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From doves to hawks: A spatial analysis of voting in the Monetary Policy Committee of the Bank of England

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Abstract. This article examines the making of monetary policy in the United Kingdom between 1997 and 2008 by analysing voting behaviour in the Bank of England's Monetary Policy Committee (MPC). It provides a new set of measures for the monetary policy preferences of individual MPC members by estimating a Bayesian item response model. The article demonstrates the usefulness of these measures by comparing the ideal points of outgoing MPC members with their successors and by looking at changes over time in the median ideal point on the MPC. The analysis indicates that the British Government has been able to move the position of the median voter on the MPC through its appointments to the Committee. This highlights the importance of central bank appointments for monetary policy.

On 11 January 2007 the Monetary Policy Committee (MPC) of the Bank of England increased the interest rate by a quarter of a per cent to 5.25 per cent. The increase came as a surprise to most observers given the economic conditions and past behaviour of the MPC. When the minutes of the meeting were published three weeks later, they revealed that the Committee had split 5 to 4 in favour of the increase. In fact, the MPC has been divided about two-thirds of the time since the Bank of England was made independent in 1997, although rarely split down the middle as in January 2007. Presented with the same information about the state of the British economy each month, why do the members of the MPC disagree on the appropriate interest rate? Clearly, British central bankers, like all policy makers, do not all think the same way. This suggests that had the composition of the MPC been slightly different in January 2007, the decision might have been to hold rates rather than to increase them.

We offer a spatial analysis of voting in the MPC from the first meeting of the Committee after the Bank of England was made independent in June 1997 until April 2008. We use Bayesian simulation methods, introduced by Martin and Quinn (2002) and Clinton et al. (2004) in the context of courts and legislatures, respectively, to estimate an item response model that measures the

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monetary policy preferences of all of the 25 individuals who have been members of the MPC during this ten-year period. We measure these preferences along an underlying dimension that we label a 'dove-hawk dimension', where 'hawks' tend to prefer higher interest rates than 'doves' when faced with identical economic conditions. Our estimates control for varying economic conditions across MPC meetings and incorporate information as to the substantive direction of the interest rate proposals voted on by MPC members. Furthermore, the Bayesian estimation method we employ ensures that our preference measures are accompanied by statistically valid uncertainty estimates and also makes it straightforward to draw inferences regarding auxiliary parameters of substantive interest. We demonstrate the value of these features by using our measures to investigate patterns in the monetary policy preferences of individuals appointed to the MPC, and in the median ideal point on the MPC over time. Our analysis indicates that the observed pattern in MPC appointments is not consistent with a simple political business cycle in central bank appointments. Nevertheless, through its appointment powers, the British Government has been able to move the position of the MPC over time. This suggests that central bank appointments matter for monetary policy. In light of this, we discuss possible alternative incentives that might have motivated the British Government's appointment choices.

In the next section we provide a brief review of the existing literature on monetary policy making on the MPC and on central banks more generally. In the third section we develop the statistical model we employ to measure monetary policy preferences, and describe our data and estimation method. We present the resulting measures in the fourth section. Finally, we apply our measures to investigate whether there is an intelligible pattern in the composition of the MPC over time.

Studying the Bank of England MPC

One of the first acts of the newly elected British Labour Government in May 1997 was to grant operational independence for setting monetary policy to the Bank of England. After almost two decades in opposition, the new Labour Chancellor of the Exchequer, Gordon Brown, was eager to demonstrate his party's commitment to economic stability. Economists have argued that central bank independence with a clear and simple mandate is an effective institutional arrangement for delivering low and stable inflation (Rogoff 1985). The logic is that removing representative government from direct involvement in monetary policy making and placing responsibility in the hands of a relatively inflation-averse central bank mitigates the 'time-inconsistency problem',

where suboptimal inflation levels arise because a policy maker cannot credibly commit to not induce surprise inflation (Kydland & Prescott 1977; Barro & Gordon 1983). Granting independence to the Bank of England hence sent a strong signal to financial markets and the electorate that Labour could be trusted to manage the British economy.

The Act of Parliament that established central bank independence in the United Kingdom provided for the Chancellor to set an inflation target and for a Monetary Policy Committee to set monetary policy instruments at monthly meetings with the aim of achieving this target. The inflation target is currently set at 2 per cent on the Consumer Price Index (CPI). If this target is missed by more than one percentage point on either side, the Governor of the Bank has to write a letter to the Chancellor explaining why this is the case. This implies that the inflation target is symmetric (below-target inflation is not deemed to be more desirable than above-target inflation) and that a range of inflation rates around the target are politically acceptable. The key monetary policy instrument set by the MPC is the official bank rate, which is the interest rate at which the Bank of England supplies funds to the banking system for a two-week period.

The MPC consists of nine members who decide on the bank rate by majority vote at each monthly meeting. The decision-making process on the MPC has been described by Bank of England employees Bean and Jenkinson (2001: 435–437) as follows. First, Committee members are presented with the latest economic information by Bank of England staff at a monthly briefing. Second, members discuss economic conditions on the first of a two-day policy meeting the following week. Third, on the second morning of the policy meeting, the Governor of the Bank of England invites each member in turn to summarise his or her views regarding the appropriate monetary policy (usually including their preferred interest rate). Members are called in a random order, with the Deputy Governor responsible for monetary policy speaking first and the Governor concluding. Finally, the Governor proposes an interest rate 'that he expects will command a majority' (Bean & Jenkinson 2001: 438) and members vote on this proposal. The Governor votes last. The preferred interest rate of a member who votes against the winning proposal is recorded.

Of the nine individuals who sit on the MPC at any one time, five 'internal' members are appointed as staff of the Bank of England and four 'external' members are appointed by the Chancellor. Of the internal members, the Governor and the two Deputy Governors of the MPC are appointed for renewable five-year terms by the Crown, which effectively means the Chancellor. The two other internal members – the Executive Directors of the Bank – are appointed for renewable three-year terms by the Governor of the Bank of England, after consultation with the Chancellor. The four external members

are appointed for renewable three-year terms. Nominees are required to go before the House of Commons Treasury Select Committee, which can take a vote of approval, but does not have the power to veto a Chancellor's appointment choice.[1] Thus the Government, and particularly the Chancellor, would appear to possess a great deal of control over the appointment of most MPC members.

Table 1 lists the details of the 25 individuals who were members of the MPC at one time or another between June 1997 and April 2008. As the table shows, there is variance in the career background of both internal and external members prior to their appointment. A plurality of the 11 internal appointees had a background within the Bank of England, but six came from other backgrounds such as financial institutions, academia and the Civil Service. Similarly, a plurality of the externally appointed members had a background in academia, but others come from financial institutions in the City of London, the Civil Service or industry.

Turning to existing research on the MPC, several scholars have estimated reaction functions of varying specifications to assess the response of MPC interest rates to key economic variables (cf. Gascoigne & Turner 2004; Adam et al. 2005; Goodhart 2005). Other researchers have exploited the availability of MPC voting records to investigate monetary policy-making behaviour within the Committee. Some papers concentrate on the voting behaviour of groups of members – particularly internals versus externals. Spencer (2007) and Harris and Spencer (2009) find that external members are more likely to vote for a cut in interest rates than internal members. Gerlach-Kristen (2009) draws similar conclusions from an analysis of the relative voting behaviour of insiders and outsiders. In a slight modification of this result, Hansen and McMahon (2008) find evidence that, after their first year on the Committee, external members tend to vote for lower interest rates than internal members.

In contrast to these studies, we analyse voting behaviour on the MPC at the individual rather than the group level. This approach reduces the risk of confounding individual-level with group-level explanatory variables. To elaborate, the result that external members on average vote for lower rates than internal members might be caused by idiosyncratic factors rather than anything systematically related to being an external member. Of course, if this result were obtained from analysis of a time period that included the terms of a large number of external and internal members, then we could be reasonably confident in attributing preferences for lower rates to the external-*ness* of a member. However, as the time period shrinks to include fewer numbers of individuals within each group, this confidence is reduced. Since the MPC has only been in existence since 1997, as of April 2008 any study can compare the votes of a maximum of only 11 internal and 14 external members. Given this

Table 1. MPC members, June 1997–April 2008

Name	First meeting	Last meeting	Status	Background prior to appointment
Howard Davies	June 1997	July 1997	Internal	Bank of England
Willem Buiter	June 1997	May 2000	External	Academia
Charles Goodhart	June 1997	May 2000	External	Academia
Ian Plenderleith	June 1997	May 2002	Internal	Bank of England
Sir Edward George	June 1997	June 2003	Internal	Bank of England
Mervyn King	June 1997	–	Internal	Bank of England/ Academia
DeAnne Julius	September 1997	May 2001	External	Industry
David Clementi	September 1997	August 2002	Internal	Finance
Sir Alan Budd	December 1997	May 1999	External	Government
John Vickers	June 1998	September 2000	Internal	Academia
Sushil Wadhwani	June 1999	May 2002	External	Finance
Christopher Allsopp	June 2000	May 2003	External	Academia
Stephen Nickell	June 2000	May 2006	External	Academia
Charles Bean	October 2000	–	Internal	Academia
Kate Barker	June 2001	–	External	Industry
Paul Tucker	June 2002	–	Internal	Bank of England
Marian Bell	July 2002	June 2005	External	Finance/ Government
Sir Andrew Large	October 2002	January 2006	Internal	Finance
Richard Lambert	June 2003	March 2006	External	Financial journalist
Rachel Lomax	July 2003	June 2008	Internal	Government
David Walton	July 2005	June 2006	External	Finance
Sir John Gieve	February 2006	February 2009	Internal	Government
David Blanchflower	June 2006	May 2009	External	Academia
Tim Besley	September 2006	August 2009	External	Academia
Andrew Sentance	October 2006	–	External	Industry

relatively small number of members within each group, we prefer to look at individual-level voting behaviour and assess patterns in group behaviour based upon our measures of individual-level behaviour.

Other studies of MPC voting records have also sought to measure differences in voting behaviour at the individual level. For example, Besley et al.

(2008) estimate a reaction function for the preferred interest rate of each member at each MPC meeting between June 1997 and July 2007. They find evidence of heterogeneity in reaction functions across individual members, but show that this heterogeneity does not appear to be systematically related to career background or to the internal or external status of a member. Brooks et al. (2007) find evidence for significant differences in reactions to economic conditions across individual members. Finally, Bhattacharjee and Holly (2005) find that individuals place more weight on personal economic forecasts (and thus increasingly differ in preferred interest rates) as Bank of England forecasts become more uncertain. In addition to these studies of the Bank of England, Chappell et al. (2005) estimate individual American Federal Open Market Committee member heterogeneity and investigate political influences on monetary policy via the Federal Reserve appointment process.

We depart from these latter studies by analysing member-specific voting behaviour on the MPC within a spatial voting framework.[2] As explained in more detail in the next section, we operationalise the spatial voting theory with an item response model and estimate the revealed relative monetary policy preferences of MPC members using Markov Chain Monte Carlo (MCMC) methods. This approach allows us to make two key contributions to the literature on the MPC. First, we provide a new measure of the relative voting behaviour of the 25 individuals who have sat on the Committee between 1997 and April 2008. Second, because the MCMC method we use estimates the posterior distribution of all parameters in the statistical model, it is straightforward to make inferences about any auxiliary or composite quantity of interest within the model (Clinton et al. 2004).

This latter feature allows us to draw inferences regarding the differences between new MPC appointees and their predecessors, as well as changes in the median monetary policy preference on the MPC over time. As a result, we are able to investigate whether the Labour Government was able to use its MPC appointment powers to influence monetary policy and, if this was the case, what may have been its incentives in doing so. This is an important issue since, as Mueller (2003: 465) notes: '[I]f the government cannot commit itself not to meddle with the macropolicy in general, how can it credibly commit itself not to meddle with the central bank?' Evidence of political patterns in central bank appointments has been reported in studies of the United States Federal Reserve (Chang 2003; Chappell et al. 2005). We demonstrate how our preference estimates enable us to test for such political patterns in the British context. These estimates also provide political scientists with the opportunity empirically to assess more general theories of appointments to independent policy-making bodies in the context of central bank committees.

Measuring the monetary policy preferences of MPC members

Our dataset consists of the voting choices of sitting MPC members in all 95 non-unanimous votes taken on interest rates between June 1997 and April 2008.[3] In total, we observe the voting decisions of 25 MPC members over the period analysed. The data were coded from an MPC voting spreadsheet maintained by the Bank of England.[4] Each observed pairwise vote choice y_{it}, by individual i at meeting t, was coded as 0 if it was cast in favour of the lower nominal interest rate alternative and 1 if it was cast in favour of the higher nominal interest rate alternative.[5]

The starting point for our analysis of these data is the standard spatial model of voting (e.g., Hinich & Munger 1997). Our model assumes that monetary policy alternatives can be placed according to some underlying dimension, that MPC members have preferences over the location of policies on this dimension, and that each member maximises his or her utility by voting for the alternative closest to their most preferred location on the dimension (their ideal point).

At each meeting, MPC members vote to set a nominal interest rate: the bank rate. However, the same nominal interest rate of, say, 4 per cent, could be considered relatively restrictive if inflation and output growth were low, but relatively stimulatory if inflation and output growth were high. Therefore, through their choice of a nominal interest rate in a given meeting, we model policy makers as choosing a point on an underlying dimension that measures the relative restrictiveness of a nominal interest rate given economic conditions. We call this the 'dove-hawk dimension'.[6]

Formally, let the location of a nominal interest rate proposal on the dove-hawk dimension be a function $f(r_t, \boldsymbol{x}_t)$, where r_t denotes the nominal level of the proposed interest rate and $\boldsymbol{x}_t$ is a vector characterising contemporaneous economic conditions at meeting t. Although we leave the exact functional form of $f(.)$ unspecified, it is reasonable to assume that $f(r_t, \boldsymbol{x}_t)$ is increasing in r_t. In other words, if r_t^l and r_t^h are two nominal interest rates evaluated at the same meeting, where r_t^l is the lower of the two nominal rates ($r_t^l < r_t^h$), then we assume that the higher nominal rate will always be a more restrictive policy than the proposal for the lower rate, and would thus be located higher on the dove-hawk dimension. Letting $l_t = f(r_t^l, \boldsymbol{x}_t)$ and $h_t = f(r_t^h, \boldsymbol{x}_t)$ denote the mapping of the lower nominal rate and higher nominal rate, respectively, onto the dove-hawk dimension, we thus assume that $l_t < h_t$. However, as economic conditions vary between meetings, the same nominal interest rate level would be mapped to different locations on the dove-hawk dimension at different times.

Our goal is to use observed voting behaviour to make inferences about the systematic differences in the preferred points of MPC members on this

underlying dimension – that is, we measure whether some members tend to prefer more restrictive interest rates relative to other members, across meetings that take place in different economic circumstances. There are several possible reasons why members might disagree about the desired interest rate given a common set of economic circumstances. For example, members may have different perceptions about the level of potential output in the British economy (Gerlach-Kristen 2006; Blinder 2007). The size of the output gap is generally considered to be a key driver of future inflation, so if members differ in their assessment of potential output, and these differences are reasonably stable over time, then members are likely to exhibit differences in preferred interest rates across meetings. Alternatively, heterogeneity in underlying monetary policy preferences may reflect systematic differences in the way in which individual members believe economic variables interact to produce inflation. Hansen and McMahon (2008: 5) describe these as differences in the 'philosophy' of members, while Blinder (2007: 109) labels them 'differences in decision-making heuristics'. Finally, members may also have differing preferences regarding the short-run trade-off between inflation and unemployment, perhaps reflecting 'personal judgements about the relative social costs of inflation versus unemployment' (Blinder, 2007: 108).[7]

We are agnostic about the precise reasons why certain MPC members might tend to prefer higher interest rates than other members across different meetings. It is sufficient for us to assume that MPC members can be conceptualised as having reasonably stable underlying monetary policy preferences, such that a member with more hawkish policy preferences will tend to prefer more restrictive interest rates relative to others.

Specifically, we model an individual MPC member as an actor who chooses between proposals for the nominal interest rate according to the relative distance between the location of these proposals on the dove-hawk dimension and his or her preferred point on this dimension. In a given MPC meeting at time t, Committee member i evaluates the utility he or she would derive from two proposed nominal interest rates r_t^l and r_t^h, where $r_t^l < r_t^h$, as follows:

$$U_i(r_t^l) = -\left(\theta_i - f\left(r_t^l, \boldsymbol{x}_t\right)\right)^2 + \eta_{i,t} = -(\theta_i - l_t)^2 + \eta_{i,t} \tag{1}$$

$$U_i(r_t^h) = -\left(\theta_i - f\left(r_t^h, \boldsymbol{x}_t\right)\right)^2 + \nu_{i,t} = -(\theta_i - h_t)^2 + \nu_{i,t} \tag{2}$$

where $\eta_{i,t}$ and $\nu_{i,t}$ are random independently distributed utility shocks with zero mean.[8] The θ_i parameter in Equations (1) and (2) measures member i's time-invariant preferred point on the dove-hawk dimension. In other words, θ_i represents the underlying monetary policy preference of individual i.

We follow Clinton et al. (2004) in deriving an item response specification, originally developed for education testing, to formalise the spatial model of voting. First, given the utility functions laid out in Equations 1 and 2, we can write member *i*'s utility differential for two proposed interest rates at locations $l_t = f(r_t^l, \boldsymbol{x}_t)$ and $h_t = f(r_t^h, \boldsymbol{x}_t)$ on the dove-hawk dimension as

$$\begin{aligned} y_{i,t}^* &= U_i(h_t) - U_i(l_t) \\ &= \left[-(\theta_i - h_t)^2 + \nu_{i,t}\right] - \left[-(\theta_i - l_t)^2 + \eta_{i,t}\right] \\ &= \beta_t \theta_i - \alpha_t + (\nu_{i,t} - \eta_{i,t}) \end{aligned} \tag{3}$$

where $\beta_t = 2(h_t - l_t)$ and $\alpha_t = (h_t^2 - l_t^2)$. Recall that h_t denotes the more hawkish interest rate proposal. Individual *i* votes for the more hawkish proposal located at h_t if $y_{i,t}^* > 0$, for the more dovish proposal at l_t if $y_{i,t}^* < 0$, and is indifferent between the two proposals if $y_{i,t}^* = 0$.

If we assume that the random variable $(\nu_{i,t} - \eta_{i,t})$ has a logistic distribution and is independent across MPC members and meetings, then we can express the probability of individual *i* voting for the more hawkish of the two interest rates proposed at time *t* as

$$\Pr(y_{i,t} = 1) = 1/(1 + \exp(\alpha_t - \beta_t \theta_i)). \tag{4}$$

This is essentially a binary logistic regression to be estimated based on the observed binary vote choices, $y_{i,t}$, of members over pairs of interest rate proposals.

Interpreting the proposal-related parameters in Equation 4 substantively, β_t is commonly called the 'item discrimination parameter', and measures the extent to which the two members' preferences over the dove-hawk dimension determine their choice over two competing interest rate proposals observed at time *t*. For example, if $\beta_t = 0$ then the two competing interest rate proposals are at identical positions on this dimension and different voting behaviour between members does not reflect considerations captured by the dove-hawk dimension. α_t is the 'difficulty parameter', measuring the general probability of voting for the more hawkish interest rate proposed at time *t*. In a one-dimensional policy space, the ratio α_t/β_t is equal to the midpoint between the two interest rate proposals on the dove-hawk dimension (Jackman 2000a). Holding member *i*'s monetary policy preference constant at θ_i, as α_t/β_t increases then the midpoint becomes more hawkish and the probability that *i* votes for the more hawkish proposal decreases. Conversely, holding constant α_t/β_t (i.e., for a given pairwise vote over interest rate proposals) if member *i* has an ideal point that is higher than that of member *j* (i.e., $\theta_i > \theta_j$) then *i* is more likely to vote for the more hawkish proposal than is *j*.

Note that by the derivation above, for a given pairwise vote, the parameters α_t and β_t are functions both of the nominal interest rate alternatives being voted upon at t and contemporaneous economic conditions at t. In this sense, the inclusion of these parameters, which are estimated (along with the θ_i) based on observed voting patterns on the MPC and can be thought of as random effects for each specific pairwise vote, allows us to control for time-varying economic conditions. In other words, by allowing the α_t and β_t parameters to vary across time-periods we tap variance in the level of nominal interest rate proposals over time and variance in economic conditions over time. An alternative approach might be to model the proposal-related parameters for each pairwise vote as a function of observed economic indicators. However, since our primary focus is on the preference estimates θ_i, we leave the inclusion of such variables for future research.

Equation 4 is estimated using a Markov Chain Monte Carlo (MCMC) algorithm.[9] For the purposes of estimation, the model specified in Equation 4 was identified by constraining the discrimination parameters β_t to be positive for every observed vote. This implies that the probability of observing $y_{i,t} = 1$ is always increasing in θ_i. Such a constraint is desirable in the monetary policy-setting case because a vote for the more restrictive interest rate proposal in any pairwise vote is clearly a more 'hawkish' vote and is always coded as 1 in the data. Thus we include information as to the directionality of each voting alternative (i.e., which alternative is the more restrictive, or hawkish, of the two) in model estimation. This is unusual in applications of ideal point estimation, which have generally focused on legislatures and the United States Supreme Court, since in these settings coding the substantive direction of voting alternatives on various issues is more difficult (Bafumi et al. 2005). Specifically, each β_t is assigned a prior distribution $\beta_t \sim N(1,4)$ truncated to lie above zero. Aside from the positivity constraint, this prior distribution is relatively uninformative in the sense that the relative differences in MPC member preferences estimates are robust to alternative specifications of the priors. The truncation ensures that the direction of the model is identified. Aside from the discrimination parameter, we select standard normal priors $\theta_i \sim N(0,1)$ for all ideal point parameters and vague priors $\alpha_t \sim N(0,4)$ for the discrimination parameters. Again, the relative differences in MPC member preferences estimates are not sensitive to alternative specifications of these priors.

Estimates of MPC member monetary policy preferences

Our ideal point estimates for the MPC members are summarised in Figure 1. Each point indicates the median estimate of the ideal point of each individual,

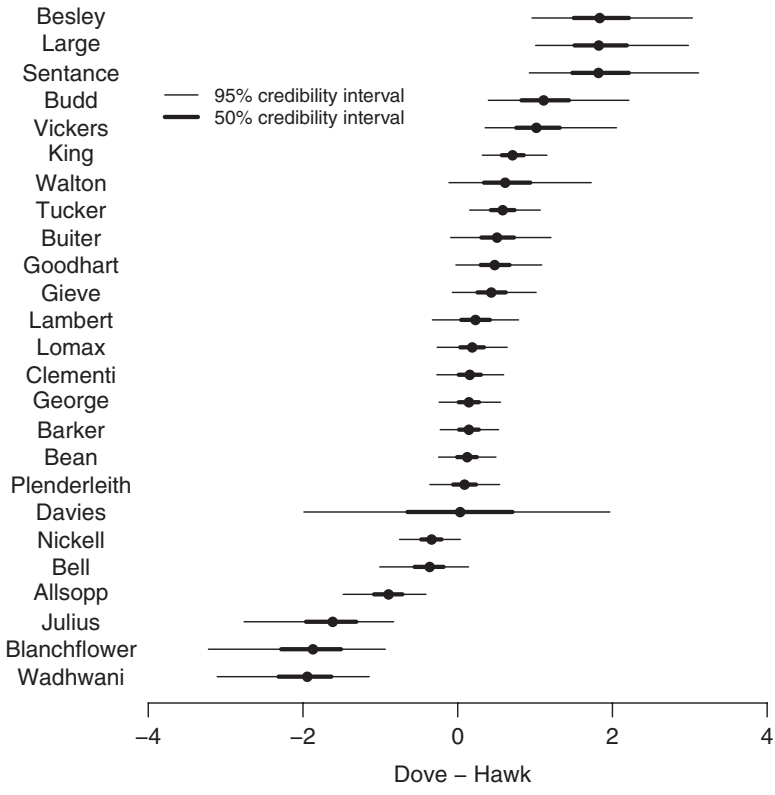

Figure 1. Revealed preferences in the MPC.

while the thick line indicates the 50 per cent credibility interval of the distribution and the thin line indicates the 95 per cent credibility interval. Inspection of Figure 1 suggests three distinct groups of MPC members: the doves, the centrists and the hawks. First, Wadhwani, Blanchflower, Julius and Allsopp are the doves. All four of these members have estimated monetary policy preferences that are clearly statistically distinguishable in the dovish direction from at least 18 other MPC members in that none of the former has a 95 per cent credibility interval that overlaps with any of the latter. Second, Large, Besley and Sentence are the hawks. All have estimated monetary policy preferences that are statistically distinguishable in the hawkish direction from 14 other members if we consider 95 per cent credibility intervals, and all 22 other members if we consider 50 per cent central tendencies. The remaining 18 MPC members are the centrists as their monetary policy preferences are indistinguishable from each other if we consider 95 per cent credibility

intervals. Davies's ideal point is estimated with large uncertainty because he only voted in two MPC meetings.

Figure 1 also reveals that, aside from Large, internal members tend to be located in the centrist group. Interestingly though, externally appointed members are found in the group of hawks, the doves and amongst the centrist group. Thus our results, which are based upon an analysis of individual-level voting behaviour, do not entirely agree with the previous research that concluded that external members tend to vote for less restrictive interest rates than internal members (e.g., Spencer 2007; Harris & Spencer 2009; Gerlach-Kristen 2009).

Given that each Committee member's estimated ideal point is associated with varying degrees of uncertainty, it is useful also to compare members according to their probable ranking on a dove-hawk scale. For each of the 10,000 samples from the posterior distribution, we ranked the sampled ideal point of each of the 25 individuals on a dove-hawk scale and stored the resulting ranking. Table 2 summarises the distribution of rankings across these samples. A rank of 1 indicates that the individual was the most dovish of the 25 members, while a rank of 25 indicates that he or she was the most hawkish.

The results in Table 2 support the idea that there have been three distinct groups of MPC members since 1997. Regarding the doves, Allsopp, Julius, Wadhwani and Blanchflower were all ranked 5 or lower (i.e., as one of the five most dovish members) in at least 95 per cent of samples. Regarding the hawks, Large, Besley and Sentence were ranked 21 or higher (i.e., as one of the four most hawkish members) in at least 95 per cent of the samples. Overall, then, these results corroborate our interpretation of Figure 1. It is also worth noting that we can be confident that the present Governor, Mervyn King, is among the more hawkish of the remaining centrists since he is ranked between 16 and 21 at least 95 per cent of the time.

As a validity check, we compare our ideal point estimates with two alternative ways of measuring the preferences of the MPC members that are commonly used by the media and MPC-watchers. The first is a simple 'batting average' score, where members are ranked according to the proportion of times they voted for an increase in interest rates. The second is a measure that is commonly used by the *Financial Times* (*FT*) and other publications (e.g., Edmunds 1999). This measure is calculated by assigning scores for each vote of each member, where a member scores 1 if he or she voted with the majority, 2 if he or she voted for a higher interest rate than the majority, and 0 if he or she voted for a lower interest rate than the majority. An average of these scores is then calculated for each member across all of his or her votes.

Table 2. Summary of rankings by iteration

MPC member	Rank 5%	Rank 25%	Median rank	Rank 75%	Rank 95%
Large	21	23	24	25	25
Besley	21	23	24	25	25
Sentance	21	23	24	25	25
Budd	17	20	21	22	24
Vickers	16	19	21	22	24
King	16	18	19	20	21
Walton	9	14	18	20	23
Tucker	14	16	17	19	21
Buiter	9	14	17	19	21
Goodhart	10	14	16	18	20
Gieve	9	13	16	18	20
Lambert	7	9	13	15	18
Lomax	7	9	12	14	17
George	7	9	11	13	15
Barker	7	9	11	13	15
Clementi	7	9	11	13	16
Bean	7	9	10	12	15
Plenderleith	7	8	10	12	15
Davies	3	5	9	19	23
Nickell	5	5	6	7	7
Bell	4	5	6	7	8
Allsopp	3	4	4	4	5
Julius	1	2	3	3	4
Wadhwani	1	1	2	2	3
Blanchflower	1	1	2	3	4

The estimates from our Bayesian ideal point model are plotted against these 'batting average' and '*Financial Times*' scores in Figure 2. The first thing to note is the relatively high correlation between our estimates and both these types of measures – as shown by the clustering of most of the MPC members along the two regression lines. In other words, our method clearly passes the concurrent validity test.

The figure nevertheless highlights some important differences between our estimates and the two more commonly used methods. The batting average method does not take account of the economic conditions at the time of each vote. For example, if a large portion of a member's time on the Committee happens to coincide with a period when economic circumstance dictates that

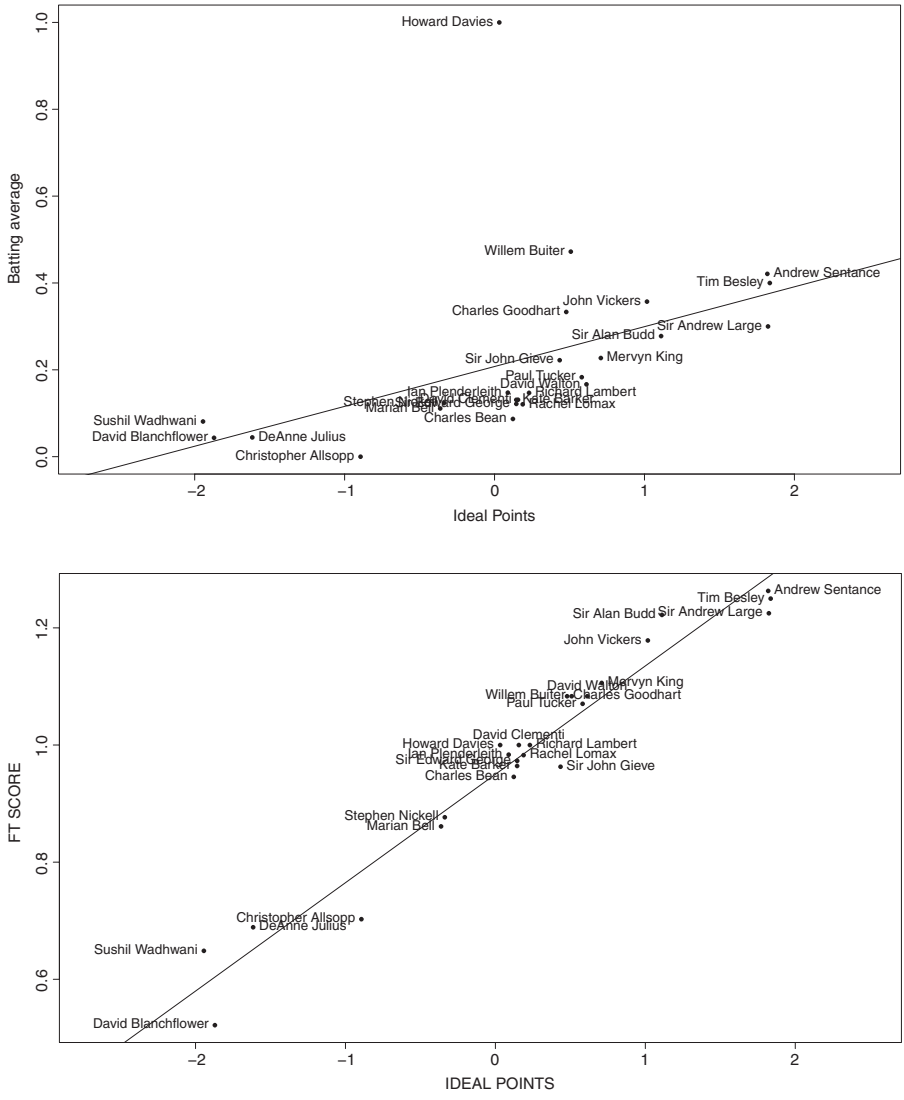

Figure 2. Comparison of Bayesian estimation with two alternative measures.
Note: The functions in the figures are bivariate regressions of our Bayesian ideal point estimates on the FT score/batting average score for each member.

the Bank of England cut interest rates, he or she will tend to be artificially located towards the dovish end of the scale. This is the case with both Allsopp and Bean, who we locate in much less extreme (albeit still relatively dovish in the case of Allsopp) positions than does the batting average measure.

The *FT* method improves on the batting average one because it measures whether each vote is part of the majority or the minority. To the extent that the majority view on the MPC tends to reflect economic conditions, it provides some sort of control for economic conditions – that is, a dissent vote implies that an individual prefers lower or higher rates relative to the majority of members, given economic circumstances. However, our method improves on the *FT* measure in this regard also. For example, our method also locates Allsopp in a less extreme position than the *FT* measure, which locates Allsopp as almost as dovish as Wadhwani. The close proximity of Wadhwani and Allsopp in the *FT*'s scores is due to the fact that, over the course of their respective terms on the MPC, they had a similar proportion of dissenting votes in favour of lower rates (13 out of 37 for Wadhwani, and 11 out of 37 for Allsopp) while neither dissented in favour of higher rates. These simple summaries, which drive the FT scores, do not reflect the fact that, during the period when Wadhwani and Allsopp were simultaneously on the Committee (between June 2000 and May 2002), Allsopp voted for higher rates than Wadhwani on eight occasions, while Wadhwani never voted for higher rates than Allsopp. By modelling each voting observation directly, rather than averaging over a member's entire voting history like the *FT* method, our measure picks up the fact that, given the same economic circumstances in the same meetings, Allsopp voted for higher rates than Wadhwani eight times.

Finally, neither the batting average nor the *FT* method provides uncertainty estimates surrounding MPC member preference estimates. This may invite the observer to conclude that any two individuals differ in their preferences when the difference between their estimated ideal points may in fact be well within the margin of error given the available data.

Patterns in the composition of the MPC

With these estimates of the relative location of MPC members' monetary policy preferences we can investigate patterns over time in the composition of the Committee in terms of preferences. We test whether these patterns are consistent with an electorally driven cycle in appointments.

Is there an electoral cycle in appointments to the Bank of England MPC?

The classic 'political business cycle' (PBC) theory predicts that incumbent governments seek to engineer economic booms prior to elections, then implement restrictive policies after elections in order to deal with the inflationary consequences (Nordhaus 1975). In the present context, this would imply that

the British Chancellor would have wanted to use his appointment powers to ensure favourable economic conditions prior to general elections. In other words, the Chancellor would be expected to use appointments to bias the MPC in a dovish direction in a pre-election period so that a comparatively easier monetary policy would stimulate (or at least not restrict) the economy in the run-up to the election. Given that it is generally thought that monetary policy affects output with a six- to nine-month lag (Clarida et al. 1999: 1685), and that appointment opportunities are relatively rare because of fixed MPC terms, it appears reasonable to focus on the period between 24 and six months prior to a general election as the 'pre-election period'. In the remaining 'non-election periods', without pressing electoral incentives, the Chancellor would be expected to seek a more balanced, centrist MPC to deal more rigorously with the inflationary consequences of any pre-election stimulus.

It should be noted that the Chancellor could not possibly have perfect information about the likely behaviour of each member he appointed to the MPC. This may have limited his ability to appoint the 'types' of central banker he wanted given the political and economic circumstances. Nevertheless, it is reasonable to assume that the Chancellor had some idea about the preferences of potential appointees. These beliefs, based upon past academic work by the individuals, their career backgrounds and also information gathered via mutual acquaintances, can be thought of as a probability distribution along the dove-hawk scale for each appointee – some relatively wide (indicating high uncertainty regarding preferences), some narrower (indicating less uncertainty regarding preferences). Of course, the Chancellor would also have been able to observe the voting behaviour of existing MPC members and use this information when deciding whether to re-appoint someone.

In order to investigate whether there are electorally driven patterns in MPC appointments, we first examine the outcome of each instance where a new Committee member was appointed to replace an existing member. Each 'appointment episode' is measured in terms of the probability that a new member of the Committee is more dovish than his or her predecessor.[10] A probability of 0.5 indicates that a new member is estimated to have an equal probability of being more dovish than his or her predecessor and being more hawkish than his or her predecessor. A higher (lower) score indicates a higher (lower) probability of an appointee being more dovish than his or her predecessor. These scores are presented in Table 3.[11]

The appointment data in Table 3 can be interpreted in terms of four key periods. First, consistent with a PBC pattern in MPC appointments, during the pre-2001 election period (June 1999 to January 2001) new appointees tended to be more dovish than the members they replaced. This trend is particularly pronounced in the cases of Wadhwani's and Allsopp's appointments.

Table 3. MPC replacements

New appointee	Predecessor	Date of replacement	Appointment type	Probability that new appointee is more dovish than his or her predecessor
Clementi	Davies	September 1997	Internal	0.45
Wadhwani	Budd	June 1999	External	>0.99
Nickell	Buiter	June 2000	External	>0.99
Allsopp	Goodhart	June 2000	External	>0.99
Bean	Vickers	October 2000	Internal	>0.99
Barker	Julius	May 2001	External	<0.01
General Election, June 2001				
Tucker	Plenderlieth	June 2002	Internal	<0.01
Bell	Wadhwani	July 2002	External	0.04
Large	Clementi	October 2002	Internal	<0.01
Lambert	Allsopp	June 2003	External	<0.01
Lomax	George	July 2003	Internal	0.43
General Election, May 2005				
Walton	Bell	July 2005	External	0.01
Gieve	Large	February 2006	Internal	>0.99
Blanchflower	Nickell	June 2006	External	>0.99
Besley	Lambert	September 2006	External	<0.01
Sentance	Walton	October 2006	External	0.05

Wadhwani replaced the relatively hawkish Budd, who had only served on the Committee for a shortened two-year term, in June 1999, two years before the general election. According to our ideal point estimates, the probability that Wadhwani is more dovish than Budd is greater than 0.99. At the same time, the Chancellor opted to re-appoint the executive director, Plenderleith, who appears to be relatively dovish compared to Budd. Allsopp replaced Goodhart in June 2000, eleven months before the general election. Interestingly, Goodhart, relatively centrist on our dove-hawk scale, stated publicly that he had expressed an interest in serving a second term (Beattie 2000). Despite this, the Chancellor chose to replace him with Allsopp, who again has an estimated probability of being more dovish than Goodhart that is greater than 0.99. Furthermore, most economic journalists at the time of Allsopp's appointment expected him to be a dove (Thornton 2000). The Chancellor is likely to have been aware of these expectations. In addition to these stand-out cases, every replacement during the pre-election period for the 2001 general elections involved the appointment of an individual who has an estimated probability

greater than 0.99 of being more dovish than his or her predecessor. The result of this appointment policy was that, from October 2000 until the general election in May 2001, the MPC contained three of the four individuals identified above as the clearest doves out of all MPC members since 1997: Allsopp, Wadhwani and Julius. In sum, the pattern of appointments in the pre-2001 election period is consistent with the predictions of the PBC theory.

Second, and again consistent with the PBC predictions, during the subsequent non-election period (February 2001 to May 2003), MPC appointments reduced the dovish bias on the MPC. In this period, appointments resulted in either the replacement of dovish or centrist MPC members with centrist individuals, or the replacement of centrist MPC members with more hawkish individuals. The appointments of Barker, Tucker and Bell fall into the first category, while that of Large falls into the second. Thus, although the estimated probability of Barker, Tucker and Bell being more dovish than their predecessors is lower than 0.01, 0.01 and 0.04, respectively, all are far from being hawks according to our ideal point estimates in Figure 1. In contrast, the probability that Large is more dovish than his predecessor, Clementi, is lower than 0.01. We have already identified Large as one of the clear hawks according to Figure 1.

Third, however, the observed pattern in appointments during the pre-2005 election period (June 2003 to December 2004) runs contrary to PBC expectations that the Chancellor would use appointments to induce a dovish bias on the MPC in the run-up to an election. During this period, appointments made only a marginal difference to the overall balance between doves and hawks on the MPC. For example, Lambert, appointed in June 2003, has estimated probability lower than 0.01 of being more dovish than his predecessor Allsopp, but is still only a centrist according to Figure 1. In addition, according to our estimates, the probability that Lomax was more dovish than George, whom she replaced[12] in July 2003, is only 0.43. The policy of making a mixture of both dovish and hawkish replacements continued during the final non-election period in our data (January 2005 to April 2008).

Another way of assessing whether there is a PBC pattern in MPC appointments is to look at how appointments shift the location of the median member of the Committee. Given that the MPC is a collective choice body that makes decisions by majority vote, the Chancellor is able to influence monetary policy via appointments only to the extent that he can move the position of the median voter on the Committee (cf. Krehbiel 2007). In line with the PBC predictions, we inspect the estimated change in the MPC median between key points in the electoral cycle – namely, the last month of a 'non-election period' and last month of the subsequent 'pre-election period', and vice versa (Figure 3).[13] Figure 3 plots the median estimate of these changes, together with 95 per cent credibility intervals.[14]

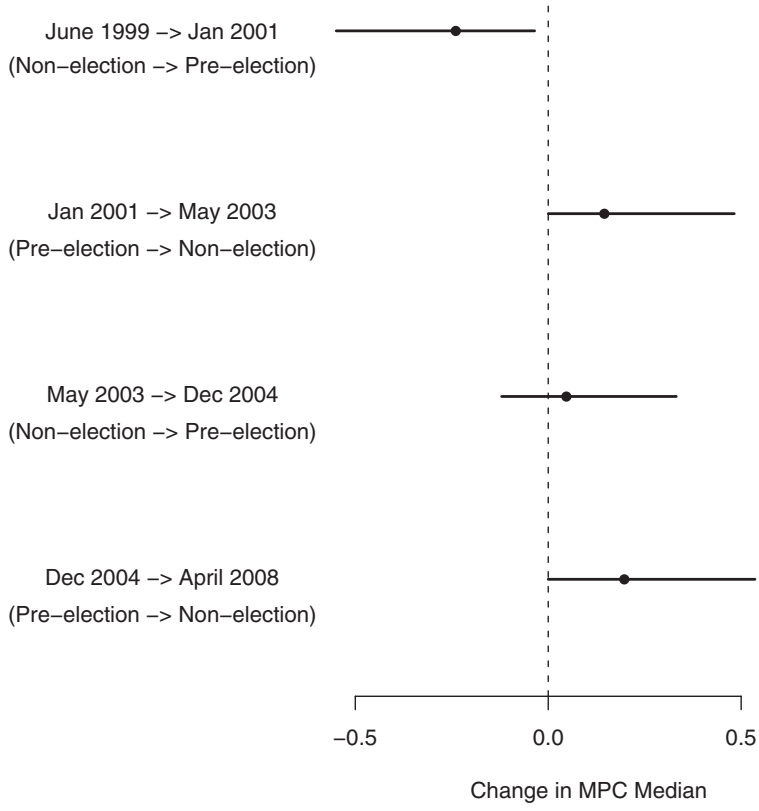

Figure 3. Changes in MPC median between key points in electoral cycle.

As with our analysis of individual appointment episodes, observed changes in the position of the MPC median are consistent with the PBC predictions in the pre-2001 election period but not in the pre-2005 election period. Figure 3 shows that, between the end of the first non-election period and the end of the pre-election period for the 2001 general elections (from June 1999 to January 2001), the estimated shift in the MPC median is negative and is statistically distinguishable from zero. In addition, between the end of the pre-2001 election period and end of the subsequent non-election period (January 2001 to May 2003), the estimated change in the MPC median is positive and marginally indistinguishable from zero at the 95 per cent level. This is consistent with the PBC prediction that the Chancellor would seek to re-balance the MPC post-election after inducing a dovish bias in the pre-2001 election period. However, between the end of this non-election period and the end of the subsequent

pre-2005 election period, where the PBC would predict a dovish change in the MPC median, the estimated change in fact tends to be positive, though clearly indistinguishable from zero at the 95 per cent level (May 2003 to December 2004).

In sum, our analysis of individual appointments and of changes in the median does not appear to support the contention that there was a straightforward PBC-type electoral cycle in appointments to the Bank of England MPC. Though in the pre-2001 electoral period the Chancellor did tend to appoint relative doves to replace more hawkish predecessors on the MPC, and in doing this successfully shifted the MPC median in a dovish direction, no such pattern is apparent in the pre-2005 election period. These results are consistent with existing research that has found only weak support for political business cycles in the United Kingdom (e.g., Alesina et al. 1997).

Discussion

Despite the lack of evidence for a straightforward electoral cycle in MPC appointments, it does appear that the British Chancellor is able to move the position of the median voter of the MPC through his appointment powers. Indeed, as Figure 3 shows, we estimate that there was a clear dovish shift in the MPC median between and June 1999 and January 2001, and that there was a hawkish shift in the MPC median, marginally distinguishable from zero, in two later periods. This suggests that appointments to the MPC matter for monetary policy. As a result, it is important to develop a better understanding of the likely incentives of the Government with regard to MPC appointments. We have demonstrated that there is weak support for a straightforward electoral cycle in appointments, but given that monetary policy is one of the most powerful tools of macroeconomic management at a state's disposal, it is likely that politicians will have some interests regarding the composition of the body that sets this policy.

One potentially fruitful avenue for future research would be to analyse the Chancellor's monetary policy (and thus MPC appointment) incentives conditional on fiscal policy. Political economists have analysed the interaction of fiscal and monetary policy in the context of varying levels of central bank independence (Alesina & Tabellini 1987; Agell et al. 1996; Clark & Hallerberg 2000). However, the British Labour Government operated in a context of varying levels of constraints on fiscal policy. Specifically, in order to demonstrate that Labour could be responsible with the public finances, during the 1997 general election campaign the party leadership pledged that for its first two years in office Labour would stick to the public spending plans of the previous Conservative Government. This pledge committed the new Labour

Government to a relatively austere fiscal policy for at least two years. For example, in the financial year 1999/2000 public expenditure as a percentage of GDP reached its lowest point since 1980 (Her Majesty's Treasury 2007). During the financial year 2000/2001 public expenditure began to rise, but only slowly. Moreover, the Government continued to record a positive budget surplus until the end of the financial year 2001/2002.

Thus, there were political constraints upon fiscal policy in the period prior to the May 2001 general election. Given these constraints, the Chancellor may have had an incentive to ensure that a relatively dovish MPC maintained economic growth in the run-up to this election. In contrast, from the financial year 2001/2002 until the present, government expenditure as a percentage of GDP has increased rapidly, while the cyclically adjusted budget balance has been in deficit since 2002/2003 (Her Majesty's Treasury 2007). Having gained a reasonable reputation for economic competence, Labour did not need to make similar restrictive fiscal policy pledges prior to the 2001 general election. In a context where increased public investment was likely to fuel continued economic growth, and was indeed electorally popular in itself, the Chancellor may have had an incentive to ensure a more centrist or hawkish MPC in order to minimise the inflationary consequences of fiscal expansion.

To explore the relationship between MPC appointments and fiscal policy, Figure 4 plots the location of the estimated median preference on the Committee for each meeting between June 1997 and April 2008, together with time series of the budget balance and public spending over this period. Figure 4 raises the possibility that MPC appointments may be related to the stance of fiscal policy. Consistent with the evidence presented earlier, the plots in the figure suggest that the MPC median became markedly more dovish in the two years prior to the May 2001 general election and then reverted to a relatively more hawkish trend, which persisted during the pre-2005 election period and thereafter. We see that when the budget surplus is at its highest we also measure the most dovish MPC median for the entire 1997–2008 period. As the budget surplus moves toward a deficit, hawks and centrists start to replace doves in the Committee and the estimated MPC median becomes more centrist.

This observed pattern is only suggestive, but raises the possibility that the Chancellor used MPC appointments to pursue a more dovish monetary policy during a pre-election period when public spending was constrained (prior to the 2001 general election), and then to pursue a more centrist or hawkish monetary policy after the initial spending constraints had been lifted (after Labour's re-election in 2001). Given the evidence that MPC appointments matter – in the sense that they have enabled the Chancellor to move the median – and the inadequacy of a straightforward PBC-type explanation for

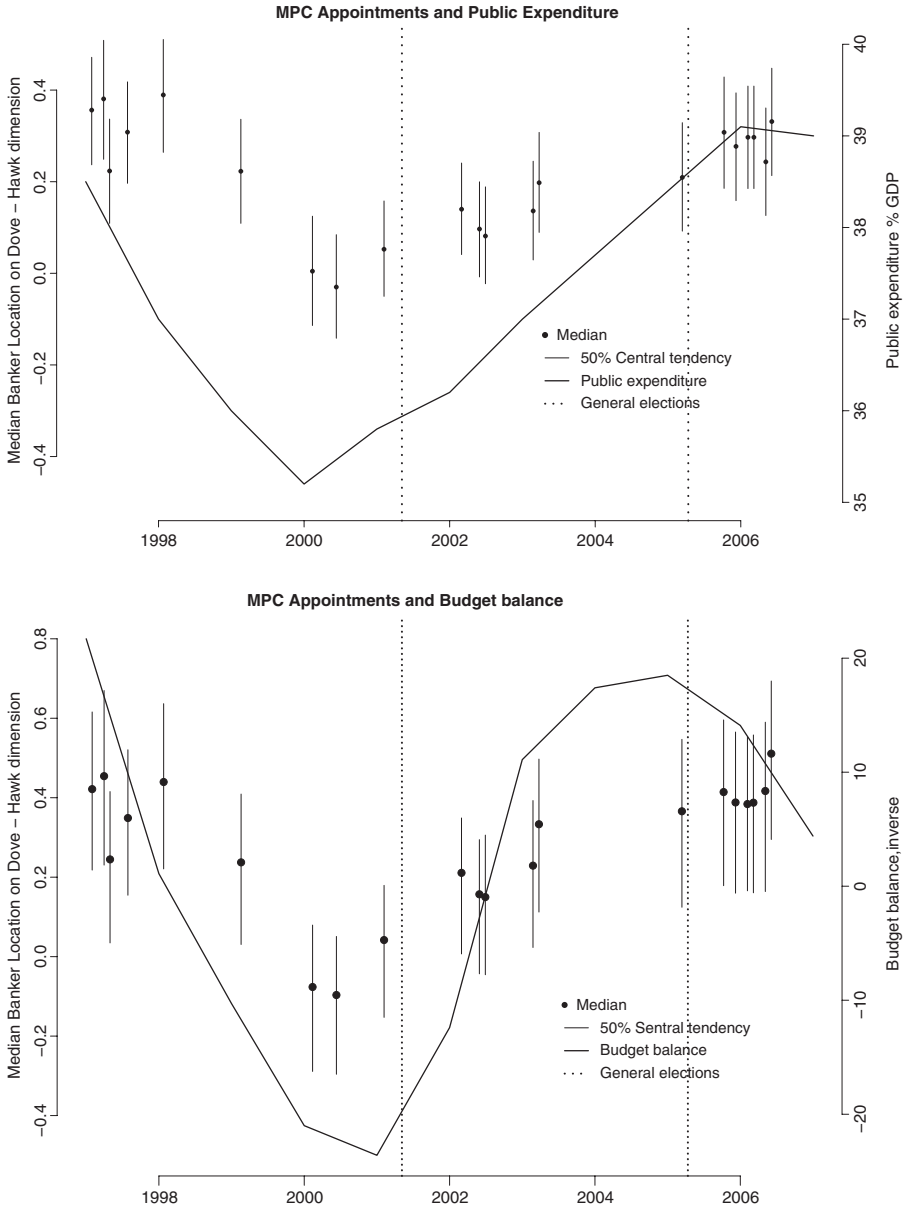

Figure 4. MPC appointments: Public expenditure and budget balance.

appointment patterns, the possibility of an interaction between the Chancellor's fiscal policy and MPC appointment incentives at least merits further investigation. We leave this to future research.

Conclusion

We have examined the making of monetary policy in the United Kingdom in the first ten years of the independence of the Bank of England. We employed a Bayesian estimation technique to undertake a spatial analysis of voting on the Bank of England Monetary Policy Committee between June 1997 and April 2008. To our knowledge, this is the first time such a statistical estimation technique has been applied to voting in a central bank committee and is also the first spatial analysis of voting in the Bank of England MPC. Using this method we produced an original set of estimates of the ideal points of MPC members on a 'dove-hawk' scale representing relative preferences over interest rates given economic conditions.

These estimates constitute a valuable contribution to the literature on the MPC, independent central banks, and on appointments to independent policy-making committees in general. They provide new and substantively motivated measures of the relative monetary policy preferences of individual MPC members, together with easily interpretable uncertainty estimates for these measures. In addition, because we use Bayesian simulation to produce our estimates, it is straightforward to make inferences about auxiliary or composite quantities of interest, such as the position of the median voter on the MPC.

We illustrated the practical value of our dove-hawk measures by using them to investigate the British Chancellor's appointments to the MPC. The observed pattern in MPC appointments, and in the movement of the median voter on the MPC over time, is not consistent with a political business cycle approach where the Chancellor seeks a more dovish MPC composition in the run-up to general elections. Although MPC appointments did lead to a clear dovish shift in the MPC median in the period prior to the 2001 general election, this was not the case in the period prior to the 2005 general election.

Nevertheless, our analysis indicates that MPC appointments do matter for monetary policy in that the Chancellor has been able to move the MPC median through appointments. This finding has implications for research on independent central banks more generally in that it suggests that politicians may still attempt to influence the monetary policy of a formally independent central bank via appointments. Some may argue that a degree of democratic control upon such a major macroeconomic policy tool is desirable, while others may argue the opposite. Either way, our results highlight the importance of

appointments as a channel for political influence. Given the inadequacy of the straightforward political business cycle approach to explaining appointments, we have suggested that future research may usefully investigate the relationship between the Chancellor's appointment incentives and the current stance of fiscal policy.

The Bayesian item response model we use to study voting behaviour on the Bank of England MPC has already been demonstrated to be useful for studying voting in other committees such as courts (see Martin & Quinn 2002) as well as legislatures more generally (Clinton et al. 2004). However, this approach is also applicable to other central banks that publish individual-level voting data. These include the United States Federal Reserve, the National Bank of Poland, the Swedish Riksbank and the Bank of Japan. In different central bank settings scholars may be able to use preference estimates to test alternative theories of central bank appointments, taking advantage of changes in the parties controlling appointing institutions or of variance in the political actors responsible for appointing different committee members. To aid this endeavour, in future work we aim to examine extensions of the ideal-point estimation framework presented above that may be possible in the context of central bank voting. Such extensions include explicitly incorporating economic information in the statistical model, as well as information regarding the nominal interest rate alternatives being voted upon, and experimenting with alternative specifications of the utility function guiding the voting behaviour.

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Notes

1. In fact, in May 2000 the Treasury Select Committee voted to reject Christopher Allsopp as the replacement of Charles Goodhart, but the Chancellor ignored the position of the Committee.

2. Chang (2003) has analysed voting on the United States Federal Open Market Committee within the spatial voting framework. However, her empirical analysis treats all votes to decrease interest rates and all votes to maintain interest rates as substantively the same, thereby losing valuable information.
3. Although there are 132 meetings in this time-period, observations from 37 meetings where voting was unanimous were dropped. These unanimous votes do not provide any information about relative differences between Committee members on the underlying dove-hawk dimension.
4. www.bankofengland.co.uk/publications/minutes/mpc/index.htm
5. If votes at an MPC meeting were split three ways, where some members dissent in favour of higher interest rates than the majority position while other members dissent in favour of lower interest rates than the majority, we coded the decision as two separate pairwise votes: one the majority-preferred interest rate against the lower rate alternative, and the other the majority-preferred nominal interest rate against the higher rate alternative. We assume that somebody who supports lower interest rates than the majority in the former vote opposes higher interest rates in the latter vote. Our coding scheme thus implies that MPC members state their preferred interest rate truthfully. Overall, there were five MPC meetings in the time-period covered where members voted for three different interest rates; hence T = 95 pairwise votes from 90 MPC meetings.
6. Initial investigation of the MPC voting data suggests that the pattern of voting is overwhelmingly one-dimensional – that is, members who tend to disagree with the majority tend to disagree in favour of a lower interest rate or tend to disagree in favour of a higher interest rate. The only exception to this one-dimensional structure is the behaviour of Willem Buiter, who occasionally disagreed with the majority on the level of interest rate activism (in other words, Buiter is observed to vote on some occasions for greater rate increases than the majority and on other occasions for greater rate decreases than the majority).
7. King (2002: 222) has argued that all MPC members have a responsibility to meet the same inflation target so there is no room for differences in preferred inflation levels. However, Blinder (2007: 110) states that in his experience as Vice-Chairman of the United States Federal Open Market Committee, such differences are 'common in practice'.
8. See Bhattacharjee and Holly (2006) for an attempt to model the voting of a subset of five MPC members while relaxing the independence assumption.
9. We estimated the posterior distribution of the parameters in 4 using the MCMCirtKd function from the MCMCpack library in R (Martin & Quinn 2006). The MCMC algorithm iteratively updates the estimates of the model parameters. After a sufficient number of iterations (or burnin period), each set of parameter estimates for each given iteration represents a draw from the joint posterior distribution. This posterior distribution 'summarizes our information about the parameters having observed the [voting] data' (Clinton et al. 2004: 357). Given the large number of iterations for which MCMC algorithms are generally run, the estimates from a smaller subset of these iterations are stored and utilised for inference (for more technical details, see Jackman 2000a, 2000b). The MCMC algorithm ran for 1 million iterations, with the first 500,000 discarded as burnin. Every fiftieth iteration after this burnin period was stored for inference. Therefore, the results presented below are based upon 10,000 draws from the posterior distribution. Standard tests (Jackman 2000b; Gelman et al. 2003) show no indication of non-convergence of the parameter estimates.

10. Each probability is based upon the 10,000 draws from the joint posterior distribution and corresponds to the frequency with which the appointee in question is drawn as being more dovish than his or her predecessor.
11. The table does not include those individuals who were original members of the MPC in June 1997 (George, King, Buiter, Goodhart, Plenderleith and Davies), or who were appointed in the months thereafter to fill hitherto empty positions (Julius, Budd and Vickers).
12. While Mervyn King replaced Sir Eddie George as the Governor of the Bank when George's term ended, it was Rachel Lomax who filled the resulting vacancy on the MPC.
13. These estimates are again based on draws from the posterior distribution. For each draw, the median ideal point of each combination of members that have sat on the MPC together at any point in time was calculated. To obtain a draw of the change in the median between two time points we then took the difference between the median of the Committee composition at the first time point and the median of the composition at the second time point. This exercise was repeated 10,000 times, yielding a sample from the posterior distribution of the change in the median MPC member at each time interval of interest.
14. The final non-election period is defined using the last month of observed voting data, and would correspond to a general election in April 2010.

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