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WHAT'S IN A SECOND OPINION?
SHADOWING THE ECB AND THE BANK OF ENGLAND^{*}

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ABSTRACT

The European Central Bank (ECB) and the Bank of England (BoE) are shadowed by professionals and academic economists who provide a separate policy rate recommendation in advance of the central bank's announcement. We explore differences between shadow and actual committee decisions based on an adapted Taylor rule and report a few systematic differences especially in the case of euro area shadow committee. The shadow committee of the ECB tends to be relatively less inflation averse and more activist than its UK counterpart, at least vis-à-vis the respective policy making bodies. Perhaps most significantly our interpretation of the stance of the shadow committees is sensitive to the use of real time data, in particular during the global financial crisis.

Keywords: Monetary policy committees, Taylor rules, central bank communication

JEL Classification codes: E52, E58, E61, E69

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1. Introduction

In spite of the sheer volume of empirical research built around Taylor rule (TR) type specifications¹ there is one road that has so far not been travelled. To our knowledge, there are only five economies where a ‘second opinion’ about monetary policy decisions is available.² They are: the U.S., Canada, the euro area, Australia, and the U.K. Moreover, with the exception of the U.S., there has been no attempt at evaluating the advice provided by shadow monetary policy committees.³ As we explain below, the lessons from the U.S.’s shadow open market committee are not comparable to those of the other shadow committees.

The main hypothesis of the paper is simply stated: one way of evaluating how well monetary authorities perform, and assess the wisdom of their policy stance, is to provide the public with a regular and independent second opinion. The European Central Bank (ECB), and the Bank of England (BoE), are both shadowed by a group of professionals and academic economists who provide independent advice about the upcoming setting of the monetary policy instrument in both economies. The remit of these shadow committees is not to predict what the central bank will do. Instead, the aim is to provide a second opinion about the appropriate stance of monetary policy. The shadow Monetary Policy Committee (SMPC) for the

¹ While there is, to our knowledge, no general survey of the literature available, Clarida, Gali, and Gertler (1999), Orphanides (2008), and Asso, Kahn, and Leeson (2010) discuss virtually all of the relevant issues and debates surrounding Taylor rules. For an overview of the interest rate smoothing debate see, for example, Rudebusch (2002, 2006), and Castelnuovo (2003).

² We are specifically referring to an organized committee that offers a recommendation on the course of monetary policy in advance of the actual policy rate announcement and not the usual opinions expressed by professional or academic economists whose advice may be sought at irregular intervals by the media.

³ Work is currently underway by the authors to analyze the work of the C.D. Howe’s Monetary Policy Council which provides a recommendation for the setting of the policy rate (an overnight rate) for Canada. See <http://www.cdhowe.org/display.cfm?page=monetarySynopsis>. The second author is a member of that Council since January 2008.

BoE has met since 1997⁴ while the shadow Governing Council (SGC) of the ECB has published its recommendations since 2006. After describing how these shadow committees operate, highlighting the differences with the central banks they shadow, we go on to present some empirical evidence based on a variant of the TR formulation.

Poole (2006), among others, has pointed out, that the TR is a useful way of understanding the extent to which many central banks have become more predictable in the last decade especially. Although there are some challenges in applying a TR to understanding the policy proposals made by shadow monetary policy committees, including, in the U.K.'s case for example, dealing with the recent period of Quantitative Easing (QE), the evidence suggests that there are a few systematic differences between shadow and actual committee decisions but also many similarities. This could be because monetary policy has, in fact, become more predictable in recent years. Alternatively, the members of the respective committees effectively coordinate their predictions about what the appropriate stance of monetary policy ought to be because they are greatly influenced, as a group, by the rhetoric and data provided by the central banks they are shadowing with consequences reminiscent of the predictions in the model developed by Morris and Shin (2002).⁵ Nevertheless, we do report that the shadow committee of the ECB tends to be relatively less inflation averse than its UK counterpart, at least vis-à-vis the respective policy making bodies. Additionally, we find that our interpretation of the position taken by both the shadow and formal monetary policy committees is sensitive to the reliance on real time data. In particular, we report that both the shadow and central

⁴ A separate shadow committee, the TIMES MPC, has operated for a few years but, as this is written, we have not been able to compile sufficient data to undertake the kind of empirical study presented below.

⁵ In the present context this means that the more inflation becomes low and stable the less likely it is for outside observers to pay attention to anything other than communications from central banks.

bank policy committees became very responsive to real economic conditions as the impact of the global financial crisis of 2007-2009 was being felt in both economies examined.

Monetary policy committees are well known to be driven by the need to achieve consensus. Hence, it is also of interest to examine how the individual members of the group behave. Indeed, we find that departures from the consensus are apparent, in the case of the ECB's shadow Governing Council (SGC), when the results are disaggregated according to whether the committee members are professional or academic economists, as well as possibly being a function of the country of origin of the shadow member, or even by the positions taken by the most hawkish and most dovish committee members. At the risk of exaggerating the importance of this result this finding may well have implications for current and future governance challenges faced by the ECB and the functioning of monetary policy committees more generally.

The rest of the paper is organized as follows. The following section briefly explains the organization, role, and functions of shadow committees focusing on the US Shadow Open Market Committee (SOMC) and concludes that its aims are quite different from those of the committees they shadow whose functions are also briefly described. Section 3 provides the background to the specifications being considered highlighting some of the challenges that emerge when interpreting the work of shadow committees through the TR filter. We also summarize the data, and provide a few stylized facts. Section 4 describes the results while section 5 concludes.

2. Monetary Policy Committees and Shadowing Monetary Policy

Increasingly, central banks are governed by a committee structure. Even in a few countries (e.g., Canada, New Zealand) where a Governor is statutorily responsible for monetary policy decisions there sometimes exists a committee-like structure to assist the Governor in making a policy rate decision. Paralleling the role of committees in the formulation of monetary policy has been the apparent consensus among policy makers and academics about what constitutes best practice in monetary policy (e.g., see Clarida, Gali, and Gertler 1999, and Goodfriend 2007). These two developments may well have combined to give the appearance that monetary policy is conducted in a similar fashion across the industrial world although, as shown in the following section, differences clearly emerge in how rates are set, their levels, and changes over time. Moreover, theory also suggests that how committees are formed, their size, voting procedures, membership (i.e., external versus central bank officials), and the manner members are appointed, all influence committee wide decisions (e.g., Siebert 2003).

While the theoretical literature offers some guidance there is little in the way of a consensus about the implications of committee structure for the conduct of monetary policy. For example, Sibert (2003), and Mihov and Sibert (2006), find that monetary policy committees (MPCs) where voting outcomes are published improve social welfare in part because this serves to improve committee members' reputations. Additional work by Gerlach-Kristen (2006) largely supports this conclusion. However, the positive externalities derived from a committee structure face difficulties when they become 'too' large.⁶ Committee size also complicates decision-making when consensus is required and committee members are not in a collegial

⁶ Borrowing from the psychology literature, Sibert (2006) concludes that most MPCs are too large.

frame of mind (Blinder 2007, Amato, Morris, and Shin 2002). Moreover, there is a risk that clarity in monetary policy communication can be threatened when there are potentially too many individuals who make pronouncements about monetary policy that come into conflict with a single monetary policy objective. While experimental evidence (e.g., Lombardelli, Talbot, and Proudman 2002), and Blinder and Morgan (2000), broadly supports the notion that committees are a relatively superior form of governance compared with the single decision maker model, differences emerge depending on the manner in which decision-making is structured (e.g., Riboni and Ruge-Murcia 2010). An excellent survey of the advantages and drawbacks of the committee structure in monetary policy and the challenges in communicating policy is Blinder, Ehrmann, Fratzscher, de Haan, and Jansen (2008).

2.1 Monetary Policy Committees and the Origin of Second Guessing: the Shadow FOMC

The original idea for second guessing monetary policy comes from the Shadow Open Market Committee (SOMC) of the U.S. Federal Reserve formed by Karl Brunner and Alan Meltzer during the 1970s in response to what the so-called 'monetarists' at the time perceived to be an ill-fated 'Keynesian' style policy of volatile money growth and persistent inflation (see Meltzer 2000). The original intention was for the SOMC to meet twice per year, and that a policy statement would follow a meeting where the members presented position papers on a wide variety of economic issues that were not restricted to matters dealing with monetary policy alone. On occasion, the SOMC would also comment on fiscal policy especially if it was felt to influence the conduct of monetary policy and inflation more generally. Like the shadow committees in the U.K. (see below) and Canada membership consists of academics and

professional economists. There were no committee meetings from 1998 to 2005 and, after 2006 when meetings resumed, only the policy papers remained. Policy statements no longer accompanied SOMC meetings. Archival documents and other related materials from the reconstituted SOMC are available at <http://shadowfed.org/>.

Poole, Rasche, and Wheelock (2011) revisit the advice given by the SOMC, relying on a New Keynesian style framework, and conclude that the SOMC's monetarist advice would have yielded less inflation and milder output losses for the U.S. economy compared with the actual policy practiced by the Fed. Partly because of the structure of the SOMC's deliberations, and in part because their advice tended to gravitate around medium-term objectives (e.g., low and stable inflation, money growth goals) their work cannot easily be compared with the shadow committees considered in this paper whose work is more tightly focused around recommendations for future policy rates.

2.2 Shadow Committees of the Bank of England and the European Central Bank

The Bank of England regained its operational independence to set the course of monetary policy in 1997 and the Monetary Policy Committee was created as the vehicle used by the BoE to set the policy rate and the course of monetary policy on a monthly basis (<http://www.bankofengland.co.uk/monetarypolicy/overview.htm>). Members of the committee are individually accountable under the legislation governing the Bank of England's operations and mandate. The BoE's MPC consists of 9 members, four of whom are external members appointed by the Chancellor of the Exchequer. Minutes of the meetings are released shortly

after each meeting and these contain information about the views of individual members.⁷ When the policy rate (i.e., the Bank Rate) is announced it is after a vote has been taken based on a motion put forward by the Governor. Since March 2009 the motion includes not only a recommendation for the next Bank Rate setting but also a vote about the continuation of quantitative easing which the BoE defines as consisting of a policy to inject more liquidity into the economy via the purchase of government and corporate bonds (<http://www.bankofengland.co.uk/monetarypolicy/assetpurchases.htm>).

The SMPC is an undertaking of the of the U.K. *Institute of Economic Affairs* (<http://www.iea.org.uk/smpc>) and was created in July 1997 shortly after the BoE became independent of the Treasury. As of this writing the membership consists of a total of 14 members who represent both professional and academic economists in the U.K. The SMPC meets either in person, or electronically, a few days before the MPC publishes its decision to provide its recommendation based on a majority vote. Like its counterpart at the BoE minutes of the meetings and individual comments are recorded and are published (see <http://www.iea.org.uk/smpc/minutes>). Organizers of the SMPC ensure that each meeting records 9 votes to match the number of votes at the BoE's MPC meeting. Table 1a provides a summary that contrasts the functions of the MPC versus the SMPC. It is not entirely clear what the voting mechanism is, however, it appears that there is a motion (e.g., to hold the rate) that is voted on in an unspecified order.⁸

⁷ Until 1998 the average lag with which minutes were released was approximately 5 weeks. Thereafter, following some consultations, the minutes have been released the second week after each MPC meeting.

⁸ In private correspondence, both Charles Goodhart and David Smith of the SMPC have pointed out the tendency for some of the members of the shadow committee to have 'monetarist' leanings. Accordingly, the TR may not

Turning to the ECB, its Governing Council also meets on a monthly basis to set the course of monetary policy and these decisions have been reported since March 1999. Monetary policy decisions are delegated to a Governing Council (GC) which consists of an Executive Board (EB) made up of six members and the Governors of the 17 euro area central banks (as of January 1, 2011). Hence, potentially 23 members make monetary policy decisions. Nevertheless, the EB is responsible for monetary policy decisions and prepares the work of the GC for the policy rate decisions expressed in terms of the rate on main refinancing operations (MRO). The ECB announces its monetary policy decision and a press conference is held shortly after the meeting and is normally led by the ECB President alongside the Vice-President. Between 1999 and 2001 there were two announcements per month although generally only one pertains to the actual policy rate setting (<http://www.ecb.int/press/govcdec/mopo/previous/html/index.en.html>). Beginning in 2002 only one announcement is made regarding the setting of the rate on MRO. Minutes are not released and the ECB openly acknowledges that its decisions are based on consensus (e.g., see Moutot, Jung, and Mongelli 2008).

The SGC operates through the German publication *Handelsblatt* and, while the original language of the publication is German, considerable information about the SGC is also available in English (<http://www.handelsblatt.com/politik/konjunktur/shadow-council/>). The group was founded in 2002. The SGC meets approximately 1 week before the ECB announces its own monetary policy decision. The meeting is held via a telephone conference call and the SGC

represent an accurate reflection of some of the members' thinking over time (also see Smith 2007). However, this suggests to us that persistent differences between the SMPC and the MPC may well emerge as a result of ideological differences. We are unable to put an ideological label on each SMPC member, nor do we have independent information on members' ages or educational background. In any event, even monetarists will aspire to some form of price stability and will subscribe to the short-run trade-off that exists between inflation and the real side of the economy that underpins the TR.

consists of 15 professional economists. While there is no voting as such the recorded opinion of the SGC is based on a tally of recommendations made at the meeting. A journalist acts as a non-voting Chair. Occasionally, commentary from some of the SGC members is recorded but there is no formal press release while the ‘minutes’ record the various issues in the euro area, and elsewhere, that pre-occupy members of the SGC. A novel element of the SGC is that members are encouraged, though not obligated, to supply a current year and one year ahead inflation and real GDP growth forecast for the euro area and the mean value for the group is reported. In addition to the recommended current setting SGC members have recently been indicating the direction of bias for interest rates over a 3 month ahead horizon.⁹ This is a form of forward guidance that is also not yet provide by the ECB. Finally, also on an irregular basis at least until fairly recently, there is often an article that provides an early indication of the concerns that the SGC will discuss at its next meeting. Table 1b compares the GC with the SGC.

3. Data, Stylized Facts, and Empirical Specifications

*3.1 Data and Stylized Facts*¹⁰

Data were collected at the monthly frequency from the respective shadow committee websites listed in the previous section with additional data collected from the websites of the Bank of England and the ECB. As will be explained below we also employ inflation forecasts from two additional sources, namely *The Economist’s* Poll of Forecasters as well as Consensus Forecasts. Because of data limitations we are unable to begin the sample from the very first meeting of either shadow committee. Hence, the sample for the SMPC begins in January 2002

⁹ Unfortunately, the available time series is too short to use in the present study.

¹⁰ We plan to eventually post some of the data used in this study on the Central Bank Communication Network’s website, <http://www.central-bank-communication.net/>.

and ends with the October 2010 recommendation. This yields 77 observations. Similarly, the first observation for the SGC dataset is for January 2006 and the sample also ends with the October 2010 MRO recommendation resulting in 52 monthly observations.

Since Orphanides (2001) it has been acknowledged, as decisions are based on data that are available to policy makers at the time, that estimated policy rules based on revised data may give a misleading picture of the intended stance of monetary policy. Therefore, we also examine different ‘vintages’ for output or the output gap¹¹ to determine the sensitivity of our results to data that both the shadow and actual policy committees had at their disposal. The data were obtained from the OECD’s real-time database (<http://stats.oecd.org/mei/default.asp?rev=1&lang=e>).

In what follows we assume that both the shadow committee and the respective central bank’ decision making bodies have the same information set. While some argue that central banks possess an information advantage over the public, including the ‘experts’ that sit on the shadow committees, it is far from clear why this would be the case. What is undoubtedly correct is that the resources available to decision-makers in central banks¹² are comparatively larger than those available to most shadow committee members. Actual policy rate decisions are based not only on estimates of, say, the relative importance of aggregate demand and supply shocks and a series of inflation or output growth forecasts generated from a suite of

¹¹ Inflation and interest rate data either are not revised or the revisions are not considered to be large enough to influence the results of estimated policy rules. While several recent papers (e.g., Molodtsova, Nikolsko-Rzhevskyy, and Papell 2008) estimate TR using real time data it is still relatively common to see estimates based on revised data. Since not all real time revisions will change inference based on TR type specifications we rely on both types of data in the present study.

¹² This comparative advantage may not extend, however, to the external members of the BoE’s MPC.

models and scenarios, among other pieces of information, but ultimately on committee members' judgment which is largely unobservable.¹³

Finally, while the BoE faces an explicit inflation target set by the Government, the ECB has defined its own objective for price stability. Tables 2a and 2b provide some summary statistics describing the BoE's SMPC together with a few comparisons with the BoE's MPC while Figure 1a plots the SMPC's recommended Bank Rate settings against the actual ones set by the BoE. Table 2b and Figure 1b repeats the exercise for the ECB's SGC and the actual GC's policy rate behaviour.

There are few differences between the median recommendations of the BoE's SMPC and its MPC counterpart (see lower part of Figure 1a). Moreover, it appears that a substantial majority supports the policy rate proposal defined as the median value of recommended policy rates. This should come as no great surprise as it must be recalled that each time the MPC sets the policy rate this always requires the SMPC to reset its next decision conditional on the prevailing policy rate set by the MPC. To some extent this rule extends to the MPC which takes the last decision as given although not all of its members might have approved the chosen policy stance. Nevertheless, other than for those members of the SMPC whose recommendations exactly match those of the MPC, the remaining members of the shadow committee are required to form their proposal possibly based on a policy rate level they may not consider adequate. Indeed, a further complication is that members who disagreed with the actual

¹³ There is one advantage that the MPC and the GC have over their shadow counterparts since there is a gap of several days between the announcement by the second guessing committee and the central banks they shadow. We cannot control for the possible news arrival during this gap. Instead, a separate event study may be required to sort out the economic significance of this gap in explaining the decisions made by the two sets of committees.

decision of the MPC may, subsequently, find the BoE's arguments credible thereby removing the earlier disagreement. Obviously, in the empirical work presented below we cannot observe all of these factors.¹⁴

Figure 1a gives an impression of the discrepancies between the Bank Rate set by the BoE and the median together with the range of policy rate recommendations made by the SMPC. It is interesting to note that, while differences between the two committees tend to be small, in part owing to the practice of changing policy rates in increments of 25 basis points, disagreement with the BOE's MPC tend to rise when rates are rising and are more subdued when they fall.

Next, we turn to summary statistics for the ECB's SGC in Table 2b and Figure 1b. Once again, for reasons previously discussed, there are few systematic differences between the GC's policy rate settings and those recommended by the SGC cousins. As is the case for the BoE's SMPC, the SGC displays a considerable amount of visible consensus with the recommended policy rate that, on average, is supported by almost 80% of the SGC. Unlike the SMPC, however, a substantial plurality of the membership is made up of professional economists.

While it is often pointed out that the ECB remains a 'young' central bank it is equally true is that independence and inflation targeting represent relatively recent regime changes at the

¹⁴ It has been suggested to us that the incentives of shadow members differ from those of members of the formal policy making committee. This may well be true since, for example, MPC members in the Bank of England are individually accountable for their decisions. Moreover, the extent to which shadow members seek out visibility might also differ from their counterparts at the central bank. If both interpretations are correct one might also expect some anomalies in the shadow committees' decisions. We do not find any such anomalies. Also, the degree to which there is consensus may also reflect differences in accountability and the demand for visibility. We return to the issue of committee consensus below though the factors just discussed would appear to be difficult to quantify.

BoE. Nevertheless, in contrast to the BoE's experience, disagreements between the shadow committee and its formal counterpart at the ECB tend to become more visible when the policy rate is falling. Finally, since the ECB is a supra-national central bank, and given the role of country of origin in creating biases in one direction or another in setting the stance of monetary policy, it is worth considering the distribution of the SGC's membership according to nationality. By this metric, on average, almost 30% of SGC members are from Germany. We investigate the role of nationality in the subsequent empirical work reported below. It is worth noting that, while there is considerable presence from France followed by other EMU countries, the membership of the SGC also includes almost 20% on non-euro area economists.

3.2 Estimated Specifications

Next, we turn to the estimated empirical specifications. As noted in the introduction, it is convenient to consider some version of the TR partly because the literature has gravitated in this direction as a short-hand expression used in evaluating the conduct of monetary policy. Under the present circumstances there may be an even more compelling reason to rely on this kind of metric. After all, whereas members of shadow committees presumably become involved in these kinds of deliberations not only because they share an academic or a professional interest in monetary policy and, hopefully, have the reputation and expertise to pronounce opinions on the subject, it is less likely that they are able to think about the correct stance of monetary policy on a full-time basis. Furthermore, there exists a considerable difference in the location of responsibility for policy mistakes with the stakes presumably much

greater for the central bankers. Consequently, it seems appropriate to consider the kind of rule of thumb approach implicit in the application of Taylor rules.

The availability of individual votes also permits us to delve more deeply into committee behaviour. In principle, one could estimate a Taylor rule for individual committee members. However, when attempting draw broad conclusions about committee performance, the average term of several members is brief enough to make this approach impractical. Instead, we consider whether there are observables that can be used to explain how much consensus there exists in the respective shadow committees examined. Consensus is defined according to the share of recommendations, as a percent of the number of votes, identical to the median recommendation. Although it is interesting to consider what explains consensus within a committee it is equally interesting to explore sources of disagreement with policy rate decisions taken by central banks. As previously noted disagreement, defined as a non-zero differential between the policy recommendation of the shadow committee and the monetary policy committee, tends to be more noticeable when central banks enter a period of rising or falling policy rates. We examine below whether there is any empirical support for this form of asymmetric behaviour.

In what follows then we estimate the following specifications. They are:

$$i_t^r = (1 - \rho)(\alpha r_t + \beta_0 \tilde{\pi}_{t+j|t} + \beta_1 \tilde{y}_{t+j|t}) + \rho i_{t-1}^{CB} + \varepsilon_t \quad (1)$$

$$Consensus_t = \delta_0 + \delta_1 X_t + \mu_t \quad (2)$$

$$Disagreement_t = \Pr[i_t^{SC} - i_t^{CB} \neq 0 | Z_t] = \kappa_0 + \kappa_1 X_t + \eta_t \quad (3)$$

Equation (1), for the most part, follows a standard Taylor rule with an interest rate smoothing parameter ρ , where the policy rate, i_t^T , is set either by the central bank (CB) or the shadow committee (SC). Both committees must set the current period policy rate according to the level set by the central bank in period $t-1$. Based on the persuasive evidence in Clarida (2010), the real interest rate, r_t , is time varying and is based on the real return yield on 10 year German government bonds, considered the benchmark for the euro area, and a similar yield based on the U.K. counterpart bond.

The determinants of the TR include an inflation gap, $\tilde{\pi}$, which is observed inflation at time t the stated inflation target in the BoE's case (see Table 2a) and 2% in the case of the ECB.¹⁵ The Harmonized Index of Consumer Prices (HICP) is used to measure inflation in both economies, although prior to 2004, the U.K. inflation rate is based on the rate of change in the retail price index (RPI). Since neither central bank's mandate requires meeting the target every period, an alternative is to replace the stated inflation target with the one year-ahead inflation forecast from three sources, namely the BoE's own forecasts¹⁶, *The Economist* Poll of Forecasters, or the one year ahead inflation forecast from Consensus Economics while, in the case of the ECB's SGC, we can rely on the mean forecast published as part of the published minutes of the SGC meeting. Since the data are monthly the forecast are for 12 months ahead (i.e., $t+12$) conditional on information available at time t . In what follows, and to conserve space, we

¹⁵ The ECB defines price stability as follows. "In the pursuit of price stability, the ECB aims at maintaining inflation rates below, but close to, 2% over the medium term." See <http://www.ecb.europa.eu/mopo/intro/html/index.en.html>.

¹⁶ We employ both types of BoE forecasts: (i) conditional on market expectations of interest rates and (ii) based on constant interest rates.

report results based on only one set of forecasts, namely those from *The Economist*, as the conclusions are generally unaffected by the source of the forecast.

As is well-known the output gap is an unobservable series. We follow past practice by proxying this series in a number of different ways to test the sensitivity of our results. First, owing to the relatively short sample, we use a simple deviation from a constant trend output (1.5%). Alternatively, we follow much of the literature in employing a Hodrick-Prescott filter with the standard smoothing parameter of 14,400 for monthly data.¹⁷ Third, we also obtain estimates based on real GDP growth forecasts from the same two sources that provide us with inflation forecasts. In what follows, and to conserve space, we report results based on only on the constant trend output, as the conclusions are generally unaffected by the source of the forecast. We chose not to add an exchange rate variable. Research on estimated as well as optimal TR (e.g., see Clarida 2001, Collins and Siklos 2004) suggest that adding this series does not make much difference to inference based on the standard TR specification.

When equation (1) relies on inflation and output growth forecasts the specification can be estimated via least squares. However, in the usual case where future inflation, unobserved at time t , replaces a forecasted value, it is the common practice to rely on GMM estimation. Moreover, since the estimated specification includes a time varying real interest rate we have further motivation for relying on GMM estimation.¹⁸ An important consideration, more often than not under-emphasized in this kind of empirical work, is the importance of the selection of

¹⁷ Note that employing the Hodrick-Prescott filter assumes perfect knowledge of all future output observations since it estimates trend output based on a two-sided filter.

¹⁸ Comparisons between GMM and OLS estimates suggest relatively few differences in the conclusions. Results are relegated to the Appendix.

valid instruments (e.g., see Siklos and Bohl 2009, and references therein). After considerable experimentation we chose lags of inflation, industrial production, a broad monetary aggregate (e.g., M3), and lags of an interest rate (EONIA) in the case of the euro area and the sterling overnight interbank rate or SONIA for the BoE specification. In the case of the U.K. Taylor rule we also add lags of the nominal U.S.-U.K. exchange rate.

Next, equation (2) considers the sources of consensus in committee decisions. As discussed above, consensus is defined as the fraction of total votes at any given meeting that match the median recommendation published by the shadow committee. As with the policy rule estimates, we consider observable sources of consensus, namely the representation of professionals on the committee, the share of German nationals in the case of the ECB's SGC,¹⁹ while, in the case of the SMPC, we add a measure of the balance of opinion in favour of the adopted policy stance, proxied by the share of votes in favour of the motion that is eventually adopted at the last MPC meeting. Moreover, the specification considers whether the consensus differs as between a rate rise or fall, in effect to detect whether the consensus is asymmetrically determined and, finally, whether larger proposed changes in the policy rate threaten consensus relative to smaller and, presumably, more gradual changes. Hence, we can write

$$X_t = \{MPC\ Votes_{t-1}, Pros_t, Nat_t, Cut_t, Rise_t, Size_t\} \quad (4)$$

¹⁹ There is a long history of studies of the behaviour of members of the US's Federal Open Market Committee and the preferences of individual members that is akin to the attempt here to assess the importance of the background of committee members. See, for example, Chappell, Havrilesky, and McGregor (2000). There is also some recent evidence for the UK's MPC (Berk, Bierut, and Meade 2010).

where **MPC Votes** is the balance of votes in favour of the adopted policy stance by the MPC at its previous meeting, **Pros** is the share of professional economists who vote at each meeting, **Nat** is the share of German nationals in the ECB's SGC, **Cut** and **Rise** are shadow committee median recommendations that support a cut (or a rise) while **Size** represents the step in percent (e.g., 0.25). Equation (2) is estimated via OLS.

Finally, equation (3) transforms non-zero differences between the actual and recommended policy rates into a [0,1] binary variable to estimate, via probit, whether the probability of a disagreement between the shadow and formal monetary policy committees is a function of the same set of observables used in equation (4).

4. Results

Tables 3a and 3b present the estimates of equation (1) for the BoE and the ECB, respectively.²⁰ In the case of the BoE the results shown in Table 3a make allowances for the possibility that the stance of monetary policy is affected by the introduction of Quantitative easing (QE) in 2009. There are three notable results for the U.K. case. First, the Taylor principle holds for both the MPC and the SMPC. That is, a one percent rise in the inflation gap produces either an actual policy rate or a recommended increase of more than one percent, but only during the era that precedes QE. Indeed, during the QE period, neither the SMPC nor the MPC react to the inflation or output gaps. The respective committees appear to react to something

²⁰ We relegate to the Appendix estimates when the bodies being examined do not smooth interest rates. The differences in the coefficient estimates are relatively small in the case of the ECB except that both the SGC and the GC react much less forcefully to the output gap than when smoothing is assumed. In the BoE's case, both committees respond far less aggressively to inflation and the output gap once the era of QE arrives than in the case where smoothing is permitted. Since the explanatory power of the BoE regressions is largely unchanged while that of the ECB specifications drops precipitously, once we drop interest rate smoothing, there is possibly a case to be made that the latter central bank, and its shadow committee, practices interest rate inertia while its counterparts in the UK do not.

else that is not accounted for in any of the specifications considered. Finally, given the same set of forecasts, the degree of inflation aversion is the same on both committees, at least in statistical terms.²¹ Turning to the ECB specifications shown in Table 3b we find that, as in the case of their cousins in the U.K., the Taylor principle is followed when reacting to inflation shocks. However, unlike the SMPC, the SGC is less inflation averse than is the GC and the margin of difference is statistically significant.

The TR specifications considered so far are unable to deal with the question of what drives differences in views about the appropriate policy rate recommendation. As noted above, while the ECB favours the consensus view of monetary policy decision-making the BoE's governance model permits disagreements to be aired in public. Accordingly, Table 4 provides estimates of the determinants of consensus building factors inside each shadow committee relying on equation (2). For the SMPC what is notable is that the share of professionals on the committee has a marginally significant influence on consensus in policy rate settings, whereas consensus in the last MPC voting does not play a significant role. Moreover, while consensus is always lower when rates change as opposed to when they remain unchanged, rate rises versus rate reductions do not appear to make a difference to the degree of consensus nor is the contemplated size of the policy rate change statistically significant. The results are rather different for the SGC. Hence, rate cuts create relatively more disagreement than rate hikes

²¹ We also separately consider the impact of using alternative inflation forecasts for the SMPC (results are relegated to the Appendix). The source of these forecasts appears to have no influence on reaction function estimates for the SMPC (or the SGC) while the type of forecast has a statistically significant influence on how the MPC sets the policy rate. For example, the MPC reacts far more strongly to an inflation forecast based on constant market interest rates than one based on the Economist's Poll of Forecasters or Consensus forecasts. Moreover, the MPC does not react to inflation forecasts conditioned on prevailing views about market interest rates. Perhaps this is either because markets do a fairly good job of anticipating the Bank of England's next move or, as Blinder (1999) points out, the central bank is actually following the policy the market wants it to adopt.

although both have the effect of reducing the degree of consensus in the committee. Moreover, the size of the proposed policy rate change also affects how much consensus exists in the committee. Hence, larger changes prompt more agreement among committee members. It is likely, however, that these results reflect the rapid reductions in policy rates in the aftermath of the global financial crisis.

Next, we examine the sources of disagreement between the shadow and formally constituted monetary policy committees. Equation (3) serves as the specification of interest and estimates are shown in Table 5. One notable difference between the two central banks is that while we are unable to explain a large portion of the variation in differences between the SMPC and the MPC the proposed specification performs considerably better when the ECB's shadow is contrasted with the formally constituted GC. Returning to the BoE's experience we do conclude that disagreement between the two committees appear to be influenced by how much consensus exists within the shadow committee. It would appear that when there is a considerable amount of consensus within the SMPC the likelihood of disagreement with the MPC declines.²² One interpretation is that when overall economic signals are clear, presumably conducive to greater consensus, both committees are more inclined to make the same policy recommendation. While the same result is found for the ECB's committees there are at least two other conclusions that can be drawn from the estimates shown in Table 5 which do not match the findings based on U.K. data. First, and perhaps most importantly, the SGC is more likely to be activist than its GC counterpart. Not surprisingly, this has implications for the degree

²² Note, that once we drop the target rate change characteristics from the model, the coefficient for consensus in the SMPC becomes significant, whereas consensus in last MPC voting remains insignificant.

of interest rate smoothing of the respective committees since, as seen from the earlier results shown in Table 3b, the interest rate smoothing parameter of the GC is larger than for the SGC. Also interesting is the result that the fraction of German nationals on the committee is positively and highly significantly related to the likelihood of producing a recommendation that both the GC and SGC would agree with.²³

To date we have relied on data, especially for output, that neither the shadow nor the actual decision-making bodies of the two central banks considered in this study could have at their disposal when making policy rate recommendations. In other words, it is instructive to consider the performance of both the shadow and formal committees when real-time data are used. Given the momentous events of the past few years this approach may yield insights into the shadow committees' recommendations as the global financial crisis (GFC) developed.

The real-time results are provided in Tables 6a and 6b for a selection of vintages. These coincide with meetings prior to, or immediately following, some momentous event such as the eruption of the Greek debt crisis in 2010 or the introduction of QE in the UK in 2009. In the BoE's case the most noticeable impact from the reliance on real-time data is that it clearly reveals that, following the introduction of QE, the output gap ceased to be relevant to the SMPC at least until September 2010. Even then, the implied tightening of monetary policy was far less aggressive than prior to the introduction of the QE era. Similarly, any reaction to

²³ As an alternative to the specifications shown in Table 4 we also estimated version of equation (1) for the most dovish and most hawkish proposals made at each committee meeting. The details are relegated to an Appendix. The conclusions largely confirm the findings discussed above. Hence, a considerable amount of consensus is evident in both the shadow and formally constituted committees. Interestingly, however, the hawks on the SMPC remain so in their response to both inflation and the output gap even when the UK enters the period of QE.

inflation in the manner advocated by the Taylor principle ceases to be apparent though this change largely pre-dates the introduction of QE.

Turning to the ECB's experience and, the SGC did not recommend policy rates based on inflation news with the possible exception of the March 2008 vintage when commodity price developments were weighing heavily on central bankers' views about the future inflation outlook. Instead, output gaps dominate policy rate prescriptions and the estimated coefficients based on real time data are considerably larger during the November 2007 through June 2010 period than when the revised data are employed (see Table 3b). In 2010, by the time the effects of the GFC subside, the Taylor principle reasserts itself with the SMPC reacting primarily to inflation shocks while GDP gaps once again play a lesser role. Finally, it is also very interesting to note that the neutral real interest rate (i.e., the intercept term) is effectively treated as zero during the height of the crisis and once again becomes statistically significant after 2009. Indeed, when contrasted with the results based on revised data views about the real interest rate are highly sensitive to the use of real time information. Overall then, there is something to be gained from an examination of real time data when estimating reaction functions.

5. Conclusions

Central to the conduct of 'good' monetary policy is credibility. Not surprisingly, interested observers of central banks have had difficulty coming up with adequate indicators of the extent to which markets and, more generally, the public understands, agrees with, or is surprised at times by the policy rate decisions taken by the monetary authorities. This paper examines these questions by evaluating how shadow monetary policy committees perform in relation to their

statutorily mandated counterparts. We examine the record of the shadow committees of the Bank of England and the European Central Bank. Three sets of tests are considered. First, we estimate Taylor type rules for both shadow and formal committees and compare them to each other. Next, we consider what drives the degree of consensus within a *shadow* committee. Finally, we consider sources of disagreement between the policy rate recommendations and subsequent settings by the actual monetary policy committees.

Our salient conclusions are as follows. While differences between shadow and formal monetary policy committees do not persist there exist clear differences in the factors that influence policy rate settings between the two groups. For example, the ECB's shadow Governing Council is less inflation averse than its cousin. Second, we find that consensus within a committee is far easier to reach when there is no pressure to change the policy rate. In contrast, rises or falls in policy rates affect consensus though only for the ECB's SGC is any asymmetry reported with consensus undermined when rate cuts are the order of the day as opposed to interest rate increases. Furthermore, departures from the consensus are apparent when the results are disaggregated according to whether the committee members are professional or academic economists. A related result is that while it is difficult to explain differences in policy rate recommendations between the shadow and formal committees of the Bank of England, the same is not true for the ECB. Indeed, we report strong evidence that the SGC is more activist than its GC counterpart but that larger changes in policy rates bring about a greater likelihood that the two committees will agree.

Finally, our interpretation of the decisions of shadow committees in particular is greatly influenced according to whether real time or revised data are used. A rather striking result is how sensitive the shadow committees' recommendations were as the global financial crisis emerged, seemingly reached a peak in 2009, and then began to recede in 2010. The estimates are a clear demonstration of the important role of real time data in evaluations of monetary policy, whether it is by those whose statutory responsibility is to render monetary policy decisions or individuals whose role is to provide a second opinion about the appropriate stance of monetary policy.

References

Amato, J., S. Morris, and H. Shin (2002), "Communication and Monetary Policy", *Oxford Review of Economic Policy* 18(4): 495-503.

Asso, P., Kahn, G.A., and R. Leeson (2010), "The Taylor Rule and the Practice of Central Banking", Federal Reserve Bank of Kansas City, RWP 10-05, February.

Berk, J.M., B. Bierut, and E.E. Meade (2010), "The Dynamic Voting Patterns of the Bank of England's MPC", DNB Working Paper 261.

Blinder, A. (2007), "Monetary Policy by Committee: Why and How?", *European Journal of Political Economy* 23 (March): 106-23.

Blinder, A. (1999), *Central Banking in Theory and Practice*, Cambridge: The MIT Press.

Blinder, A., M. Ehrmann, M. Fratzscher, J. De Haan, and D. Jan-Jansen (2008), "Central Bank Communication and Monetary Policy: A Survey of Theory and Evidence", *Journal of Economic Literature* 46 (December): 910-45.

Castelnuovo, E. (2003), "Taylor Rules, Omitted Variables, and Interest Rate Smoothing in the US", *Economics Letters* 81 (October): 55-59.

Chappell, H.W., T.M. Havrilesky, and R.R. McGregor (2000), "Monetary Policy Preferences of Individual FOMC Members: A Content Analysis of the Memoranda of Discussion", *Review of Economics and Statistics* 79 (August): 454-60.

Clarida, R. (2010), "What Have We Learned About Monetary Policy in a Low Inflation Environment? A Review of the 2000s", Federal Reserve Bank of Boston Conference, *Revisiting Monetary Policy in a Low Inflation Environment*.

Clarida, R. (2001), "The Empirics of Monetary Policy Rules in Open Economies", *International Journal of Finance and Economics* 6 (October): 215-23.

Clarida, R., J. Gali, and M. Gertler (1999), "The Science of Monetary Policy: A New Keynesian Perspective", *Journal of Economic Literature* 37 (December): 1661-1707.

Collins, S., and P. Siklos (2004), "Optimal Monetary Policies and Inflation Targets: Are Australia, Canada, and New Zealand Different from the US?", *Open Economies Review* 15 (4): 347-62.

Gerlach-Kristen, P. (2006), "Monetary Policy Committees and Interest Rate Setting", *European Economic Review* 50 (February): 487-507.

Huber P. (1967), "The Behavior of Maximum Likelihood Estimates Under Non-Standard Conditions", *Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability* 1, 221-33.

Meltzer, A. (2000), "The Shadow Open Market Committee: Origins and Operations", *Journal of Financial Services Research* 18 (December): 119-28.

Molodtsova, T., A. Nikolsko-Rzhevskyy, and D. Papell (2008), "Taylor Rules With Real-Time Data: A Tale of Two Countries and One Exchange Rate", *Journal of Monetary Economics* (Supplement): 563-79.

Morris, S., and H. Shin (2002), "The Social Value of Public Information", *American Economic Review* 92: 1521-34.

Moutot, P., A. Jung, and F.P. Mongelli (2008), "The Workings of the Eurosystem - Monetary Policy Preparations and Decision-Making – Selected Issues", ECB Occasional paper 79, October.

Newey, W. And K. West (1987), "A Simple, Positive Semi-definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix". *Econometrica* 55 (3), 703–8.

Orphanides, A. (2008), "Taylor Rules", in *The New Palgrave: A Dictionary of Economics*, Second Edition, New York: Palgrave MacMillan.

Orphanides, A. (2001), "Monetary Policy Rules Based on Real Time Data", *American Economic Review* 91 (September): 964-85.

Poole, W. (2006), "The Fed's Monetary Policy Rule", *Review of the Federal Reserve Bank of St. Louis* (January/February): 1-11.

Poole, W., R. Rasche, and D. Wheelock (2011), "The Great Inflation: Did the Shadow Know Better?", NBER Working Paper 16910.

Riboni, A., and F. Ruge-Murcia (2010), "Monetary Policy By Committee: Consensus, Chairman Dominance, or Simple Majority?", *Quarterly Journal of Economics* 125(1): 363-416.

Rudebusch, G. (2002), "Term Structure Evidence on Interest Rate Smoothing and Monetary Policy Inertia", *Journal of Monetary Policy* 49 (September): 1161-87.

Rudebusch, G. (2006), "Monetary Policy Inertia: Fact or Fiction?" *International Journal of Central Banking* 2 (December): 85-135.

Sibert, A. (2003), "Monetary Policy Committees: Individual and Collective Reputations", *Review of Economic Studies* 70 (3): 649-65.

Sibert, A., and I. Mihov (2006), "Credibility and Flexibility with Independent Monetary Policy Committees", *Journal of Money, Credit and Banking* 38 (February): 23-46.

Siklos, P., and M. Bohl (2009), "Asset Prices As Indicators of Monetary Policy: An Empirical Assessment of their Role in a Taylor Rule", *Open Economies Review* 20 (February): 39-59.

Smith, D. (2007), "Cracks in the Foundation? A Review of the Role and the Functions of the Bank of England After 10 Years of Operational Independence", Economic Research Council Research Paper No. 23.

Taylor, J. (1993), "Discretion Versus Policy Rules in Practice", *Carnegie-Rochester Conference Series on Public Policy* 39: 195-214.

White, H. (1980), "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity", *Econometrica* 48 (4): 817-38.

Figure 1a:
SMPC Target Rate Recommendation, MPC Target Rate Setting, and their Differences

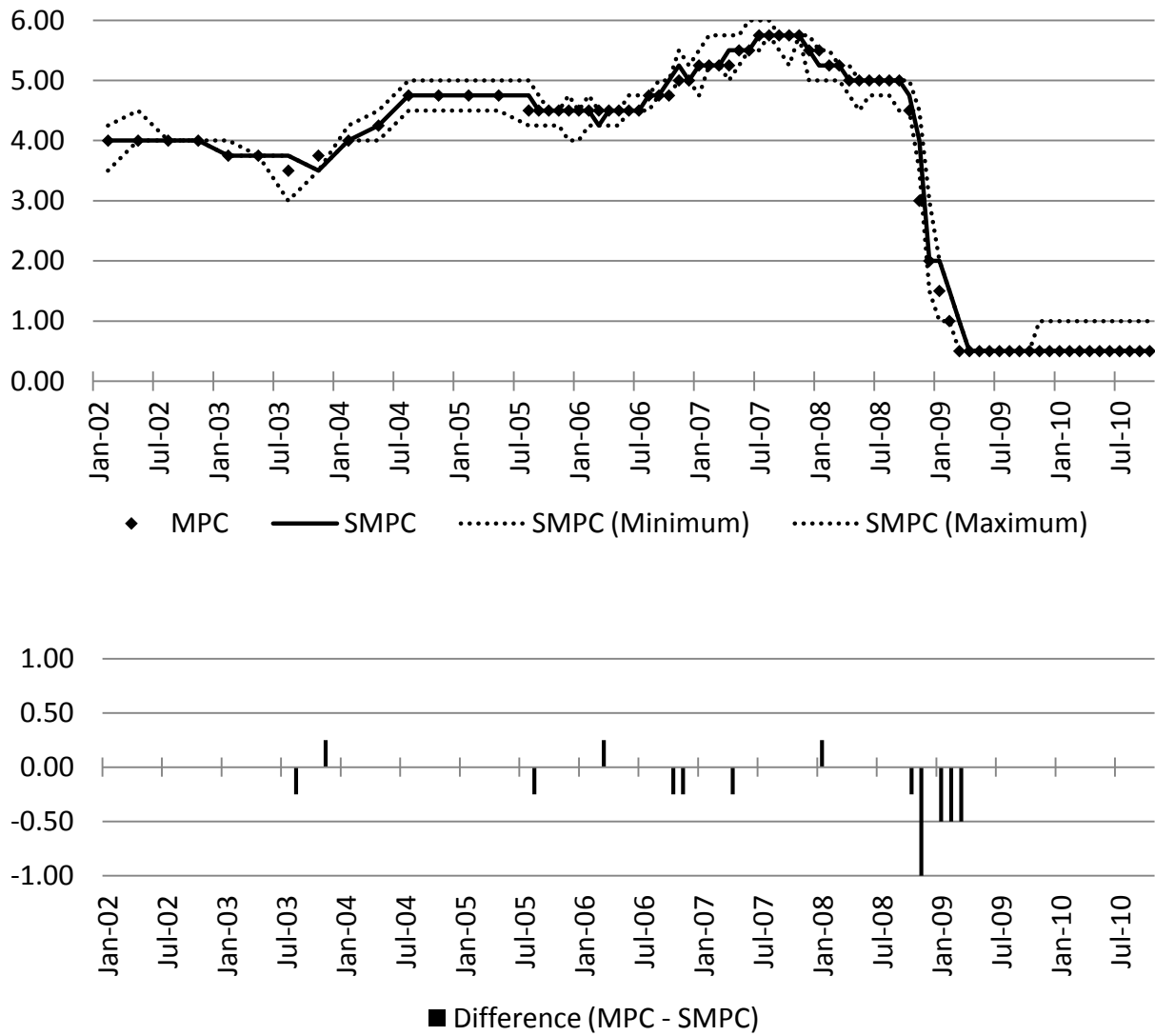


Figure 1b: SGC Target Rate Recommendation, GC Target Rate Setting, and their Differences

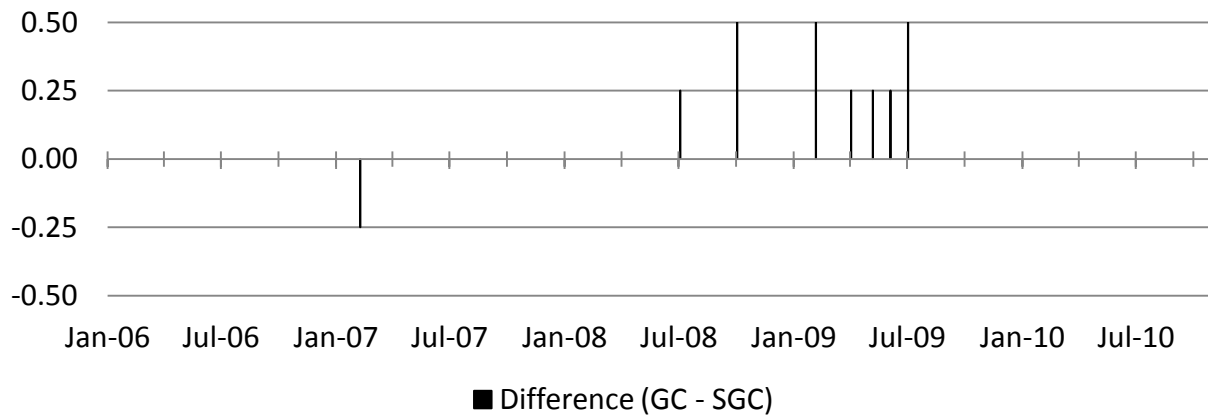
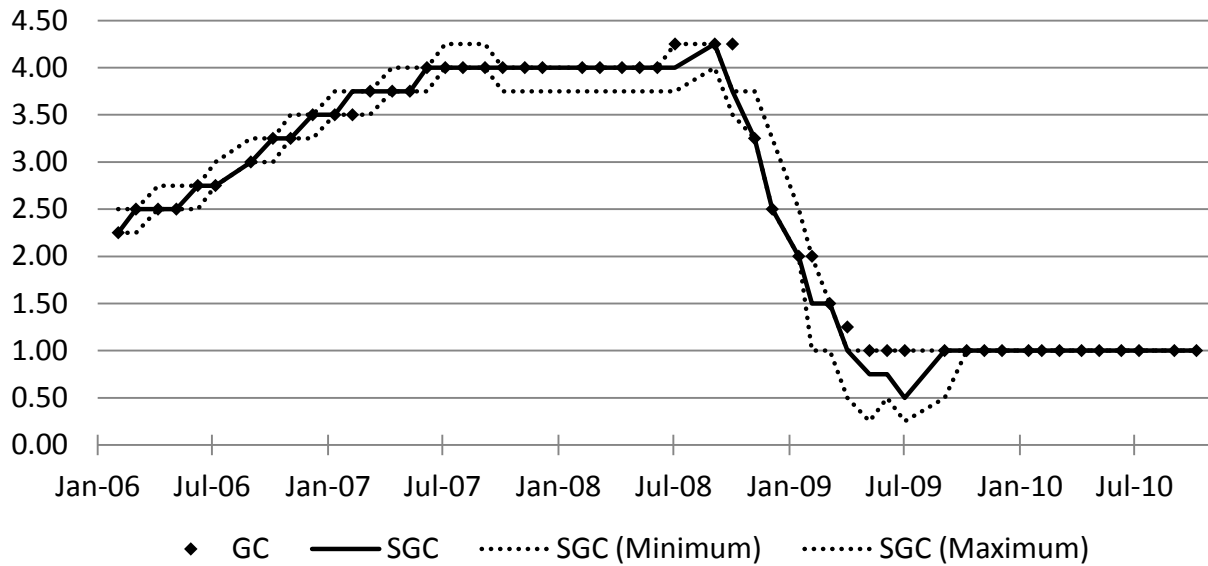


Table 1a: Shadow Monetary Policy Committee for the Bank of England

	MPC	SMPC
Statement	yes	yes
Voting Record	yes	yes
Minutes	yes	yes
Press Conference	no	no
Forecast	quarterly	no

Sample period: February 2002–October 2010 (77 observations)

Table 1b: Shadow Monetary Policy Committee for the European Central Bank

	GC	SGC
Statement	yes	no (press release)
Voting Record	no	yes
Minutes	no	no
Press Conference	yes	no
Forecast	quarterly	monthly

Sample period: January 2006–October 2010 (52 observations)

Table 2a: BoE SMPC Descriptive Statistics

	Mean	Std. Dev.	Skewness	Minimum	Maximum
SMPC Proposal	3.56	1.95	-0.72	0.50	5.75
MPC Target Rate	3.51	1.96	-0.69	0.50	5.75
Difference	0.04	0.17	3.12	-0.25	1.00
10 Year Real Bond	1.50	0.52	0.15	0.43	2.80
Inflation Forecast Gap	0.16	0.45	0.80	-0.88	1.50
GDP Forecast Gap	0.09	1.26	-1.66	-4.05	1.55
Voting for Proposal (%)	0.70	0.20	-0.28	0.11	1.00
Share of Professionals (%)	0.43	0.11	0.10	0.11	0.67

Note: Dataset contains all SMPC proposals from February 2002–September 2010 (77 observations). Note that the Bank of England changed its inflation measure and target during our sample. Until the end of 2003, the (midpoint of its) inflation target was 2.5% annual growth of the Retail Price Index. Since 2004, the (midpoint of its) inflation target is 2% annual growth of the Harmonized Index of Consumer Prices. Inflation and GDP forecasts (with a 12 month horizon) are obtained from The Economist’s Poll of Forecasters. The output gap is derived from a constant growth trend (1.5% annually).

Table 2b: ECB SGC Descriptive Statistics

	Mean	Std. Dev.	Skewness	Minimum	Maximum
SGC Proposal	2.57	1.30	-0.21	0.50	4.25
GC Target Rate	2.61	1.27	-0.17	1.00	4.25
Difference	-0.04	0.14	-2.22	-0.50	0.25
10 Year Real Bond	2.22	1.00	0.35	0.49	4.47
SGC HICP Forecast Gap	-0.24	0.64	-0.23	-1.40	1.00
SGC GDP Forecast Gap	-0.47	1.40	-1.30	-3.85	0.97
Voting for Proposal (%)	0.78	0.18	-0.55	0.33	1.00
Share of Professionals (%)	0.68	0.11	-0.17	0.50	0.93
Share of Germans (%)	0.29	0.06	0.22	0.20	0.41

Note: Dataset contains all SMPC proposals from January 2006–September 2010 (52 observations). Inflation and GDP forecasts (with a 12 month horizon) are obtained from the SGC minutes. The output gap is derived from a constant growth trend (1.5% annually).

Table 3a: SMPC Recommendations and the Taylor Rule: Equation (1)

Dependent Variable	SMPC Proposal	MPC Target Rate
Interest Rate Smoothing	0.952 **	0.898 **
10 Year Real Bond	0.506	0.541
Inflation Forecast Gap pre-QE	5.796 **	4.861 **
Inflation Forecast Gap QE	0.192	0.154
GDP Forecast Gap pre-QE	5.775 **	4.883 **
GDP Forecast Gap QE	-0.017	0.008
S.E. of regression	0.110	0.169
Observations	77	77
R ²	0.997	0.993
J-statistic	0.116	0.109

Notes: * and ** indicate significance at a 5% and 1% level, respectively. Newey-West (1987) standard errors are used if autocorrelation was detected. Inflation and GDP forecasts (with a 12 month horizon) are obtained from The Economist's Poll of Forecasters. The output gap is derived from a constant growth trend (1.5% annually).

Table 3b: SGC Recommendations and the Taylor Rule: Equation (1)

Dependent Variable	SGC Proposal	GC Target Rate
Interest Rate Smoothing	0.948 **	0.967 **
10 Year Real Bond	1.570 **	1.762 **
Inflation Forecast Gap	3.701 **	4.705 **
GDP Forecast Gap	2.246 **	1.363 **
S.E. of regression	0.135	0.151
Observations	52	52
R ²	0.990	0.987
J-statistic	0.184	0.173

Notes: * and ** indicate significance at a 5% and 1% level, respectively. Newey-West (1987) standard errors are used if autocorrelation was detected. Inflation and GDP forecasts (with a 12 month horizon) are obtained from the SGC minutes. The output gap is derived from a constant growth trend (1.5% annually).

Table 4: Determinants of Consensus in the SMPC and the SGC

	SMPC	SGC
Constant Term	0.494 **	0.437
Last MPC Consensus	0.115	—
Share of Professionals	0.384 *	0.695 **
Share of Germans	—	-0.279
Proposal: Cut	-0.334 *	-0.895 **
Proposal: Hike	-0.213 **	-0.312 *
Proposal: Absolute Size	0.079	1.297 **
S.E. of regression	0.167	0.143
Observations	77	52
R ²	0.351	0.467
AR Test	5.462 **	2.612
Hetero Test	2.083 *	1.440

Notes: * and ** indicate significance at a 5% and 1% level, respectively. Newey-West (1987) standard errors are used if autocorrelation was detected.

Table 5: Determinants of Disagreement between SMPC and MPC and between SGC and GC

	SMPC	SGC
Coefficients		
Constant Term	0.479	-12.976
Consensus	0.445	11.376 **
Last MPC Consensus	0.514	—
Share of Professionals	0.202	-4.251
Share of Germans	—	39.274 **
Proposal: Cut	-1.143	-5.241 *
Proposal: Hike	-0.940	-6.963 **
Proposal: Absolute Size	0.092	10.823 **
Average Marginal Effects		
Consensus	0.096	0.648 **
Last MPC Consensus	0.111	—
Share of Professionals	0.043	-0.242
Share of Germans	—	2.225 *
Proposal: Cut	-0.340	-0.470
Proposal: Hike	-0.261	-0.620 **
Proposal: Absolute Size	0.020	0.616 *
Observations	77	52
LR Statistic	9.620	202.240 **
Pseudo Log-Likelihood	-30.151	-5.369
Pseudo R ²	0.138	0.760
Correct Predictions	63	50

Note: *, and ** indicate significance at a 5%, and 1% level, respectively. Huber (1967)/White (1980) robust standard errors are used.

Table 6a: Taylor Rules for the SMPC and MPC in Real Time: Selected Estimates

SMPC / GDP Vintage	Sep-10	Jun-10	Apr-09	Dec-08	Jun-08	Mar-08	Nov-07
IR Smoothing	0.954 **	0.994 **	0.880 **	0.953 **	0.935 **	0.928 **	0.964 **
10 Year Real Bond	2.126 **	-0.174	2.570 **	1.233	1.254 **	2.179 **	1.801 *
Inflation Forecast Gap pre-QE	2.028	7.216	1.349 **	1.931	0.573	4.972 **	4.597 **
Inflation Forecast Gap QE	-0.554	1.862	—	—	—	—	—
GDP Forecast Gap pre-QE	1.888	6.320	0.585 **	4.079 **	2.271 **	1.999 **	3.380 **
GDP Forecast Gap QE	0.258 *	-0.086	—	—	—	—	—
S.E. of regression	0.172	0.183	0.274	0.194	0.144	0.168	0.130
Observations	77	73	58	55	49	46	40
R ²	0.993	0.991	0.928	0.926	0.948	0.933	0.956
J-statistic	0.125	0.117	0.133	0.168	0.198	0.162	0.180

MPC / GDP Vintage	Sep-10	Jun-10	Apr-09	Dec-08	Jun-08	Mar-08	Nov-07
IR Smoothing	0.942 **	0.910 **	0.964 **	0.941 **	0.973 **	0.932 **	0.994 **
10 Year Real Bond	-0.250	-0.515	0.830	0.942	1.377	1.839 **	1.617 *
Inflation Forecast Gap pre-QE	-0.275	3.931 **	-0.677	-0.303	2.794 *	3.195 **	4.019 **
Inflation Forecast Gap QE	0.720	0.284	—	—	—	—	—
GDP Forecast Gap pre-QE	4.979 **	5.340 **	4.014 **	3.562 **	3.794 **	2.171 **	4.800 **
GDP Forecast Gap QE	-0.100	-0.149 *	—	—	—	—	—
S.E. of regression	0.195	0.199	0.237	0.228	0.126	0.132	0.122
Observations	77	73	58	55	49	46	40
R ²	0.991	0.990	0.955	0.906	0.959	0.957	0.959
J-statistic	0.061	0.117	0.165	0.124	0.168	0.151	0.220

Note: * and ** indicate significance at a 5% and 1% level, respectively. Newey-West (1987) standard errors are used. Inflation and GDP forecasts (with a 12 month horizon) are obtained from The Economist's Poll of Forecasters. The output gap is derived using the respective GDP vintage.

Table 6b: Taylor Rules for the SGC and GC of the ECB in Real Time: Selected Estimates

SGC / GDP Vintage	Sep-10	Jun-10	Jun-08	Mar-08	Nov-07
IR Smoothing	0.741 **	0.960 **	1.000 **	0.956 **	0.943 **
10 Year Real Bond	1.420 **	2.044 **	-1.018	0.495	0.598
Inflation Forecast Gap	2.382 **	2.573 *	1.418	3.341 *	2.844
GDP Forecast Gap	0.425 **	0.731 **	5.758 **	2.923 **	2.520 **
S.E. of regression	0.202	0.238	0.135	0.117	0.133
Observations	52	47	28	24	20
R ²	0.978	0.967	0.954	0.968	0.960
J-statistic	0.158	0.151	0.201	0.208	0.138

GC / GDP Vintage	Sep-10	Jun-10	Jun-08	Mar-08	Nov-07
IR Smoothing	0.877 **	1.000 **	1.000 **	0.954 **	0.973 **
10 Year Real Bond	1.522 **	1.750	-0.642	0.526	-0.010
Inflation Forecast Gap	3.519 **	-0.938	1.478	3.374 *	7.421 *
GDP Forecast Gap	0.199 **	1.158 **	5.141 **	2.864 **	4.364 **
S.E. of regression	0.146	0.209	0.135	0.116	0.131
Observations	52	47	28	24	20
R ²	0.988	0.973	0.955	0.968	0.960
J-statistic	0.235	0.160	0.211	0.206	0.135

Note: * and ** indicate significance at a 5% and 1% level, respectively. Newey-West (1987) standard errors are used. Inflation and GDP forecasts (with a 12 month horizon) are obtained from the SGC minutes. The output gap is derived using the respective GDP vintage.