal” policy configurations can be a valuable input into policy discussions and decisions. Although most policy makers would be very unlikely to take the prescriptions from such rules literally, such analysis can help provide a guide to making the link between the forecast and the policy decision at hand. That link can be further enriched by considering analysis that takes account of the uncertainties in the outlook and their implications for the conduct of policy—uncertainty about the structure of the economy, uncertainty about the nature of the disturbances

affecting the economy, and uncertainty about the way in which various policy actions might operate on the economy. This analysis could also lead more naturally to useful discussions among policymakers as to what constitutes preferred or desirable outcomes for inflation and real GDP.

1.3 Communicating the macroeconomic and policy outlook

26. The third purpose served by a central bank forecast is its use as a communications device with the public. The forecast, especially of the variables that are primary and ancillary policy objectives, is a central element of accountability to the public. The forecast and the analysis offered in support of the forecast should provide for as transparent an engagement as possible with the public, allowing the public to better understand the central bank's thinking about the evolving outlook and the factors that might cause that outlook to change. Transparency about the forecast also provides an opportunity for those outside the central bank to critique the analysis of the central bank. That feedback can be helpful to the central bank in gaining alternative perspectives on difficult issues of economic analysis. Finally, a central bank forecast should offer sufficient information to allow the public and market participants to infer the likely path of policy and how that path might change in response to evolving economic circumstances. That information can enhance the effectiveness of policy by better aligning private expectations with those of the central bank.
27. This brief description of functions is undoubtedly incomplete, but it does provide some useful benchmarks for an assessment of the Bank of England's forecast process. In the next section, I focus on the "numbers" aspect of forecast performance. In Sections 3 and 4, I describe and evaluate the "analysis" and "communications" aspects of the forecast, and their relation to forecast process and policy-related deliberations.

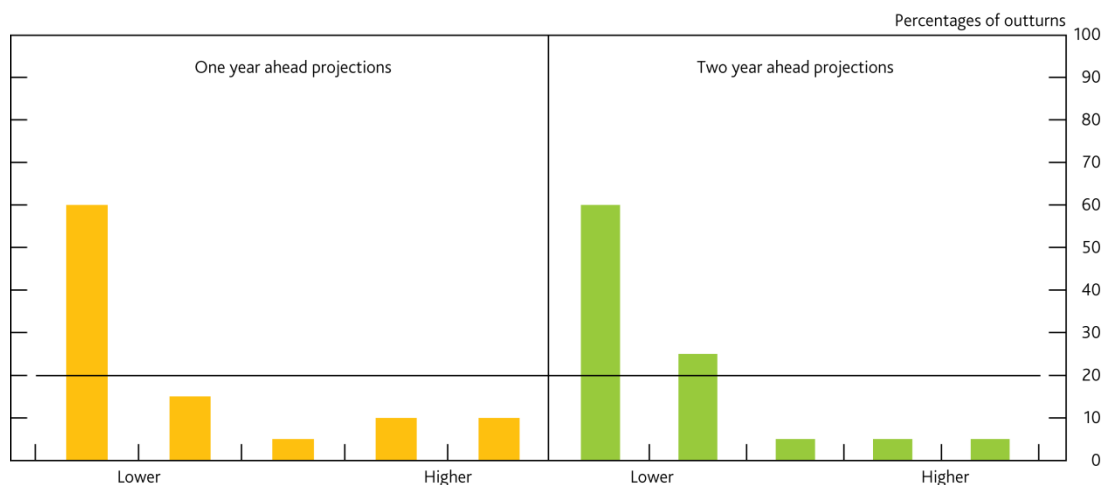
Section 2: The performance of the MPC's forecasts since 2008

28. As part of the remit for this review, I was asked to examine the performance of the MPC's projections for the growth of real GDP and inflation since 2008. My examination of the forecast performance of the MPC encompasses three elements: some statistics related to the forecast performance of the MPC and a comparison with outside forecasters; a presentation of the narrative offered by the Bank of their forecast errors; and a discussion of that narrative and some broader observations on the forecast evaluation process at the Bank.

2.1 The MPC's forecasts for GDP growth

29. The MPC stresses that the nature of its forecast is a distribution of possible outcomes rather than a point forecast. So one way to gauge the success of the MPC's record—and the one the MPC prefers—is to compare the distribution of actual outturns to the previously forecasted distributions. Chart 1 shows the proportion of outturns for four-quarter GDP growth that have fallen in each quintile of the forecasted probability distributions at the one-year and two-year horizons over the period since the financial crisis began in the middle of 2007.

Chart 1: Distribution of GDP growth since August 2007 across quintiles of the distribution forecasted by the MPC^(a)



^(a) The center of forecasts made prior to 2011Q3 have been adjusted upward by 0.3pp to reflect backdated methodological changes in GDP measurement introduced in that quarter.

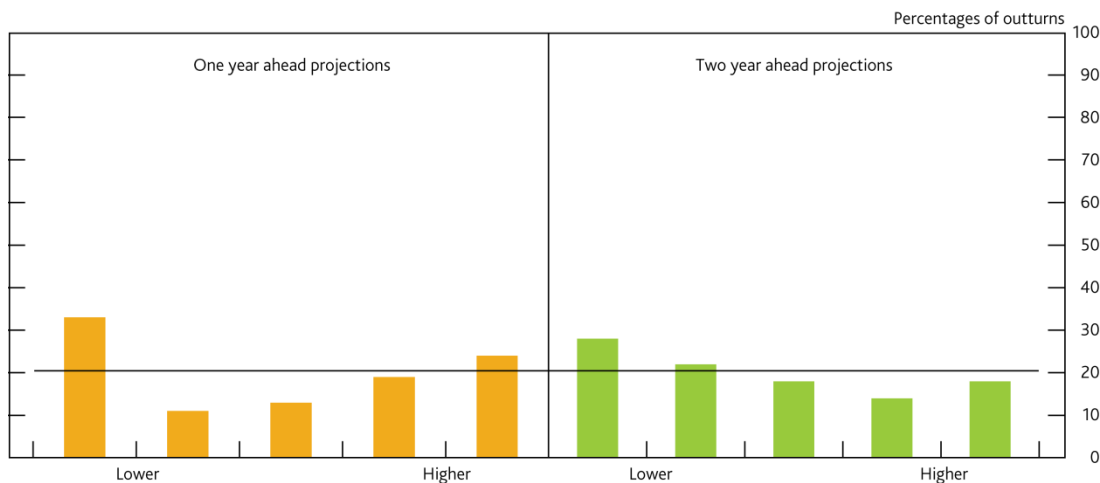
30. Were the MPC to have accurately forecast the distribution of outturns, then in large samples outturns would be expected to lie within each quintile 20 percent of the time². Instead, outcomes in the period since the crisis commenced have been concentrated in the lowest

² One caveat is that the forecast distribution is conditioned on the market-implied path for financial market variables available at the time of the forecast, while the GDP outturns are a product of the actual path followed by financial market variables.

quintile, meaning growth has consistently been weaker than the MPC forecast both one-year ahead and two-years ahead.

31. Five years is, of course, a relatively short sample period. In Chart 2, the analysis is extended to cover the full period for which MPC forecasts are available. As is shown, over the full sample, the outturns have been more evenly distributed relative to the MPC's forecast. Nonetheless, the MPC's significant over-prediction of growth since 2008 means that, even over that longer period, more than 30 percent of outturns for one-year ahead GDP growth have fallen in the lowest quintile of the forecast distributions, compared with the 20 percent that might have been expected on average.

Chart 2: Distribution of GDP growth since February 1999 across quintiles of the distribution forecasted by the MPC^(a)

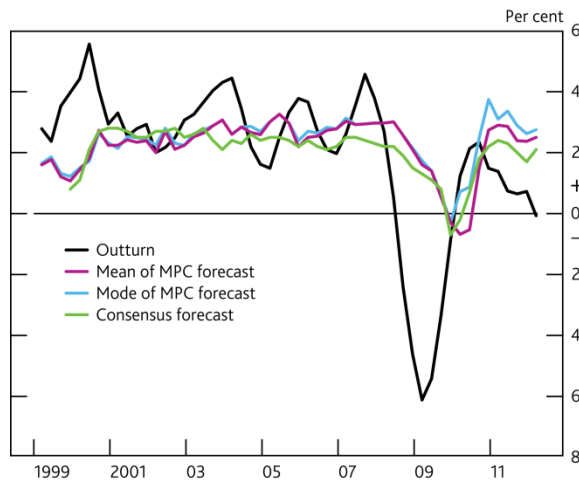


^(a) The center of forecasts made prior to 2011Q3 have been adjusted upward by 0.3pp to reflect backdated methodological changes in GDP measurement introduced in that quarter.

32. To gain some perspective on this performance, a comparison of the MPC's forecast record with that of other forecasters over the same period is instructive. For this exercise, it is necessary to focus on the MPC's central projections, because that tends to be the only forecast provided by others. I consider both the mode of the MPC's forecast distributions and also the mean of those distributions. For purposes of this review, I label the difference between the outturn and the central projection an "error," though I recognize that others may wish to label them low-probability outcomes.

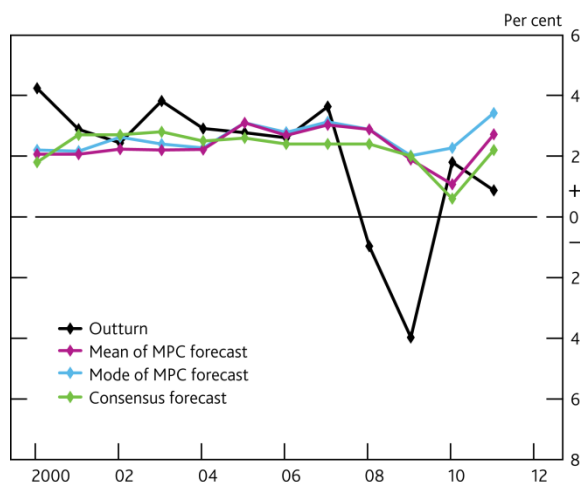
33. Chart 3 shows outturns for year-on-year growth of real GDP, the mean and mode of the MPC's forecast distribution of real GDP growth one year prior, and the average of around 25 other forecasts made one year previously, as collected by Consensus Economics survey of forecasters.³ Chart 4 shows the forecasts made at the beginning of each year for calendar year GDP growth the following year—in essence, the two-year ahead forecast—which is the longest horizon over which Consensus forecasts are provided.

Chart 3: Central forecasts for annual GDP growth made one year prior to the outturn



Sources: Consensus Economics and Bank of England

Chart 4: Central forecasts for calendar year average GDP growth made at the beginning of the previous year



Sources: Consensus Economics and Bank of England

³ One technical matter that makes these and subsequent forecast comparisons imprecise is that the MPC conditions their forecast on the market-implied path for the Bank rate, while external forecasters are presenting, in general, an unconditional forecast—one that incorporates their best guess for the path of Bank Rate.

34. A number of points are apparent from these comparisons. First, neither the MPC nor external forecasters anticipated the deep recession which began in 2008 following the onset of the global financial crisis. Second, once the recovery began in the second half of 2009, both the MPC and, on average, external forecasters were overly optimistic that it would continue. As with the MPC, external forecasters did not predict the significant weakening in growth over 2011, or that the economy would return to technical recession.
35. However, despite those qualitative similarities, the MPC has over-predicted growth by more than the average of external forecasters. The MPC's modal and mean projections have consistently been above those of the average of external forecasts over this period. Table 1 compares the forecasting errors of the mode and the mean of the MPC forecast and that of Consensus for one-year ahead forecasts. The table confirms that, since the crisis commenced, the MPC have made somewhat larger forecast errors for growth than the average errors of external forecasters, though the differences are not striking.

Table 1: Comparison of MPC GDP growth forecast and Consensus forecast made 1-year prior

	Root Mean Square Errors			Average absolute errors			Average errors ⁽¹⁾		
	MPC mode forecast	MPC mean forecast	Consensus	MPC mode forecast	MPC mean forecast	Consensus	MPC mode forecast	MPC mean forecast	Consensus
Whole period	2.41	2.40	2.26	1.66	1.68	1.54	0.52	0.34	0.15
Pre-crisis ⁽²⁾⁽³⁾	1.31	1.32	1.38	1.01	1.02	1.01	-0.56	-0.63	-0.74
Crisis	3.54	3.50	3.21	2.71	2.74	2.40	2.27	1.91	1.61

Sources: Consensus Economics and Bank calculations.

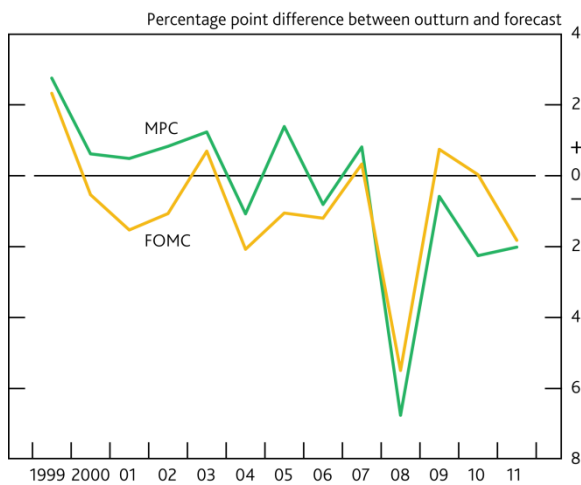
⁽¹⁾ A positive number signifies the forecast was higher than the outturn

⁽²⁾ 2007Q3 is used as the widely recognized starting period of the crisis. This differs slightly from the remit of the review which refers to forecasts "since 2008."

⁽³⁾ It should be noted that methodological changes in the 2011 ONS Blue Book resulted in upward back revisions to historical estimates of GDP growth. This increased the incidence of forecasts underpredicting GDP growth.

36. To supplement this analysis, I also looked at the recent forecast records of the European Central Bank (ECB) and the Federal Reserve. A direct comparison of forecast records is fraught with difficulties, as one is looking at different economies, with different volatilities, and different shocks. But Charts 5 and 6 show the difference between the central forecasts of the participants of the FOMC—the deliberative body of the Federal Reserve—and the ECB relative to the outturns; that difference is also shown for the MPC. The major takeaway from this exercise is that, as in the United Kingdom, neither the ECB nor the Federal Reserve anticipated the deep contraction in activity that occurred in 2008 and into 2009. The forecast errors of the ECB and the Fed have been less marked in the period since the global recession receded, but drawing any firm inference from that observation would be problematic.

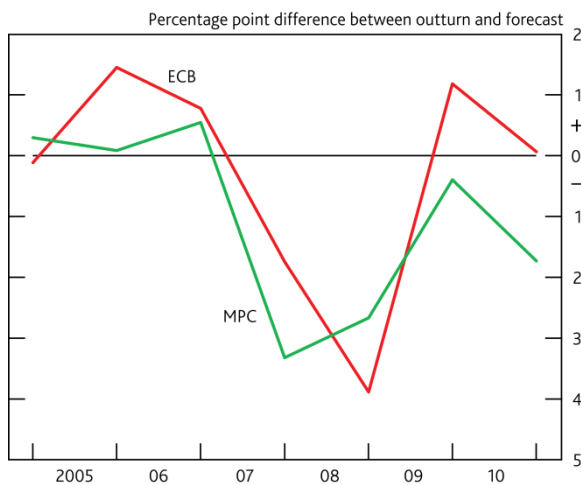
Chart 5: The performance of FOMC and MPC forecasts of annual GDP growth^{(a)(b)}



^{a)} MPC modal forecasts; For the FOMC: Semi-annual forecasts from 1999 to 2007 and reported to Congress. From 2008 onwards, midpoint of the central tendency published in the Summary of Economic Projections.

^{b)} Observations are the difference between Q4-on-Q4 growth rates and those forecast one year prior.

Chart 6: The performance of ECB and MPC forecasts of annual GDP growth^{(a)(b)}



^{a)} MPC modal forecasts; Center of interval forecast provided by ECB.

^{b)} Observations are the difference between calendar year average growth rates and those forecast one year prior.

37. In summary, the MPC has persistently over-predicted growth since the onset of the financial crisis. It is not surprising that the MPC did not foresee the onset and intensity of the recession over 2008 and 2009—other forecasters of the UK economy made similar errors during that period, and both the ECB and the Fed also failed to anticipate the depth of the impending recessions in their economies. In the period since the global recession, most UK

forecasts have tended to over-predict growth. However, the MPC has predicted stronger growth than other forecasters, on average, since that period—and therefore has made somewhat larger forecast errors than others.

2.2 The causes of the MPC's forecast errors for the growth of real GDP

38. In evaluating the MPC's forecast performance, it is useful to consider the possible reasons that have been offered to explain why the economy evolved differently than the MPC's central projections. In what follows, I report the broad narrative that has emerged at the Bank concerning the reasons for recent forecast errors. In developing this narrative, I have used information available from the staff in Monetary Analysis (MA), in Inflation Reports, and in various speeches given by MPC members. In the conclusion of this section, I discuss the plausibility of these explanations.
39. Based on material made available to me by the Bank to assist in the preparation of this review, among the expenditure components, the largest contributors to the weakness in GDP growth relative to the MPC's forecasts made in 2008 have been, in order of their contribution to the forecast errors, household consumption and private sector investment. External trade has also provided a smaller contribution to real GDP growth than was expected in 2008, despite the weaker demand for imports that is likely to have resulted from weaker domestic demand. The contribution of government spending to growth has been broadly in line with forecasts made at the start of the recession.
40. Of course, this examination of expenditure components does not address at a deeper level the reasons why growth in real GDP has been weaker than the MPC expected. The principal candidate explanations offered by the Bank are: tighter-than-expected credit conditions; downward pressure on real incomes from increases in global commodity prices; surprising weakness in labor productivity; less support than expected from international trade; and the widespread effects on UK activity from the continuing strains in the euro area.

2.2.1 The tightening in credit conditions

41. The Bank believes that a major driver of the recession of 2008/2009 was the effects of the sharp tightening in credit conditions that occurred in the wake of the severe financial turbulence in autumn of 2008 and the associated fallout on UK and overseas banks. And continued restrictions in the availability of credit may also have been responsible for some of the weakness in activity since then. One indicator of that restriction in credit supply is the spread between Bank Rate and the average effective interest rate paid by firms and households. This spread increased by several percentage points relative to its level in 2007, and the growth of lending volumes effectively came to a halt in late 2008.
42. The contraction in private sector credit coincided with a process of balance sheet adjustment by households and businesses that has likely weighed on real GDP growth throughout the period in question. In contrast to the period of strong credit growth that occurred in the ten years prior to the recession, the ratio of total debt to GDP has been flat since 2008. Within

that total, private sector leverage has been falling as households and firms save a higher proportion of their income, while government borrowing has increased.

43. The financial crisis, and the sharp tightening in credit conditions that resulted from it, was not foreseen by the MPC or by other forecasters. That was probably responsible, in large part, for the MPC not predicting the dramatic fall in GDP in 2008 and 2009.
44. Regarding the period since then, there is some evidence that the MPC has been overly optimistic regarding the pace at which the banking system would stabilize and credit conditions would normalize. Throughout the period since the recession, the MPC has generally been predicting a gradual improvement in credit conditions as the most likely outcome⁴, which was expected to provide some boost to growth as private sector borrowing picked up in response. Instead, credit conditions have remained tighter for longer, not least as challenges facing several euro area countries weigh on asset prices and bank funding costs.

2.2.2 Influences from—and trade with—the rest of the world

45. A second drag on the growth of real GDP has been the price and quantity of the UK's trade with the rest of the world. In particular the very sizeable increase in global commodity prices put significant and unexpected downward pressure on real household incomes, and upward pressure on non-energy companies' costs, over much of the period. The damper this likely placed on domestic spending, most notably consumption, is a recurring theme of the narrative that the MPC puts forward for its forecasting errors.
46. In addition, the volume of trade with the rest of the world has disappointed. Following the depreciation of sterling in 2008, the MPC forecast a somewhat quicker and more significant improvement in net trade than was subsequently experienced. Four years later, it seems increasingly likely that the ultimate boost to net trade will be smaller than suggested by historical movements in the exchange rate. Moreover, world activity has been weaker than the MPC had expected—especially in the euro area, further weighing on UK GDP growth.
47. The Bank believes that events in the euro area may also have weighed on UK growth through other channels beyond simply reduced demand for UK exports. Continued uncertainty over the resolution of the challenges facing the euro area may have increased strains facing some UK banks, given their exposure to the euro area, and so may be partly responsible for the continued restrictions to the supply of bank credit discussed above. More generally, euro-area concerns are judged to have increased the degree of macroeconomic uncertainty facing UK households and firms, reducing their willingness to spend. Such channels are difficult to quantify, but are thought by the MPC to have likely contributed to its over-prediction of growth over this period.

⁴ See, for example, the August 2010 Inflation Report, p43, and the November 2010 Inflation Report, p43.

2.2.3 Weakness in productivity

48. A third drag on economic activity cited by the Bank has been persistent weakness in productivity, which has been an additional weight on real incomes. A fall in productivity is to be expected when output declines; following a drop in demand, firms tend to operate for a period with a significant amount of spare capacity of both capital and labor, which is reduced over time as either demand recovers or firms reduce capacity. The experience of previous UK recessions, and the cyclical behavior of productivity in some other developed economies, was consistent with this pattern.
49. The fall in labor productivity in the UK in 2008 and 2009 was, however, particularly sharp. The pace and extent to which productivity would recover became a key judgment for the MPC to make when assembling its forecasts; the path of productivity influences the incomes of households and businesses, and the sustainable level of output in the economy overall.
50. As set out in various Inflation Reports following the 2008/2009 recession, the MPC's central judgment was that some appreciable proportion of the decline in productivity, and so in the supply capacity of the economy, was likely to persist.⁵ Nonetheless, firms were judged likely to be operating with a significant margin of spare capacity. Implicit in these judgments was an assumption that damage to the potential output of the economy had been smaller than the fall in output per head. And so some rebound in the level of real GDP toward its pre-recession trend could be expected, implying a period of above-trend GDP growth.
51. With the passage of time, the hit to labor productivity is proving to be more persistent than the MPC initially assumed. Output per worker has still not even recovered its level in 2007. Moreover, business surveys imply little spare capacity within firms. Weak productivity has been reflected in persistently weak wage growth.
52. Several explanations have been put forward for the persistent weakness in productivity growth, including that: there is more spare capacity within firms than surveys suggest, and thus productivity will eventually recover; that the reduction in credit availability has had a significant impact on the supply side of the economy, perhaps by slowing the necessary reallocation of resources within the economy; that low real wages and high financing costs have resulted in a substitution of labor for capital; and that output and productivity were unsustainably high before the recession. As yet, no consensus has been reached on this question.

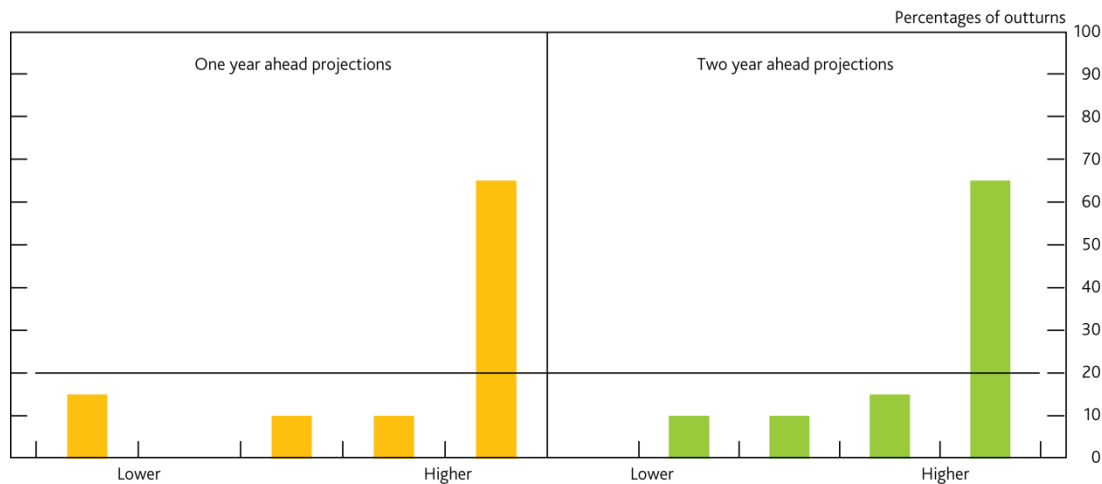
2.3 The performance of the MPC's forecast of inflation

53. A similar exercise to that above can be employed to examine the MPC's forecasts for inflation since 2008, comparing them to the subsequent outturns for inflation, and to other contemporaneous outside forecasts. Chart 7 shows the proportion of outturns for four-quarter inflation that have fallen in each quintile of the forecast probability distributions at the one-year and two-year horizons over the period since the financial crisis began in mid-

⁵ See, for example, the February 2010 Inflation Report, pages 44-45, and the May 2010 Inflation Report, pages 45-46.

2007. Again, were the MPC to have accurately forecast the distribution of outcomes, then outturns might be expected to lie within each quintile on roughly 20 percent of occasions⁶. Instead, outturns have been highly concentrated in the highest quintile of the forecasted distribution; inflation has frequently turned out significantly higher than the MPC forecast.

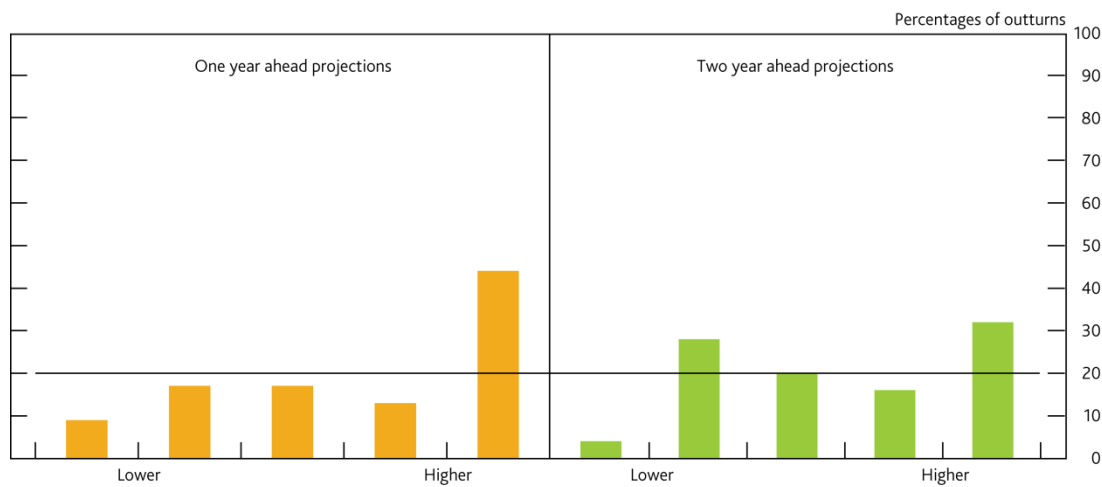
Chart 7: Distribution of inflation since August 2007 across quintiles of the distribution forecasted by the MPC



54. Extending the chart back to cover the all available MPC forecasts shows a more even distribution of outcomes relative to the distribution projected by the MPC (Chart 8). But even over this longer period, inflation has been concentrated in the upper quintile—around 40 percent of outturns having fallen in that quintile, rather than the expected 20 percent.

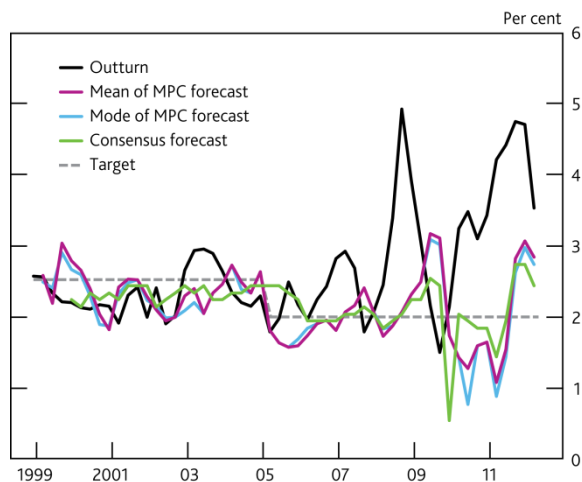
⁶ With the caveat that the forecast distribution is conditioned on the market-implied path for financial market variables available at the time of the forecast, while the inflation outturns are a product of the actual path followed by financial market variables.

Chart 8: Distribution of inflation since February 1999 across quintiles of the distribution forecasted by the MPC



55. Chart 9 shows the year-on-year outturns of inflation relative to both the mean and mode of the MPC's forecast distribution one year previously, and the consensus average of external forecasts made one year previously. Neither the MPC nor external forecasters foresaw the inflation spike in 2008, nor did either group anticipate the sustained period of above-target inflation which began in late 2009. Table 2 compares the forecasting errors of the mode and the mean of the MPC forecast and that of Consensus for one-year ahead inflation forecasts. Both prior to the crisis and in the period since then, the MPC's root mean squared error when forecasting inflation one year ahead is a little higher than that of the Consensus average forecast. But for both the MPC and the Consensus, errors have been significantly larger over the past five years than prior to the crisis.

Chart 9: Central forecasts for annual CPI inflation made one year prior to the outturn



Sources: Consensus Economics and Bank of England

Table 2: Comparison of MPC inflation forecasts and Consensus forecast made 1-year prior

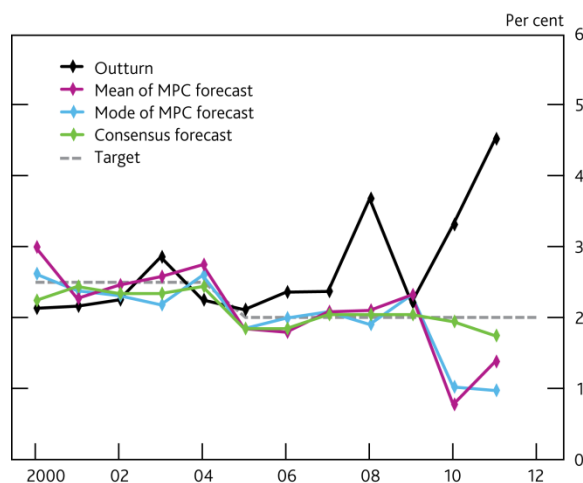
	Root Mean Square Errors			Average absolute errors			Average errors ⁽¹⁾		
	MPC mode forecast	MPC mean forecast	Consensus	MPC mode forecast	MPC mean forecast	Consensus	MPC mode forecast	MPC mean forecast	Consensus
Whole period	1.21	1.16	1.07	0.86	0.85	0.76	-0.59	-0.54	-0.57
Pre-crisis ⁽²⁾	0.46	0.46	0.40	0.38	0.39	0.32	-0.14	-0.11	-0.12
Crisis	1.80	1.72	1.60	1.54	1.50	1.40	-1.22	-1.15	-1.22

Sources: Consensus Economics and Bank calculations.

⁽¹⁾ A positive number signifies the MPC's forecast was higher than the outturn.

⁽²⁾ 2007Q3 is used as the widely recognized starting period of the crisis. This differs slightly from the remit of the review which refers to forecasts "since 2008".

56. Chart 10 shows the forecasts made at the beginning of each year for calendar year inflation the following year (that being the longest horizon over which Consensus forecasts are provided). At this horizon the MPC's forecast has more clearly underperformed the Consensus. In particular, at both the beginning of 2009 and the beginning of 2010, the MPC anticipated that inflation would fall significantly below the 2 percent target in the following year. In contrast, other forecasters, on average, predicted that inflation would be close to the target. Given that inflation was in fact significantly above the target in both 2010 and 2011, the MPC made larger forecast errors than external forecasters.

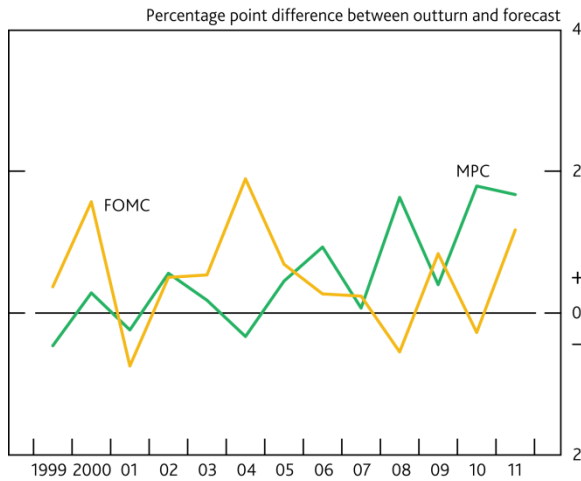
Chart 10: Central forecasts for calendar year average inflation made at the beginning of the previous year

Sources: Consensus Economics and Bank of England

57. For completeness, Charts 11 and 12 display the inflation forecast errors of the Federal Reserve, the ECB and the MPC. The inflation shocks to these three economies are probably even more idiosyncratic to their individual economies than the financially driven shocks to demand and output, most especially so because the United Kingdom experienced a

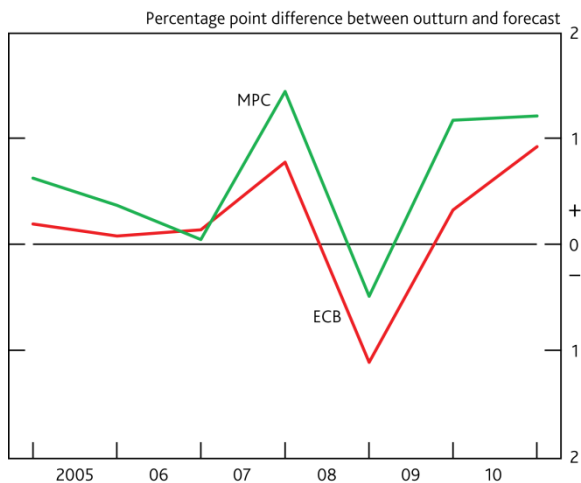
substantial depreciation of the sterling exchange rate. So a direct comparison of forecast performance is even more problematic. About all that can be said is that the ECB and the Federal Reserve also experienced some upside surprise to their inflation forecasts.

Chart 11: The performance of FOMC and MPC forecasts of inflation^{(a)(b)}



- (a) MPC modal forecasts; For the FOMC: Semi-annual forecasts produced from 1979 to 2007 and reported to Congress. From 2008 onwards, midpoint of the central tendency published in the Summary of Economic Projections.
- (b) Observations are the difference between Q4-on-Q4 growth rates and those forecast one year prior.

Chart 12: The performance of ECB and MPC forecasts of inflation^{(a)(b)}



- (a) MPC modal forecasts; Center of interval forecast provided by ECB.
- (b) Observations are the difference between calendar year average inflation rates and those forecast one year prior.

2.4 The narrative of the MPC's forecast errors of inflation

58. As with the analysis of the forecast errors for real GDP, what follows is the broad narrative that has emerged at the Bank as to the sources of the inflation forecast errors. Again, I report, as best I can, the Bank's stories about the inflation surprises.
59. In explaining the unexpected strength of inflation over recent years, the Inflation Report and speeches given by some MPC members have tended to distinguish between the effects of "external" price shocks (specifically the effects of energy prices and import prices) and domestic influences on price inflation.
60. One external cost shock that has undoubtedly had a substantial effect on inflation since 2007 has been large swings in energy prices, most notably the price of oil. Overall, the price of oil has risen by more than half since 2007. This and other energy price increases have put upward pressure on inflation—directly through higher petrol and utility costs and indirectly through effects on input costs in the production of other consumer goods and services.
61. Unexpected changes in the price of oil have clearly been responsible for some of the MPC's inflation forecast errors over this period. Throughout the period (and prior to it), the MPC has assumed that oil prices would follow the path implied by futures prices, though the MPC has, at times, indicated that it thought risks to its central forecast were skewed because of the possibility of further oil price rises. Those futures prices did not predict the large rises in oil prices during 2008, their subsequent plunge following the global recession, or their steady and significant recovery during 2010 and 2011.
62. A second external cost pressure that the Bank believes has been responsible for some portion of its inflation forecast errors has been increases in non-oil import prices. Non-oil import prices rose by a cumulative 25 percent in sterling terms between the middle of 2007 and the end of 2011. These increases occurred in the wake of the roughly 25 percent decline in the sterling effective exchange rate in the two years beginning mid-2007. This fall in sterling was not anticipated and thus was not factored into the MPC's central projection in advance—the MPC conditions its forecasts on the path for sterling implied by interest rate differentials between the United Kingdom and other countries⁷. Higher import prices also reflected unexpected upward pressure from a global increase in the price of non-energy commodities which began in mid-2009.
63. Movements in exchange rates and world commodity prices take time to affect consumer price inflation, as prices are gradually adjusted throughout the supply chain. Moreover, some of the effect of these changes can be absorbed via lower wages or lower price mark-ups. Therefore the MPC was faced with a judgment concerning the extent and timing of the pass through of a weaker exchange rate and higher world commodity prices into consumer prices. Immediately following the depreciation, the MPC's central case embodied the view that only a small amount of the adjustment to higher imported costs would come through

⁷ In fact, the MPC assumes the exchange rate follows a path half way between that implied by interest rate differentials and a constant path.

higher consumer prices. The MPC judged it most likely that firms would accept a lower price mark-up or reduce wage costs. To be sure, there is a body of academic literature that supported this judgment based on the more recent experiences of developed economies,⁸ though that view is not unanimously accepted by economists.

64. The MPC now judges that it underestimated the effects of sterling's depreciation on consumer prices, and that this contributed to their inflation forecasting errors since 2008.⁹ In 2008, the rate of inflation of goods (which are relatively import intensive) increased significantly, relative to both its historical average and the equivalent rate of inflation of goods in the euro area. Meanwhile the rate of inflation of (less import intensive) services was not weak enough to offset the effect on aggregate inflation¹⁰. This suggests that a larger proportion of the necessary adjustment to the higher level of import prices occurred through higher consumer prices, likely raising inflation by significantly more than the MPC had anticipated immediately after the depreciation. The MPC's views on pass-through appear to have shifted in response to the accumulating evidence that the effects have been larger than it initially projected.
65. Inflation is also influenced by domestic factors, including, in particular, indirect taxes. During the period since 2008, there have been three changes in the rate of Value-Added Tax (VAT). The standard rate of VAT was reduced by 2.5 percentage points in December 2008, increased by 2.5 percentage points in January 2010, and raised by a further 2.5 percentage points in January 2011. The MPC's convention is to condition their forecast on publically announced fiscal measures. Therefore these VAT changes will only have been factored into their forecasts once announced; by staff estimates, each change would have resulted in forecast errors of between ½ and 1½ percentage points on annual inflation relative to forecasts made prior to the announcements. If those estimates are in the right ballpark, the VAT effects likely contributed significantly to some of the upside forecasting errors—for example for the inflation forecasts for 2011 made before the most recent VAT increase was announced in June 2010.
66. The Bank believes that the influence of other domestic sources of inflation pressures have been small and largely offsetting. Throughout the period, the MPC has anticipated that domestic wage growth would be weak, given the influence of elevated unemployment and weak demand. Wage growth has indeed been low throughout the period.
67. Growth in companies' unit labor costs—that is, their labor costs per unit of output produced—has been considerably stronger than the growth of wages themselves over much of this period, owing to the influence of the weaker than anticipated productivity growth discussed above. But this appears to have been offset, to some degree, by downward

⁸ For a comprehensive review of the literature available at the time see Mishkin, F S (2008), 'Exchange rate pass-through and monetary policy', Norges Bank Conference on Monetary Policy

⁹ See, for example, the Box on pages 48-49 of the August 2010 Inflation Report, which suggested that higher-than-expected exchange rate pass-through was responsible for ½ to 1-1/2 percentage points of the year-ahead inflation forecast error in mid-2010.

¹⁰ See the Box on pages 34-35 of the February 2011 Inflation Report for further ex-post analysis on the effect of the exchange rate on UK inflation.

pressure on inflation from a reduction in businesses' profit margins, perhaps as a result of persistent weakness in demand. Overall, the MPC finds little evidence that stronger-than-expected domestic inflationary pressure has been responsible for the MPC's persistent over-prediction of inflation.

2.5 A summary analysis

68. On the whole, the forecast performance of the MPC over the past five years has been noticeably worse than its performance prior to the crisis and marginally worse than that of the average of outside forecasters. The failure to anticipate the crisis and its accompanying fallout for activity is not surprising—other forecasters in the United Kingdom and those at other major central banks made similar forecast errors. The series of predominantly one-sided errors subsequent to the crisis, in both the forecasts for growth of real GDP and inflation—persistent over-predictions of growth and persistent under-predictions of inflation—raise more difficult questions. Here again the forecast record of the MPC relative to that of the average of outside forecasters is marginally worse.
69. On the whole, I find the Bank narrative for its forecast errors of recent years reasonably persuasive, assuming that I have stitched it together correctly. But that narrative leaves open the question of whether the serial persistence of the MPC's recent errors represents only a string of bad luck, points to some slowness in responding to these errors as they became apparent, or reflects a deeper flaw in the analytical framework of the MPC. And, the lack of more detailed quantitative support for the narrative makes it quite difficult to assess its balance and completeness.
70. There should be no illusions that it will be possible for the Bank to construct a fully coherent and holistic “accounting” of all of its forecasting errors. Our knowledge of how large modern economies operate is incomplete, as is aptly demonstrated by the lack of any consensus within and outside the Bank as to the causes of weak activity and elevated inflation in the United Kingdom. Nonetheless, the Bank and the MPC will need to make an effort to prevent the well-worked and standard list of reasons that have been developed to explain its errors from becoming the Bank's “catechism of forecast errors”. As will be discussed later in this review, that effort is likely to require more internal work, study, and analysis about this most recent episode than has occurred to date. And, it is likely to require the Bank to open that analysis to greater public scrutiny to encourage a broader and more productive dialogue about its forecast both in the past and going forward.
71. As I noted in the previous section, statistics on forecast accuracy form only part of the basis for assessing the contribution of a forecast process at a central bank to the conduct of monetary policy. The forecast process and accompanying analysis should also be judged on the extent to which policy makers are forced to confront key issues, to explore their implications for the economic outlook, and to shape an appropriate policy response. The next two sections describe and assess the forecast process in place at the Bank of England.

Section 3: The forecast process at the Bank of England

72. In this section, I begin with a brief description of the forecast process in place at the Bank of England. I then turn to the organization of the forecast process. I conclude with a comparison of the forecast outputs provided by the MPC with those of other central banks.

3.1 A brief description of the process

73. The basic objective of the MPC's forecasting process is to produce probability distributions for future GDP growth and inflation. These distributions are illustrated several ways in the quarterly Inflation Reports, the most prominent being fan charts showing probability bands for the growth of real GDP and CPI inflation. The central, darkest band in each fan chart encompasses the central ten percent of probability distribution and the modal forecast of the MPC's distribution; the relative width of the bands above and below the modal forecast represents the Committee's judgment of the skew of the likely outcomes (in the absence of any skew, these bands represent 5 percent of the distribution); the absolute width of the fan charts is determined by the MPC's judgment of the general uncertainty surrounding the forecast. Some numbers and parameters underlying these fan charts are published a week after the release of the Inflation Report.
74. The conditioning assumption for monetary policy underlying the forecast is an important element of the forecast process. There are many different approaches that can be taken to setting the policy path that conditions the forecast. In the MPC's forecast, Bank Rate is assumed to follow the path implied by financial markets over the three-year forecast horizon,¹¹ and the stock of asset purchases is assumed to remain in line with the most recent decision. If the majority of the probability mass is one side or the other of the inflation target in the medium term, market participants have typically taken a qualitative signal that the MPC does not view the market-implied path for policy as being consistent with achieving the inflation target.
75. To produce the forecast presented in each quarterly Inflation Report, staff work on the forecast for around six weeks, with the MPC engaged with the process for a period extending over nearly four weeks. Table 3 shows the key milestones during the MPC's "forecast round". The process begins when the staff receive the Quarterly National Accounts data release. At around the same time, and as part of the MPC's regular monthly process, staff present to the MPC a thorough analysis of the incoming financial and economic information on the UK and global economies, reports from the Bank's agents on economic conditions around the country, and a briefing on outside economic analysis. The members of the MPC actively engage staff in a discussion of the information that has been presented.

¹¹ The Inflation Reports also contain fan charts conditioned on Bank Rate remaining unchanged. But most of the discussion of the projections is focused on the distributions conditioned on market expectations of interest rates.

Table 3: A stylized timeline of MPC forecast production

Time until Publication	Milestone	Description
6 weeks	Quarterly National Accounts data release	The most detailed quarterly release of GDP expenditure components and income. Allows the staff to begin to update the preceding forecast in earnest.
5½ weeks	Pre-MPC presentations*	Set of presentations given to the MPC each month ahead of their regular policy meetings. Provides data reports and flags new analysis.
5 weeks	MPC policy meeting*	Regular monthly policy meeting and decision.
4 weeks	Benchmark Meeting	The staff present the new “Benchmark” forecast to the MPC. It embodies their processing of the data, any new staff judgments which have been imposed, and any reassessment of past (Committee or staff) judgments.
3 weeks	Key Issue meetings	The MPC are given presentations on, and opportunities to discuss, the key risks surrounding the Benchmark forecast for GDP growth and inflation.
1½ weeks	Pre-MPC presentations*	Set of presentations given to the MPC each month ahead of their regular policy meetings. Provides data reports and flags new analysis not already covered in the forecast process.
1½ to 1 week(s)	Draft meetings	The staff present updated versions of the forecast, incorporating feedback from the MPC along with the latest data.
6 days	MPC policy meeting*	Regular monthly policy meeting and decision.
6 days	Sign off	The Committee signs off the forecast following their policy decision.
0 days	<i>Inflation Report</i> press conference	

*Meetings in blue are not strictly part of the forecast process, but are relevant nonetheless.

76. In the next step of the process, the staff update the MPC’s previous forecast. The staff layer onto the previous forecast several assessments: 1) the effect of the data news; 2) the implications of any new analysis; and 3) staff reassessment of past forecast judgments. This is presented to the MPC as a “benchmark forecast”, and importantly, is an update of the MPC’s previous forecast rather than an independent assessment of the outlook made by the staff. The staff subsequently present some key risks to the outlook for GDP growth and inflation in two “key issues” meetings. These key issues meetings usually contain alternative forecasts for GDP and inflation based on alternative assumptions.
77. There then follows an iterative process (via a series of “Draft” meetings) through which the MPC make adjustments to the staff update, based on their reading of the incoming economic

and financial information and any reassessments that they have made of the outlook and its determinants. In principle, the MPC is not constrained by past judgments embedded in earlier forecasts and, at times, has made sizeable adjustments to its forecast.

78. The MPC refer to the final fan charts published in their Inflation Report as being a reflection of their “best collective judgment”. In each meeting, individual MPC members are given an opportunity to voice their opinions on the issue under discussion. As the forecast round progresses Committee members provide input on the overall positioning of the fan charts. In the process of reaching “best collective judgment”, members of the MPC do not typically provide individual quantitative assessments of either the point forecasts or the position of the fans. Individual MPC members are asked at the Draft meeting and again before the final sign-off if they are in reasonable accord with the fan charts for real GDP growth and inflation. But no formal votes are taken on the final fan charts.
79. There is scope, in principle, for MPC members to ask for alternative forecasts to be quantified in the Inflation Report should their views differ considerably from that of the “best collective judgment”. In the early 2000s, a separate table¹² was occasionally included quantifying how different assumptions would affect the inflation forecast. But that device has not been employed for over a decade, even though there have been times when some MPC members took public positions at a variance with the published fan charts. For a number of the current and former MPC members that I interviewed for this report, the implicit hurdle for using such a device is viewed as high; most thought that they have sufficient opportunities to expand on their personal differences in speeches and in other fora.

3.2 The organization of the forecast effort

80. The responsibility for assembling the benchmark forecast, presenting key issues, and making adjustments to the forecast in response to directives from the MPC falls principally on the Forecast Team in the Conjunctural Assessment and Projections Division within the Monetary Analysis (MA) Directorate of the Bank. But inputs and analyses relevant to the forecast process are provided by other divisions as well. For example, the forecasts for overseas activity and inflation, estimates of structural unemployment, and forecasts of key financial conditions are provided by the relevant specialist teams in other divisions, as are the forecasts for the near-term outlook for inflation. Moreover, the Bank’s network of regional agents provides substantive surveys and anecdotal information from regional businesses to provide further perspective on economic developments beyond national statistics.
81. As would be expected, the staff use a wide array of econometric and statistical tools in support of the forecasting effort. The central model used by staff for processing news and judgments is known as Compass, which is a Dynamic Stochastic General Equilibrium (DSGE) model with a relatively parsimonious 16 variables at its core. Compass replaced its more complex predecessor (BEQM) in November 2011. Although Compass is the central forecasting model, Bank staff develop, track, and utilize a large suite of models to support

¹² See, for example, Table 6B on page 57 of the February 2000 Inflation Report.

the forecast and to inform key judgments that must be made in the forecast process. Indeed, new software, designed specifically for the purpose, allows for the incorporation of insights from the suite of models into Compass.

3.3 A comparison with other central banks

82. Table 4 provides a summary of the key features of the forecasts of other central banks and how those features compare with the forecast of the MPC. As the table reveals, there are as many differences as similarities in the forecast setups of the major central banks. There is considerable congruence in the forecast procedures of the Norgesbank and Riksbank, and both banks are characterized by their analytically sophisticated frameworks. That, of course, does not imply that those frameworks can or should be grafted onto different institutional and committee structures, which may offer other compelling advantages of their own. But the table makes clear that there is not one single model for forecast development and presentation that prevails among the major central banks. One nearly uniform feature of the published forecasts is that they are “owned” by the policy makers and not their staffs (the one major exception is the ECB). This seems as it generally should be—policy actions ought to be conditioned on the views of the policy makers.
83. A detailed study of the evolution, motivation, and experience of these other central banks with their respective frameworks is beyond the remit of this report. Instead, I offer a few broad thoughts on how the MPC’s framework stacks up against those of other central banks. When it comes to characterizing the uncertainty surrounding the economic outlook, I would place the MPC near the front of the pack. The fan charts for inflation and real GDP growth explicitly place the outlook in a probabilistic setting, which communicates clearly the fact that predictions about the future are more than a series of point estimates. In terms of forecast detail—most notably, the components of expenditure, labor costs, alternative prices measures, and some measure of the output gap or labor utilization—the MPC is perhaps a little further back in the pack. Many central banks provide qualitative descriptions of these variables, as is the practice of the MPC, but some also provide quantitative forecasts for some or all of those variables. As for the policy path used in the forecast, the practice of conditioning the forecast on the market-implied path of Bank Rate is not unique to the MPC; the ECB follows a similar procedure, and a couple of others condition their forecasts on an unchanged policy rate. But a number of the central banks listed in the table now condition their forecast on a published endogenous path for the policy rate, and therefore the MPC has now fallen farther back in the pack, at least in terms of transparency. I should note that determining whether greater transparency about the path of policy rates improves the effectiveness of monetary policy remains an unsettled issue at this point.
84. In the next section, I offer an evaluation of the forecast process described above. I also discuss some of the accompanying issues that inform the options for consideration offered in the final section of the report.

Table 4: Key features of international central bank forecasts

	Bank of England	Bank of Canada	European Central Bank	Norgesbank	Reserve Bank of New Zealand	Reserve Bank of Australia	Riksbank	Swiss National Bank	Bank of Japan	Federal Open Market Committee
Forecast ownership										
Ownership of forecast	Policy makers	Policy makers	Staff	Policy makers	Policy makers	Policy makers	Policy makers	Policy makers	Policy makers	Policy makers
Range of policymakers' views quantified?	No	No	No	No	No	No	No	No	Yes	Yes
Forecast presentation										
Point forecasts	Yes ⁽¹⁾	Yes	No	Yes	Yes	No	Yes	Yes	No	No
Interval	No	No	Yes	No	No	Yes	No	No	Yes	Yes
Fan charts	Yes	Yes	No	Yes	No	No	Yes	No	Yes ⁽²⁾	No
Alternative scenarios quantified	No	No	No	Yes ⁽³⁾	No	No	Yes ⁽⁴⁾	No	No	No
Forecast variables										
GDP growth	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Components of GDP	No	Yes	Yes	Yes	Yes	No	Yes	No	No	No
Unemployment	No	No	No	Yes	Yes	No	Yes	No	No	Yes
output gap/potential output	No	Yes	No	Yes	Yes	No	Yes	No	No	No
Wages/labor costs	No	No	No	Yes	Yes	No ⁽⁵⁾	Yes	No	No	No
CPI inflation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Narrower measure of inflation ⁽⁶⁾	No	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes
Conditioning assumptions for policy										
Unchanged policy rate	Yes	No	No	No	No	Yes ⁽⁷⁾	No	Yes ⁽⁸⁾	No	No
Market-implied path	Yes	No	Yes	No	No	No	No	No	No	No
Endogenous policy ⁽⁹⁾ assumed, not published	No	Yes	No	No	No	No	No	No	Yes	No
Endogenous policy ⁽⁹⁾ assumed, published	No	No	No	Yes	Yes	No	Yes	No	No	Yes
Forecast frequency										
Forecasts per year	4	4	4	3	4	4	6	4	4	4

⁽¹⁾ Point forecasts made available with a week lag.⁽²⁾ Rather than continuous fans, the BoJ publish distributions around forecasts for discrete points in time.⁽³⁾ The Norgesbank presents alternative profiles for the key policy rate on the basis of qualitatively different scenarios.⁽⁴⁾ The Riksbank presents alternative forecasts for key variables on the basis of quantified different scenarios.⁽⁵⁾ An average wage forecast of around 3.5% is referred to in the text of the most recent Statement on Monetary Policy, but not in tables or charts.⁽⁶⁾ E.g. inflation excluding energy and/or indirect taxes and/or food.⁽⁷⁾ In the past the RBA has used qualitatively different paths for the policy rate when unchanged was considered less realistic.⁽⁸⁾ Recent SNB forecasts have been conditioned on the expectation that the exchange rate will depreciate.⁽⁹⁾ For example a simple policy rule, or monetary policy considered consistent with the policymakers' objectives.

Section 4: An evaluation of the forecast process of the MPC

85. As noted in the Introduction, my review of the forecast process of the MPC involved two main avenues of information gathering. First, I reviewed the materials prepared by the staff for the MPC as part of the forecast process; this included a set of standard materials circulated during each forecast round, as well as special notes and briefings provided to the MPC for the May and August forecasts. I also attended the main meetings held by the staff and MPC for the preparation of the August Inflation Report. As a second avenue, I interviewed all current members of the MPC, all former members who served on the Committee during the period under study, members of the Bank's staff, academics, financial market participants, and outside forecasters. My review encompasses both information that I observed directly during my stay at the Bank and information that was reported to me by others. In what follows, I have tried to carefully distinguish between those two sources of information because I can only directly vouch for my own observations on the process. As for the views of others, I have reported only sentiments expressed with sufficient frequency that they were not likely to represent the idiosyncratic views of one individual.

4.1 Forecast capabilities and process

4.1.1 The staff forecasting capabilities and organization

Staff capabilities

86. The staff of the Bank of England play a central role in supporting the development of the MPC's forecast for growth of real GDP and inflation. The staff provide considerable analysis to the MPC during the forecast round in the form of written notes and oral presentations. I found that material to be of a very high quality—thorough, analytically sound, and focused on the key issues confronting the MPC. The staff presentations appeared to serve well the purpose of provoking discussion among the policymakers on relevant issues.
87. In this process, the staff are, for the most part, assisting in the preparation of the MPC's forecast, rather than directly challenging the MPC on the major issues (though that reportedly occurs from time to time). Some former MPC members and some staff members suggested that there were too few incentives for staff to seriously challenge the MPC on major forecast issues. Senior management of the Bank has already recognized this as a possible problem and has moved to create some vehicles to better allow staff to surface alternative views related to the forecast. The Chief Economist hosts a special "Challenges" meeting between forecasting rounds at which staff can present work that offers alternative views on various aspects of the forecast. Those meetings are well attended by staff, clearly indicating that they view this effort as providing a vehicle for influencing the discussion on important policy-relevant topics. Within MA, there is a less formal but very active web-based forum named "Thinkspace" that offers staff an opportunity to offer up thoughts, evidence, and early-stage analysis on a wide variety of economic issues and policy-oriented topics, including views at variance with those of Bank executives and the MPC. These are

creative attempts by the Bank to promote a more assertive staff that will be better positioned to engage and challenge the MPC on major forecast and policy issues.

88. One factor that makes that engagement difficult for the staff is their relative lack of experience compared with that of the members of the MPC, many of whom have been involved for many years in the forecasting enterprise. Tenures on the Forecast Team are relatively short, with the average experience being less than two years. Rapid movement by staff around various positions in MA (and by many reports throughout the Bank) is viewed by staff as a key to advancement; and, no doubt, exposing staff to many aspects of Bank business is useful in developing the future leadership of the institution. **But that rapid turnover does create some difficulties in developing a staff with enough experience and analytical depth on forecast-related issues to challenge members of the MPC in a constructive manner.**
89. The difficulties that the Bank faces in retaining a high-quality forecasting staff go well beyond the internal churning that occurs among positions. I found staff in MA to be intelligent and energetic, and the Bank faces fierce competition for their services from firms in the private sector, and particularly in the City, that can offer much better pay.

Staff forecasting tools

90. Turning to the tools employed in the development of the forecast, the staff use a wide array of statistical and econometric models that compare favorably to those used by central banks elsewhere. As noted above, the staff employ Compass, a DSGE model, as the central model around which the forecast is organized. But the analysis provided by that model is supplemented with considerable statistical machinery that processes the incoming high-frequency data on activity and inflation when constructing the near-term projection. And staff inside and outside the Forecast Team provide insights offered from reduced-form equations, partial equilibrium models, and other research. As noted above, an innovative feature of the Bank's modeling efforts has been the development of software that they hope will allow alternative specifications of key economic relationships to be integrated into Compass. This would enable the staff to assess the sensitivity of the forecast to alternative model specifications about which the data sometimes offer only weak guidance. The staff and policy makers are keenly aware of the limitations of econometric models, and they are intelligent producers and consumers, respectively, of model output. In that regard, while DSGE models have shown some promise in forecasting and policy settings, they have some drawbacks as well—as do all macro models. So staff and policy makers will need to remain alert to those shortcomings, make adjustments when needed, and be prepared to consider shifting to alternative models when evolving knowledge or accumulating experience suggests that is warranted. Indeed, Bank staff have done just that in the past. All told, the staff's approach to modeling and forecast development follows closely the criteria that I laid out in Section 1 for an effective forecast process at a central bank.
91. Of course, there is always additional work to be done. The financial crisis and its aftermath exposed most large-scale macroeconomic models as woefully ill-equipped to deal with the implications of this type of shock. How to adjust our models and our forecasting frameworks

to better account for the impact of financial disturbances is, understandably, an active area of research. Compass, as it currently stands, and in common with the majority of DSGE models being used for policy purposes, has limited financial detail. And because the central model used in a forecast process can be important in framing the types of questions that get asked and answered, staff should give strategic consideration to expanding some of the financial dimensions of Compass. Modelers always face difficult tradeoffs between simplicity and completeness. Indeed, an important motivation for shifting to Compass from a previous, very complicated model (BEQM) was to achieve considerable simplifications that would free up unproductive use of staff time without sacrificing, and likely gaining, analytical coherence. Moreover, the Bank has developed a considerable analytical apparatus that models financial sector behavior outside of the confines of Compass. **So a decision about whether to enrich the financial specifications of Compass would need to be set against the costs of greater complexity. If those costs are deemed too high, staff will need to ensure adequate attention is given to further developing, monitoring, and reporting on satellite models that incorporate the key linkages between financial conditions and economic activity and inflation.**

92. Compass has now been in active use by the staff as input into the forecast for nearly a year. However, interested parties outside the Bank have little to no understanding of the model and its key features. Bank staff made, in my view, a sensible decision that the first priority should be to get the new model into action to alleviate the very heavy costs of running its predecessor. **But with that transition moving along, effort should soon be devoted to documenting for public consumption the new model’s specification and key properties—as had been done for previous large-scale models in use at the Bank.**

Staff organization

93. Some consideration of staff organization to support the production of the forecast is probably warranted. The Forecast Team is the most visible conduit of forecast-related analysis to the MPC. In putting together the Benchmark forecast, the Forecast Team gathers inputs from economists in other divisions in MA. While that process works reasonably well, it is not seamless. Some economists outside the Forecast Team expressed the view that their work did not get the attention or have the influence on the forecast that it should have had. And some current and former members of the Forecast Team indicated that, in some cases, the work of the “specialists” in other divisions was not as influential as those economists might wish because it was not aimed squarely enough on the issues of greatest interest to the MPC, or perhaps not delivered in a form easy to incorporate in the central forecast. This is not a major problem, and senior management within MA recognize the issue and have put in place a number of initiatives to address it. But my general observation is that the full human capital that exists in MA is not being exploited to the maximum benefit of the Bank and the MPC.

4.1.2 The MPC forecast process and deliberations

Best collective judgment

94. During my visit, I witnessed a deliberative process that has considerable coherence and integrity. The discussions and debates were vigorous, analytical, and reflected an awareness of both the data and the anecdotes. There was broad participation by the members of the MPC, with the encouragement of the Chair. Some of the key virtues of “best collective judgment” were on display. MPC members engaged each other in a productive discussion of the key issues driving the outlook. They made considerable effort to come to a common understanding of some difficult outstanding economic issues of relevance to the forecast. And, when that was not possible, remaining differences were respected. **I observed no deep structural problems with the process currently in place**, though I recognize that witnessing a single forecast round can provide only limited perspective.
95. Nevertheless, despite its considerable strengths, there are some aspects of a forecast process organized around best collective judgment that deserve further thought and perhaps re-examination. By its nature, reaching a collective judgment is intended to round off differences in views; the objective of the process is to emphasize consensus among policymakers rather than individual assessments. That has the virtue of simplifying the message of the MPC with little loss of transparency when a reasonable consensus among policymakers actually exists. But the financial crisis highlighted the potential value of encouraging and taking account of views that diverge, perhaps widely, from the consensus. In these circumstances, **a focus on best collective judgment may convey more conformity of opinion than actually exists and could obscure differences that, if more visibly and quantitatively surfaced, would provide valuable perspective to the policy makers and public.**
96. In general, there is a risk of some murkiness around the “ownership” of the forecasts arrived at by best collective judgment. In principle, one might infer that the fan charts are owned by the members of the MPC who do not dissent from the current majority view on policy. But dissents at the policy meeting could reflect differences in policy preferences rather than differences about the forecast; for example, dissenting members might have different views about how quickly inflation should be returned to target. Individual members of the MPC are queried directly at several meetings about their comfort with the fan charts, but they are not necessarily asked to explicitly indicate where their outlook stands relative to that of the collective judgment fans (though, of course, MPC members are free to offer that information). This lack of specificity is likely helpful in allowing the nine members of the MPC to reach consensus. **But without a more formal canvassing of the outlooks of individual members, there is some possibility that the fans do not always accurately capture the centre of gravity of the MPC members. Moreover, those MPC members that do not subscribe to the best collective judgment behind the fans are not required to specify just how large their differences are with the fans.**

97. Some former MPC members that I interviewed reported that they encountered difficulties getting divergent points of view to be seriously considered in the forecasting process. As expressed to me, the problem was one of breaking strongly held “house views” on key issues relevant to the forecast. Some examples provided were the magnitude and duration of the effects of financial shocks on aggregate demand, the effects of house prices on consumer spending, and the effects on aggregate prices of relative price shocks, such as changes in oil prices. As noted above, for a brief period in the early 2000s, some MPC members requested an additional table be included in the Inflation Report to illustrate the consequences of their alternative judgments about key aspects of the forecast. More recently, the public surfacing of such differences has relied on the initiative of the individual MPC members that have held divergent views.

Forecast scrutiny and evaluation

98. In a similar vein, some former policy makers, academics, and market participants take the view that the Bank would benefit from greater exposure to and consideration of outside views. This is not to imply that members of the MPC do not solicit the views of those outside the Bank. The Bank hosts a twice-yearly Monetary Policy Roundtable (MPR)—a large meeting with outside economic practitioners and academics. Moreover, most MPC members have considerable individual contact with businesses, academics, market participants, and other members of the public to gather information and exchange views. But neither the large MPR gatherings nor the individual interactions with external contacts force the same degree of engagement on issues as occurs internally. As one person noted, **a broader “ventilation” of the key maintained hypotheses underlying the MPC’s forecast would be valuable to the Committee.**
99. The structure of the forecast process can impart inertia to the forecast. As noted above, the benchmark forecast prepared by the staff for the MPC basically takes as its starting point the previous forecast and updates that forecast for incoming information and any new analysis that might bear on the outlook. To be sure, the MPC has the discretion to reconsider the forecast each round with a blank slate, but the process lends itself more naturally to incremental adjustment. Moreover, **there are few institutional or procedural mechanisms that would act as a trigger for a more fundamental reassessment of the outlook.**
100. The MPC includes an assessment of its forecast record each August in a Box in the Inflation Report. This material is interesting and helpful. In addition to reporting how output growth and inflation outturns have compared with the probability distributions underlying the fan charts, the box offers some speculations about the reasons for that dispersion of outturns. But that analysis is relatively narrow in scope, given its focus on forecast performance over the previous year and given the lack of detail the Bank makes available about its forecast and, therefore, about its forecast performance. As a consequence, the August Box feels insufficient to the task of addressing the question of how to interpret the dramatic events of the past five years and the extent to which those events may be still be reverberating through the economy in unexpected ways. Was the basic paradigm the Bank was using to think about the outlook seriously flawed? Or did the surprise simply result from an

incredibly large, low-probability shock? Or was it a combination of those factors? Similar deep questions could be raised about the outlook for inflation and the serially correlated errors evident in that aspect of the forecast. **Some greater struggle with past forecast errors could shed light on areas where thinking and forecasts might need adjustment going forward.**

Forecast horizon

101. The current forecast of the MPC has a three-year horizon. One motivation for that forecast period is that it was deemed sufficiently long to allow, in normal circumstances, for the return of inflation to its target. However, the events of the past five years demonstrate that large shocks to activity and prices mean that the economy could take more than three years to return to something resembling equilibrium. In such circumstances, the Committee might find it useful to consider the paths for output and inflation over a longer forecast period and to consider some of the policy tradeoffs and choices that it could face during the transition period. Moreover, the Committee may find it useful to communicate to the public the nature of some of those tradeoffs
102. There are other benefits to a longer forecast interval. At least one of the chief factors underlying the severity of the financial crisis and its effect on the major economies was the unwinding of significant imbalances that had built up over a period of time. A three-year forecast interval does not force policy makers to grapple with the implications of the unwinding of those types of imbalances (even if they have been correctly identified). To be clear, I am not suggesting adding one or two more years, but rather adding perhaps five to ten years to the forecast horizon. To be sure, a forecast with a horizon of that length is better viewed as a calibrated construction rather than a statistical prediction. **But longer-term forecasts can be a helpful part of the input to policy deliberations.**

Macroeconomic analysis

103. Finally, I offer one additional observation on the MPC forecast process that was shared by some policy makers and staff as well. The forecast process, as it is currently constructed, carries the very heavy burden of being both the principal vehicle for delivering macroeconomic analysis to the MPC and also the principal forum for the discussion of that analysis. At a conceptual level, this would seem only natural; the forecast should encompass all of the macro analysis relevant to the outlook. But as a practical matter, the forecast process operates under binding time constraints, and the meetings are structured to efficiently consider the key issues and to then reach decisions. At times, this can lead some issues that are important and controversial—but not clearly key to the decision at the current meeting—to be excluded from the agenda. Other fora for analysis and research to be presented to the MPC do exist—for example “special project” teams and “research away days”—but demands on Committee members’ time means that they are not always able to attend these meetings. **The time constraints on the Bank’s decision makers are severe, but some consideration of alternative avenues for presenting relevant macroeconomic analysis to them may well be warranted.**

4.2 The forecast and monetary policy decisions

104. As the remit for this report makes clear, one of the key functions of the economic forecast of a central bank is to provide an assessment of the most likely outcomes and the risks around those outcomes as a guide to the appropriate setting of monetary policy. Despite the heavy burden borne by the forecast as a vehicle for many aspects of macroeconomic analysis, **the current forecast process at the Bank seems under-developed as a vehicle for delivering analysis of how the forecast and its risks directly bear on monetary policy strategies.**
105. There are likely to be some circumstances when the MPC faces difficult tradeoffs when setting policy. For example, some shocks might lead to inflation moving above target but output falling below the productive potential of the economy. On such occasions, the Committee is likely to find it useful to discuss alternative strategies for monetary policy and the effects of different policy choices on the paths for output and inflation. And such discussions have reportedly occurred from time to time. But as a routine matter of process, Bank Rate is held fixed along the market-implied path while the most likely trajectory for the economy and the risks around it are discussed. That limits the extent to which the Committee is able to debate the economic implications of alternative monetary policy strategies during the forecast round.
106. There are also some more technical problems created by the current process. As noted above, the forecast is conditioned on an assumption that the policy rate follows current market expectations. This creates some challenges when using the Compass model (and would be a challenge when using many types of forward-looking models). The model necessarily incorporates a policy “rule” that governs how agents within the model expect the central bank to respond to evolving economic circumstances. But the policy prescriptions of the model’s rule using the MPC’s forecast is unlikely to deliver, except by chance, the path of rates expected by market participants. As a consequence, when the market-based path of policy rates is forced on the model, the model-based forecast must be constructed on the assumption that there are a series of unanticipated policy “shocks”—that is, policy makers do not behave in the manner expected by the private sector. This is not a fatal problem for the forecast process, but is not the most natural starting point for policy deliberations.
107. One could envision a process in which policy makers articulate an objective function—for example, preferences over the deviation of inflation from target and output from potential—and ask, given the forecast, what policy path would maximize that objective function—a so-called “optimal policy”. Similarly, as a routine part of the policy and forecast process, policy makers might wish to consult the prescriptions of a variety of simple policy rules with desirable properties, many of which are commonly employed at central banks, in the academic literature, and in many forecasting models. No doubt, there are significant limits to the contribution made by exercises that endogenize policy variables, and most policy makers would view the results as but one of many types of input to the policy process. **But having some systematic and routine analysis of policy strategy during the forecast process would seem likely to be of some value to the MPC.**

108. The staff currently produce a quarterly note on monetary policy strategies that is circulated to the MPC. But that note is not a formal part of the MPC's forecast and policy process and is produced on a schedule that is not coordinated with development of the Inflation Report forecasts or the meetings of the MPC. My sense is that the staff have the analytical capabilities and the capacity to incorporate some of this material into the forecast process, should the MPC make the request.
109. Some former MPC members and staff suggested that the sharp separation of policy deliberations from the forecast process creates some unproductive incentives for MPC members. They reported that at times, some MPC members had argued in favor of changing forecast assumptions or setting particular parameter values primarily in order to push the forecast in a direction that would ultimately support their policy position rather than out of conviction about those specific choices. Those discussions were viewed as consuming valuable time in the forecast process, with little fundamental return to the participants. I should note that I did not detect any such behavior in the meetings that I attended.
110. Finally, although it is beyond the specific remit of my review, I should flag a forecast-related issue that will need attention not too far in the future—the interaction of the forecast process, the monetary policy process, and the financial stability policy process. Because the new institutional structure for financial stability policy, including the advent of the Financial Policy Committee, is in its infancy, it would be premature to make any firm judgments about how these policy functions should interact. But the crisis made clear that the development of the economic forecast and the conduct of monetary policy could likely benefit from the intelligence gathered and the analysis prepared as part of the efforts to monitor and respond to emerging financial stability concerns. Likewise, understanding vulnerabilities to the financial system is likely to be closely linked in many instances to the outlook for the domestic and global economies. Effective interaction among these activities will almost certainly be vital to their collective success. Considering the best mechanisms for promoting productive integration of these efforts should likely be high on the agenda in the period immediately ahead.

4.3 Forecast communication and transparency

111. The Bank of England was among the early pioneers in developing and promoting central bank transparency. The discipline of the Inflation Report, the manner of information conveyed by the fan charts, and the quality of analysis that stood behind this apparatus set a high bar for other major central banks. The Bank continues to provide an impressive amount of information to the public about the outlook for the economy and the current environment for policy. When the Inflation Report becomes available, the Governor and other internal members of the MPC hold a press conference to explain the major issues surrounding the outlook for the economy and to answer questions from the press. Members of the MPC provide testimony to committees of Parliament and make speeches on the outlook, broad economic issues, and their individual policy positions. Economic analysis developed by the staff appears in research papers and in the Bank's Quarterly Bulletin.

112. Many practices that are now considered routine had their origins at the Bank of England or gained greater traction because they had been adopted by the Bank. But, as time has progressed, some central banks have pushed farther forward in increasing the quality of their communications and transparency. **The Bank may wish to take stock of its communications strategy in light of its own considerable experiences and the experiences offered by other central banks employing different approaches.**

4.3.1 Communicating risks and uncertainties

113. The fan charts remain a valuable tool in communicating the idea that the forecasts should be thought of as probability distributions, not the single-minded development of a series of point estimates. However, some amendments to the fan charts and some **additional vehicles to convey uncertainty deserve consideration. Some people inside and outside the Bank view the very fine gradations in the fan charts as suggesting a greater sense of precision** of the uncertainties than is likely justified. Moreover, instead of the continuous quarterly forecast currently presented in the Inflation Report, not much would be lost by moving to annual year-over-year changes or changes on a fourth-quarter-to-fourth-quarter basis. **Reporting, for example, 70 and 90 percent confidence intervals along with the forecast mean and/or mode at an annual frequency might be sufficient detail for most audiences and in most circumstances. Although it would not reduce perceived precision by much, additional perspective on the uncertainties surrounding the forecast could be conveyed by transforming the information in the fan charts into cumulative density functions at specified dates.**
114. In some cases, the Bank could find it helpful to communicate more information concerning the implications of a particular risk to the outlook. At times, the MPC may be forced to make a key judgment in the forecast about an economic development over which it has little conviction but which has important consequences. In those situations, **the use of alternative scenarios could help illustrate how sensitive the forecast is to different key judgments.** This would both alert the public to these risks in the forecast and communicate the Bank's thinking on the dimensions of the uncertainties that they pose to economic developments. Moreover, there could be times when MPC members hold different views about key aspects of the forecast. Alternative simulations could address those differences and indicate their quantitative consequences.
115. The MPC has recently encountered difficulties in dealing with the risks posed by economic and political developments in the euro area in the context of the fan charts. The MPC has argued that it is unable to quantify the risks surrounding extreme outcomes associated with developments in the euro area, and thus excludes those outcomes from the fan charts. Some outside observers expressed skepticism about the MPC's inability to quantify these risks and indicated that they themselves are forced to do so, however imprecisely. Others more sympathetic to the MPC's predicament saw the situation as highlighting some of the limitations of the fan charts as the principal device for communicating risks and suggested that the Bank should do more to communicate the consequences of a more significant economic or financial disturbance in the euro area. I readily admit that I see no simple

solutions in this instance. Judgments about possible outcomes are as much about politics as they are about economics, and there could be considerable unintended financial consequences if the Bank of England were seen as placing moving odds on the dissolution of the euro area.

4.3.2 Communicating forecast detail

116. One common view expressed by outside forecasters and market participants was that the MPC provided too little detail in support of their forecast. **The lack of detail makes it difficult for outside observers to fully understand the key drivers of the MPC forecast.** It also makes it difficult to audit and interrogate the forecast over time. As a consequence, the MPC was failing to provide valuable information that could better inform the public's understanding of the outlook. Moreover, the MPC was also missing the opportunity for scrutiny and feedback that might help sharpen its own thinking about key issues in the forecast. The Office of Budget Responsibility (OBR) was often offered as a model example of forecast transparency, though when pushed some outsiders conceded that greater forecast detail was more central to the fiscal policy analysis conducted by the OBR and probably easier to arrive at with a three-person committee.

4.3.3 Communicating divergent points of view

117. **Another area worth some exploration by the Bank would be to report, either in full detail or using summary statistics, the individual forecasts of the members of the MPC.** Summary information of individual committee members is made available by the Federal Reserve and the Bank of Japan. While this information could risk detracting from the central message of the forecast, it would provide greater transparency as to the range of views held by members of the MPC as well as the location of the centre of gravity of those forecasts. The value of that information might be especially large when risks were mounting and sharply different views about critical issues were emerging among members of the MPC. In those circumstances, fan charts based on best collective judgment could provide an incomplete or misleading picture of the degree of consensus, or lack thereof, among the policy makers. Outside decision makers might benefit from a clearer understanding of the extent of and reasons behind the different views held by policy makers.

4.3.4 Communicating about policy

118. Turning to policy communications, some central banks have taken large steps toward greater transparency by offering explicit guidance about the expected path of the policy rate. Some, like the Norgesbank and the Riksbank, provide that information in the form of specific probability distributions similar to those provided for other key forecast variables. Others, like the Federal Reserve, offer information from individual policy makers on the date of the first tightening of policy and on the distribution of interest rate expectations of those members over the forecast period. In addition to providing greater transparency to the forecasts of those institutions, guidance about the future path of rates provides those central banks with another policy tool to influence financial conditions.

119. More explicit guidance about the expected path of policy could generate other benefits. The necessary internal deliberations to arrive at the policy path would facilitate greater discussion among members of the MPC of preferred outcomes for inflation and output and enable easier consideration of the associated tradeoffs when they arise. Moreover, if the Bank wished to move in the direction of alternative scenarios, those scenarios would likely be more plausible and useful if the policy interest rate were endogenized.
120. Of course, there are some advantages to not being a “first mover” in the endeavor to provide more information about policy expectations. The efforts by other central banks to provide interest rate forecasts are generally in their infancy—for the Federal Reserve, specific interest rate forecasts have only been available since January of this year. It remains too early to declare these efforts a success. **The MPC may wish to take advantage of the opportunities to learn from these recent innovations before deciding whether to move in this direction and, if so, how.**

Section 5: Options for consideration

121. In this final Section of the review, I offer a wide array of options for making adjustments to the forecasting process, most of which follow from the evaluation presented in Section 4. I have grouped these options into three functional areas: 1) options related to improving forecast capabilities, process, and organization; 2) options that could raise the support offered by the forecast process to the conduct of monetary policy; and 3) options to enhance the forecast as a device for communications, transparency, and accountability. For each option, I put forward a rationale for why the Bank might consider making such a change, and I highlight some issues—and potential costs—that the Bank might take into account before making that change. There are many characteristics in addition to functionality by which these options could have been categorized and ordered—ease of implementation, resource cost, urgency, consequence, and no doubt others. Faced with that daunting matrix of possibilities, I have opted for simplicity here and categorized the options by functionality and, within functionality, by no special order of consequence. That said, I have done my best to indicate the considerations surrounding the decisions that would need to be taken and to provide some perspective on the potential consequence of those decisions.
122. One over-arching theme that cuts across many of the options offered below is the objective of increasing the number of “entry points”, both internally and externally, for alternative points of view about economic developments and their relation to the forecast and to policy. I doubt that the implementation of any or all of these options six years ago would have materially increased the probability that the Bank of England, or any other central bank, could have fully foreseen the intensity of the impending financial crisis. But more questions about the financial shock and its implications for the trajectory of output and inflation might have been raised earlier and with greater effect if more avenues were open to considering divergent points of view. In any event, this review should be more about looking forward than looking back. Given the experience of the past five years, the greater objective should be to make changes, when warranted, that improve the efficiency, robustness, and transparency of forecasting and policy processes.

Options related to forecast capabilities, process, and organization

Option 1: Further expand efforts to increase the detail with which the financial sector is incorporated into the forecast and the models that support the forecast.

123. **Rationale:** The financial crisis and its aftermath made abundantly clear that nearly all of the major models used in forecasting and policy analysis inside and outside central banks were woefully inadequate to the task of anticipating financial disturbances and projecting their propagation into activity and inflation. So enhancing the financial apparatus included in our forecasting models would seem to be an uncontroversial and obvious direction in which to proceed. Such efforts will be quite complex, and how to proceed is far from clear. Nevertheless, experience warns that continued focus on this effort should not be allowed to flag. The credit crunch in the early 1990s in the United States spurred vast amounts of research, much of it done at central banks and at official international institutions and much

of it documenting the importance of the credit channel. Yet a decade later, that research had left little imprint on most macroeconomic models in use at policy making institutions. That should not be the case ten years hence.

124. **Issues to consider:** This effort will take time and resources, and as with all research endeavors the payoff is not certain. Decisions will need to be taken about whether this greater financial texture should be directly incorporated in the central model currently in use—Compass in the case of the Bank of England. That decision will involve familiar modeling tradeoffs between simplicity and completeness. On the one hand, a key advantage offered by Compass relative to its predecessor is a simplicity of structure that allows staff to easily manipulate it and that allows policy makers to understand it. And the use of “suites” of models outside Compass hold out the promise of enhancing the analysis of financial factors without complicating Compass itself. Still, models can act as “framing devices” and if key financial linkages are excluded from the central model, those linkages may tend to get less consideration in the forecasting process.

Option 2: Support even greater engagement with the academic community on forecast technology.

125. **Rationale:** A small group at the Bank are engaged in the development and use of more cutting-edge statistical forecasting techniques. Those individuals are well aware of the work being done by academic econometricians and statisticians on the theory and applications of forecasting techniques. But Bank staff efforts could be leveraged up by supporting and encouraging greater engagement of the academic community on forecasting issues of interest to the Bank. I interviewed a number of academics who felt there were likely mutual advantages from greater interaction than already takes place. Model combination, forecast evaluation, the direct forecasting of probability distributions, and the development of joint probability distributions were some of the areas mentioned. Staff at the Bank concur that mutual benefits would accrue to this effort.
126. **Issues to consider:** Some small amount of resources might be required to organize and sustain increased interactions between Bank staff and the relevant academicians.

Option 3: Hold four “special issues” meetings each year that would be used to explore topics relevant, directly or indirectly, to the forecast but that need greater attention than can be devoted under the meeting constraints of the forecast round. To create time for MPC members to attend, these meetings could replace four pre-MPC meetings.

127. **Rationale:** As noted in the review, the forecast process now carries the heavy burden of being the principal vehicle of presenting macroeconomic analysis to the MPC. In part this is because other demands on MPC members’ time mean their attendance at presentations of longer-term analysis outside the forecast round cannot be relied upon. To be effective, the special issues meetings put forward in this option would need to carry the same general obligation of attendance that is currently associated with the forecast meetings—hence the suggestion that this additional claim on MPC members’ time could be offset by a little less time spent being briefed on short-term developments. This option would allow for detailed

staff analysis and research bearing on forecast issues to be surfaced with the MPC outside the pressure of the forecast round, which may allow freer engagement between Committee members. The staff participating in these efforts would extend beyond the Forecast Team to specialists with expertise on policy-relevant topics; this approach would offer an additional avenue to the specialists to more directly participate in the support of the MPC. Divorcing the presentation of these special analyses from the forecast/policy process might also encourage freer engagement of MPC members with the staff on issues when that discussion is not viewed as being part of the lead up to a policy decision.

128. **Issues to consider:** The members of the MPC and the staff are already very busy, and the net addition of meetings to the calendar may be difficult. Although there are likely many ways that the time for these meetings could be “funded”, as noted above, one possibility would be to eliminate four pre-MPC meetings each year. The loss of four pre-MPC meetings risks adding some distance between the MPC members and the incoming data. But other less costly vehicles are, or could be, made available to MPC members for keeping abreast of the recent economic and financial news. Alternatively, there may be other activities that could be reduced or eliminated so as not create additional net demands on the time of the MPC members or the staff.

Option 4: Produce a staff forecast and present that forecast to the MPC prior to each Inflation Report.

129. **Rationale:** The principal benefit provided by the development and presentation of a staff forecast would be that it could provide the MPC with an independent assessment of the economic outlook. As noted above, one objective for the MPC should be to develop a range of “entry points” for alternative thinking and to create “speed bumps” that are capable of breaking the momentum of the house view. Developing a staff that is capable of and encouraged to provide independent assessments would be one way to serve that objective. This option would better increase the likelihood of disrupting the inertia that is built into the present process; in the present process, the staff largely update the MPC’s previous forecast for incoming data and changes in conditioning assumptions as the starting point for the next round. To be sure, the staff can also make adjustments for new analysis—but those are typically “adjustments” not “challenges”. A secondary benefit of moving in this direction is that staff would have increased incentives to be more fully engaged in the forecast process if they viewed themselves “owning” part of the output.
130. **Issues to consider:** The development of a staff forecast would be a big step. First additional resources would be required; attempting this enterprise at current staffing levels would be inadvisable and likely counterproductive. And that expenditure of additional resources would be wasteful if the MPC were not going to be open and willing to consider an independent assessment of the outlook. Likewise, some staff might be reluctant to embrace this activity for fear of having to challenge the MPC or its individual members. Or they may feel discomfort with being held accountable for their forecast. Moreover, the staff forecast, while being different than that of the MPC’s, could exhibit the same tendency toward inertia. Even in that case, however, persistent differences should raise persistent questions that

could force an examination of the evidence in an effort to reconcile those differences. The Bank may wish to consider publishing the staff forecast, albeit with a lag of sufficient length so as not to distract from the forecast of most direct relevance to the policy decision—that of the members of the MPC. In addition to enhancing transparency, knowing that the staff forecast would eventually be published could very well sharpen the focus of both the staff and the members of the MPC on this activity. All told, some cultural adaptations would be required by the Bank, the MPC, and the staff to maximize the benefits of this option and minimize its costs—though the value of change and adaptation should not be dismissed lightly.

Option 5: At some point in the forecast process, canvass individual MPC members for their forecasts of real GDP growth and inflation.

131. **Rationale:** At present, after productive debate and discussion about the positioning of the fan charts, at two points in the process, the Chair asks each individual Committee member whether they are comfortable with the fans and offers them an opportunity to provide further suggestions. When at least a majority of the Committee assents to the fans, the process is complete. But without more explicit input from the members of the MPC, there is the possibility that centre of gravity might not always align with the fan chart. By collecting this information, the MPC can better ensure that the process has led to an accurate representation of the centre of gravity. In addition to possibly improving the process, if individual members made explicit their quantitative assessments of the outlook, there would be greater internal accountability as well. The extent of the potential problem here should not be overstated; under an able Chair and with active MPC members—the configuration that I encountered in the meetings that I attended—the agreed upon fans are likely to accurately represent the centre of gravity. But that configuration may not always exist.
132. **Issues to consider:** There is some risk that asking for individual forecasts would undermine or degrade the effort to forge group consensus that underlies the present effective process of best collective judgment. That cost should be considered carefully because, as I noted above, the deliberative process stimulated by best collective judgment is a sound one that should be preserved to the greatest extent possible. This risk could be diminished by collecting the views of MPC members at the end of the deliberative process, so that the forecast conversation does not commence with hardened views promoting particular quantitative assessments. Adjustments could then be made to the fans if the individual views suggested the fans did not adequately capture best collective judgment.
133. There may be some concern that MPC members do not have the capacity to produce individual quantitative assessments. If that is, in fact, the case for some members, they should feel free to submit the exact same figures that underlie the agreed upon fans, when they view themselves as in the consensus. For those with views farther from the consensus, they should have some obligation to indicate how far they are from the centre of gravity. The individual members need not convey their views in decimal places—fractions or even integers might be sufficient in some cases.

Option 6: Develop richer and more systematic internal processes for evaluating outturns against the forecast.

134. **Rationale:** The MPC could probably benefit from a more comprehensive and systematic analysis of its forecasting errors. As background to the preparation of the box in each August Inflation Report, staff prepare a thorough note that examines recent forecasting errors and provides some analysis of the sources of that error. Moreover, on an ad hoc basis, analysis is presented on forecast evolution and forecast errors in key components of the forecast over longer periods to shed light on current puzzles in the outlook. But there could be benefits from stepping back to assess the sources of surprise in episodes of more persistent errors, such as the over-prediction of output growth and the under-prediction of inflation that has occurred in recent years. Greater investigation of those errors might provide clues about the likely trajectory of events going forward. Observations about these past errors could also help to set a work and research program to attack key areas of uncertainty. As noted in Option 14, this type of analysis might also be valuable to communicate to the public.
135. **Issues to consider:** Conducting this analysis will require staff and MPC resources. Perhaps a “special issues” meeting of the type discussed in Option 3 could be devoted to this topic from time to time so that the demand on staff and MPC time could be more easily accommodated.

Option 7: To promote a more assertive and experienced staff, increase the participation and influence of specialists within the Monetary Analysis Directorate of the Bank in the forecast process.

136. **Rationale:** Economists from around Monetary Analysis (MA) are already drawn into the forecast process. They provide inputs directly into the forecast; develop, monitor, and report on models that filter high-frequency data; and contribute analysis on key issues. But a number of economists outside the Forecast Team expressed the view that it was sometimes difficult for their work to have the influence and visibility it deserved when the Forecast Team were, in essence, the gatekeepers to the process. Meanwhile, the Forecast Team work very hard under tight time constraints—one factor behind the high turnover and relatively short tenures on the team. Some shifting of responsibilities for preparation of forecast materials to those outside the Forecast Team could be mutually beneficial to all groups. As I noted earlier, senior management within MA are well aware of this issue and have been actively working to effect improvements. And by most reports, the staff have already sensed improvement in this area.
137. **Issues to consider:** To be effective, the specialists outside the Forecast Team will need to better understand the issues most central to the forecast and be capable of providing the Forecast Team with products that are timely, well focused, and capable of integration into the forecast product with a reasonable degree of ease. (See Option 8 for one way to increase the awareness of economists outside the Forecast Team to the policy-relevant issues.) Likewise, the Forecast Team will need to be flexible enough to relinquish some control of the process and products, while still ensuring that the trains run on time.

Implementing this option without clear mutual expectations about the rules of engagement could ultimately put even greater pressure on people and a process that are already operating close to their limits.

Option 8: To the extent possible, consider increasing the number of staff allowed to witness forecast presentations and meetings.

138. **Rationale:** The most common complaint lodged by the staff about the forecast process was the constraints placed on their ability to witness some of the key forecast meetings—either in person or by remote video. With justification, the staff argue that in order to organize their work efforts and research programs to address the issues of highest value to the MPC, they need to be better informed about Committee discussion. The Chief Economist provides a de-brief for staff after the forecast round is over; this is viewed as helpful, but is not viewed as a perfect substitute. This problem is considered most acute by those outside of the Forecast Team—further adding to some of the discontent noted in Option 7.
139. **Issues to consider:** I seem to have received an equally common and adamant response from Bank executives to this staff concern: Limitations on staff attendance at these meetings is intended to preserve the free-flowing discourse that is promoted by a meeting with small attendance. And, that free-flowing discourse contributes to the overall quality of decision making—the ultimate objective of the process. In my observation, the small room and limited attendance of many of the forecast related meetings did contribute positively to an active and interactive dialogue among members of the MPC. Current and former MPC members indicated that the move to a small room with limited staff in attendance had improved the quality of discussions. I do not think that should be sacrificed, at least not lightly. But whether the limits on the number of staff that can witness the meetings by remote video are set at *exactly* the right level seems open to question. Some modest experimentation with those limits is warranted. Just as a free-flowing conversation contributes to good decision making, so does a well-informed and motivated staff.

Option 9: Contemplate encouraging longer tenure in positions and less rotation.

140. **Rationale:** Staff experience in MA is relatively lean at present. Longer tenure in forecast positions, for example, would over time cultivate a staff with greater standing and ability to participate in the forecast process and to challenge, when appropriate, views expressed by members of the MPC. This would improve the quality of the intellectual content of the forecast and the process by which it is developed. This could become especially valuable if, at some point in the future, there were less expertise in forecasting on the MPC than is the case at present. An experienced staff can contribute to institutional continuity and provide valuable institutional memory. This is reportedly an issue at the Bank beyond MA, though that was beyond my remit.
141. **Issues to consider:** Less frequent rotation of the staff among various positions might slow the process of developing a well-rounded staff with a broad understanding of the work of the Bank. That, in turn, might inhibit the training of the future leadership of the Bank. Moreover, Bank executives would need to provide and communicate clear incentives for

staff to remain longer in positions, especially those working on the forecast, where long hours and pressing time constraints are the norm. In that regard, some greater sharing of the forecast burden throughout MA could be helpful.

Options related to better integration of the forecast and monetary policy analysis

Option 10: Analysis of monetary policy options and strategies could be included routinely in the background materials and briefings prepared by the staff for every forecast round.

142. **Rationale:** The MPC currently devotes little or no time during its forecast round to discussing monetary policy strategies and tactics. But policy is best thought of as a sequence of actions that need to be taken to promote achievement of the policy objectives, and hence material on alternative possible sequences of actions and their implications for the economic outlook, and discussion of that material, should be useful to the members of the MPC in arriving at their decisions. Moreover, that information may help Committee members better understand and better communicate both the outlooks for policy and for the economy. Indeed, Committee engagement on these issues might be further enhanced if expected policy trajectories were to be published as part of the forecast process (see related Option 15). The material might include information on so-called “optimal” policies and on a variety of alternative rules. This analysis might be especially valuable when policy settings are far from their likely steady states by providing some perspective on when and how policy rates and the Bank’s balance sheet will need to be re-normalized. The size and nature of the risks surrounding the economic outlook might also bear on risk management strategies employed by the MPC. In general, the materials could be structured by the MPC and the staff to encourage and support systematic and routine strategic thinking about monetary policy and its relation to the economic forecast.
143. **Issues to consider:** Developing these materials and implementing a process for their routine preparation and presentation would be costly of staff time, and adequate resources would need to be devoted to the effort. However, there are staff in several units of MA already thinking about and working on issues related to monetary strategy. Some coordination of that work might be necessary, but I sense that staff would be eager to provide the MPC with greater support on monetary policy design—for some staff, that interest is the chief reason for working at the Bank of England.

Option 11: Consider creating a forecast with an extended horizon beyond the current three-year period—a horizon of sufficient length to allow consideration of the development and likely unwinding of major economic and financial imbalances.

144. **Rationale:** A three-year forecast interval is too short in many circumstances. In some situations, inflation or economic activity may be so far from desired levels that a reasonable return to target or equilibrium will likely occur beyond the three-year horizon. Policy makers should have an understanding of what policy adjustments may be required beyond that horizon to achieve their objectives. Moreover, a longer forecast interval allows for the identification of emerging imbalances (fiscal, financial, current account), and it forces policy makers to think through the consequences of the various ways in which those imbalances

can unwind and their implications for the economy. When those imbalances can be affected by monetary policy actions, a forecast with an extended horizon can provoke consideration of the costs and benefits of alternative policy approaches—the consequences of large versus small actions or the virtues of acting now versus the benefits of waiting to act.

145. As in other settings, the forecast serves as an important framing device. So unless the horizon of the forecast is long enough to capture the unwinding of significant economic imbalances, questions surrounding those imbalances and their policy consequences are less likely to get serious consideration. In addition to its value for internal deliberations, some consideration should be given to communicating with the public about key economic issues that might be raised by a look further out into the future.
146. **Issues to consider:** Again, additional staff work would be required to implement an extended forecast. But as noted earlier, an extended forecast is less a statistical prediction of the future and more a calibrated construction. For that reason it is most likely to be generated by a model-based process where costly data-intensive judgment is less useful. Moreover, because incoming news about the economy is likely to have only small effects on the longer-run forecast, its care and feeding should be less costly than that associated with the near-term forecast. Another approach would be to produce an extended forecast twice a year rather than quarterly. All that said, there would still be costs in terms of staff time and effort to implement this option.

Options for improving communication and transparency of the forecast

Option 12: Consider publishing some alternative scenarios.

147. **Rationale:** In some cases, the forecast may be greatly affected by a key judgment about which there is considerable uncertainty. In these situations, there could be value in publishing an alternative scenario that illustrates the sensitivity of the forecast to this key judgment. While in principle the fan charts should capture this uncertainty, alternative scenarios could provide valuable information to the public about some specific sources of uncertainty and the implications of those uncertainties for the outlook. Because these scenarios would likely mirror the discussions being had by the MPC on key issues, they would provide greater transparency to the MPC's thinking about the risks to the outlook.
148. In recent years, such scenarios might have included alternative assumptions about the evolution of productivity, the response of consumer spending to deleveraging, and the implications of exchange rate depreciation for inflation and output. Some individuals that I interviewed went so far as to advocate dispensing entirely with a central forecast and substituting instead several different forecasts. For a variety of reasons, I would not be prepared to endorse that suggestion at this point, but the possible inclusion of some alternative scenarios in the Inflation Report is motivated by a similar concern.
149. A second function that might be served by alternative scenarios would be to illustrate a chief source of disagreement among policy makers on a forecast judgment. In the early 2000s, the Inflation Report included, on a few occasions, a table (Table 6B) that highlighted the

consequences for the forecast of an alternative judgment about a key forecast parameter. Those tables were included at the request of MPC members whose judgment differed from the consensus of the Committee. While that particular vehicle may not be the preferred way to go, there could be value in using alternative scenarios to bring greater transparency to views of MPC members outside the consensus.

150. **Issues to consider:** The cost of constructing these scenarios is likely to fall disproportionately on the staff, so some additional resources would likely be required to implement this option. Moreover, for scenarios that were designed to reflect the collective uncertainty of the MPC, the deliberative cost of approving the scenarios would be impractical if the MPC members insisted on having the same level of input on the construction of the alternatives as they do on the construction of the central forecast. Some control for the design of the scenarios would need to be relinquished to staff in order for the process to remain manageable. Finally, there is some risk that the inclusion of alternative scenarios could detract from the message of the central projection, making the MPC's message more complicated.
151. The Bank may also want to consider this option in parallel with Options 13 and 15, below, to provide greater detail about the forecast and to provide information about the path for policy given that forecast. Providing more detail about both the MPC's central forecast and about alternative scenarios would likely increase the informational content, and, therefore, the usefulness, of both. Likewise, allowing interest rates to respond to the economic circumstances depicted in the alternative scenarios would make those scenarios more plausible and informative.

Option 13: Provide greater detail about the consensus forecast.

152. **Rationale:** One frequent request that I heard from outside forecasters and market participants was for the MPC to provide greater detail about the central forecast, beyond that offered by the fan charts and the text included in the Inflation Report. There were a range of requests. Some wished to see the type of expenditure and price detail produced by most large forecasting organizations and which they assumed that Bank staff were already producing in support of the MPC's forecasting operation. Others would be content with more quantitative information about key variables that are central to the MPC's forecast—for example, the output gap or unemployment rate, the household saving rate, productivity, and profit margins. As noted earlier, this information would allow outside observers of the MPC's forecast to better understand its rationale and to audit its outcome. Furthermore, outside interrogation of the MPC's forecast might provide valuable feedback to the Bank and members of the MPC about the outlook. In my words, it would provide another "entry point" for alternative views that could be helpful in ventilating the forecast process.
153. **Issues to consider:** As with the alternative scenarios, providing additional detail on the central forecast might be difficult if the MPC felt it needed to approve all of that detail. One practical solution would be for the MPC to outsource the production of the forecast detail to the staff. The staff could present a product, perhaps outside the Inflation Report, that would represent a reasonable construction of detail that is consistent with the MPC's fan chart forecasts. My sense is that such an output would go a long way toward satisfying the desires

of outside observers without bogging down the policy process. The demands on staff time would be minimal because, as I understand it, this output is already produced by staff as part of the forecast process. A drawback to providing greater forecast detail is that it might constitute another distraction from the simple message conveyed by the fan charts. That would especially be the case if MPC members routinely distanced themselves from the published detail. But even in this situation, there could be some benefits; MPC members who disavowed the details might be forced or might feel some obligation to explain the details underlying their alternative view of the outlook. More generally, the risk of distraction from the main messages of the Inflation Report might be mitigated by the inclusion of the detail in an appendix to the Report, or in another document altogether.

Option 14: Expand the forecast evaluation exercise currently published in the Inflation Report to include a fuller discussion of how outturns have differed from expectations.

154. **Rationale:** If Option 6 (internal evaluation of forecast errors) and Option 13 (publication of forecast details) were implemented by the Bank, then including a more detailed examination of forecast errors in the Inflation Report would not require much additional work for the MPC or Bank staff. As in Option 6, the idea would be to step back from a year-by-year assessment of errors and look at episodes as a whole. Making the assessment public would contribute to a better understanding of the Bank’s interpretation of the important economic developments of the past six years. And, it would allow others to scrutinize that interpretation and offer alternatives for the MPC to consider. Providing this analysis to the public would contribute to the MPC’s transparency.
155. **Issues to consider:** If the MPC declined to offer greater forecast detail, more thorough multi-year evaluation of forecast expectations and outturns would still be possible to include in the Inflation Report, though the value of the exercise would be reduced because it would necessarily be more qualitative.

Option 15: Consider publishing a summary of the individual forecasts of the MPC members as a supplement to the fan charts in the Inflation Report.

156. **Rationale:** There might be some benefits for external transparency in providing a summary of the assessments of individual MPC members. When there is considerable consensus among the MPC members about the outlook, these benefits are likely to be small. But when there are more widely diverging assessments of the outcome, the fan charts can provide an incomplete picture of Committee views. As a consequence, some consideration should be given to publishing a quantitative summary of individual Committee assessments—perhaps the range and the median of the individual forecasts, with additional information about assessments of variance and skew if that were deemed helpful. Again, this information provides another formal “entry point” for divergent points of view to be expressed, explained, and examined by the MPC and the public.
157. **Issues to consider:** One potential cost to making the range of individual views available is that the central consensus message of the MPC’s forecast would be overshadowed by

attention given to the differences among the policy makers. That cost would need to be weighed against the value of greater external transparency.

158. As for potential value added to external transparency, many current and former MPC members reported that MPC members already have adequate opportunities to publicly express their alternative views. Some MPC members have certainly taken advantage of those opportunities. So the magnitude of the benefits offered by this option in promoting greater external transparency is open to question. Nevertheless, there would appear to be potential vulnerabilities to a process that relies solely on the initiative of MPC members to publicly express alternative views and to choose the appropriate forums for presenting those views.

Option 16: Consider increasing communication about the outlook for policy as part of the forecast process.

159. **Rationale:** As noted above, in recent years, some central banks have moved in the direction of providing more explicit information on the outlook for their policy instruments in the context of their economic forecasts. Two major purposes are served by the provision of this information. First, to the extent that central bank projections of policy rates help shape expectations, those projections can increase the effectiveness of monetary policy. This communications tool may be especially valuable when the policy rate is stuck at the effective lower bound; in these circumstances, forward guidance about the policy rate can influence long-term interest rates and broader financial conditions even when the short rate is fixed in the near term, and thus it has the potential to deliver additional monetary stimulus. Second, greater transparency about the policy outlook provides another element of institutional accountability. To avoid undue focus on near-term policy decisions, indicators of policy rate expectations could be provided for periods one-year ahead, two-years ahead, and three-years ahead.
160. **Issues to consider:** This would be a very consequential move, and one that would be difficult, though not impossible, to back away from once implemented. One often cited concern about greater specificity by a central bank about the expected path of policy is that it will come to be seen as a commitment by the public and market participants. This, in turn, might make the central bank more reluctant to alter policy than in the absence of public projections of the policy rate. The publication of policy expectations in the Inflation Report would also add an additional dimension of complication in arriving at the overall best collective judgment. The potential size of the benefits and costs would need to be weighed carefully before moving forward. As for the benefits, the evidence on the value of policy guidance is not clear cut (and, even without forward guidance, the yield curve in the United Kingdom is currently quite flat). As for the costs, I suspect that, with experience, market participants and the public would come to learn the difference between a conditional forecast and a commitment—though I would not rule out that the learning process could be painful both for the public and for the Bank. Moreover, the difficulties of reaching consensus on that policy path might be reduced if the Inflation Report were to supplement the

consensus forecast with some summary of the degree of divergence in views—that vehicle might provide the MPC members with enough wiggle room to more easily reach consensus.

161. One approach the MPC might take to this issue is to first commission and then implement the type of routine monetary analysis for incorporation in the internal forecast process that was suggested in Option 10. As greater comfort and experience was gained internally with considering a forecast conditioned on a policy path that produces “desired” outcomes for inflation and output, the MPC could consider how best to communicate that information. Because the use of interest rate forecasts as part of public communication is at an early stage in most central banks, the success of those efforts is not yet assured. The MPC could use experiences at other central banks in formulating its own policy communications strategy, if it determined such a strategy would be beneficial.

Option 17: Consider publishing a vote by MPC members on the forecast in addition to a vote on the policy decision.

162. **Rationale:** At present, members of the MPC vote only on the policy decision. A dissent on the policy decision could reflect either a difference of view about the forecast or difference of view about how best to respond with policy to the situation presented by the forecast. Separate votes on the best collective judgment forecast and on the policy decision, with supporting explanations for dissents, would provide valuable information to the public about alternative views held by MPC members concerning the economic outlook and the direction of policy. This transparency would again serve the broad objective of adding entry points for non-consensus views, the discussion and exploration of which might encourage greater contemplation of vulnerabilities to the consensus view. That information would also further enhance the accountability of individual MPC members. If the MPC were to publish more information on the range of the views of individual MPC members as suggested in Option 15, there may be less communications value in recording votes on best collective judgment, though there would still be some accountability benefits.
163. **Issues to consider:** The transparency and accountability benefits are not likely to be large. That would be especially true if the policy preferences of the MPC members are very homogenous so that dissents almost always reflect different economic outlooks rather than how best to respond to the economic outlook. Moreover, by shedding greater light on the diversity of views, this option could, like some others, distract from the main message the majority of the MPC wishes to convey.

Option 18: Outsource to a reputable and impartial research organization the responsibility to organize once- or twice-a-year meetings of the MPC with leading researchers and scholars, focused on difficult or controversial issues. This outside group would set an agenda based on what they think the MPC should hear, including views that would challenge prevailing conventional wisdom at the Bank.

164. **Rationale:** The Bank already organizes and reports on the meetings of its semi-annual Monetary Policy Roundtable. Many individuals inside and outside the Bank report that those meetings are helpful, though the size and format of the meetings makes detailed discussion

of major issues difficult. The type of meeting that I have in mind would be a much smaller gathering, for which the organizers might commission 3 or 4 short papers on one important or controversial topic that the organizers judged would help inform the MPC on policy-relevant research. Each paper might have a couple of discussants. MPC members would be “at the table” to engage in the ensuing discussion. Attendance would be limited to participants and some staff so as to ensure unfettered give and take. In order to maximize open discussion and, therefore, the effectiveness of such meetings, they could operate under Chatham House rules, but with the papers made available to the public, and perhaps a short summary of the meeting subsequently published. Again, the objective is to maximize the probability that difficult and controversial topics and viewpoints get surfaced with the policy makers. Given recent experiences, the meetings might include issues such as understanding productivity, the latest work on exchange rate pass-through, optimal monetary policy design and communication, forecasting inflation, and other similar relevant topics.

165. **Issues to consider:** Choosing an appropriate organization to undertake this task will be important. In the United States, the National Bureau of Economic Research would be the type of organization that I have in mind. The Centre for Economic Policy Research or a similar type organization could be asked. Alternatively, a council of respected scholars with enough practical familiarity with policy making and policy making institutions could be established to organize these meetings. For some topics, the meetings could rely on researchers outside the UK.

Option 19: Consider changes to the fan charts. The Bank could reduce the fine gradations of the fan chart and add a line for the mean and/or modal forecast. And, some consideration should be given to moving away from a continuous quarterly projection and providing projections for half years or years.

166. **Rationale:** The current format of the fan charts, with fine gradations of the bands throughout the three-year forecast period, might convey a sense of greater precision about uncertainty assessments than is actually held by most MPC members. But even with the current degree of precision, the fan charts still make it difficult to identify the mode or mean of the forecasts. A simple chart with the mean or modal forecast and, for example, the 70 and 90 percent confidence intervals would be both transparent and easy to digest—delivering the key information of greatest interest to most outside observers. Another simplification might involve moving away from the continuous quarterly forecasts of the fans to forecasts of key variables by year or half year.
167. **Issues to consider:** The inclusion of the mean or mode and the elimination of the fine gradations of uncertainty may erode the central message that the forecast is a continuous probability distribution not a point estimate.

Option 20: Consider the creation and publication of cumulative density functions for inflation, the growth rate of real GDP, and the level of real GDP for a couple or few specified dates.

168. **Rationale:** Cumulative density functions would simply be transformations of information in the existing fan charts. But they would provide readers of the Inflation Report the

information necessary, for example, to determine the MPC's assessment of the probability that inflation would be above or below various levels at some specific date in the future¹³. Cumulative density functions could also be made available for growth of real GDP and the level of real GDP.

169. **Issues to consider:** Some readers might not be familiar with the concept of a cumulative density function, raising some possibility of confusion or misinterpretation. If the gradations of the fan charts were reduced to avoid too great a sense of precision about uncertainty, then adding cumulative density functions might just reintroduce that sense of precision.

Option 21: Publish the supplementary data with the quarterly detail and the probability distribution parameters underlying the fan charts at the time of the release of the Inflation Report rather than a week later.

170. **Rationale:** At present, considerable effort is undertaken by market participants and some journalists to infer the modal forecast from the fan charts. Indeed, several outside observers reported that they and others project magnified versions of the fan charts on screens and then manually measure the location of the bands to determine the point forecast. This seems a socially inefficient use of resources. Moreover, providing this information to everyone at the same time may be preferable to conferring informational advantage on those with the biggest projectors and finest rulers. There is another element of transparency that might tip one in the direction of releasing this information immediately. The information in the supplementary table actually represents the way that the forecast is constructed. The forecast process develops a central forecast with the information on the variance and skew added around the central forecast; this is a sensible process, and it is neatly and accurately represented by the information in the supplementary table.
171. **Issues to consider:** Providing explicit information on the point forecasts (modal and mean) might dilute the message that the forecast is really a probabilistic enterprise.

¹³ The current 'Ribbon chart' in the Inflation Report is a variant of this, but it indicates only the probability of inflation being above or below the target.

Annex: Terms of reference for the Review

Economic forecasts play a central role in helping the Monetary Policy Committee to assess the key economic risks and uncertainties affecting the economic outlook and hence the appropriate setting of monetary policy.

Since the onset of the global downturn in 2008–9, both output growth and inflation have been significantly more volatile than in the preceding decade. And the Monetary Policy Committee has found it more challenging to assess the outlook for growth and inflation.

The Court has asked David Stockton, former Director of Research and Statistics at the Board of Governors of the Federal Reserve System, to review the forecasting capability of the Monetary Policy Committee. This review will supplement the MPC's regular annual review of its forecasting performance.

The review will examine:

- The performance of the MPC's projections for growth and inflation since 2008.
- The analysis presented to the MPC in the production of those projections.
- The processes followed by the MPC to produce projections.
- The capability of the Bank to support the production of the MPC's projections.

Overall, the review will examine whether the MPC's forecasting procedures allow it to take full account of the relevant risks and uncertainties, and thus support the MPC's monetary policy decisions in order to meet the inflation target. The review will be used to inform decisions about the Bank's forecasting procedures and methods.