Democratic Accountability in Open Economies*

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Abstract

We analyze democratic accountability in open economies based on different hypotheses about political evaluations and government responsiveness. Specifically, we assess whether citizens primarily rely on government policies or if they focus on economic outcomes resulting from these policies to evaluate governments. Our empirical analysis relies on Bayesian structural vector autoregression models for the British economy, aggregate monthly measures of public opinion, and economic evaluations from 1984–2006. We find that voters continuously monitor and strongly respond contemporaneously to changes in monetary and fiscal policies, but less to changes in macroeconomic outcomes. Voters also respond to policies differently when institutions change. When the Bank of England became politically independent, citizens shifted their attention toward fiscal policy, and the role of monetary policy in their evaluations decreased significantly. Finally, politicians respond to voting behavior by adjusting their policies in a sensible way. When vote intentions and approval decrease, the government reacts to the public by adjusting fiscal policy and, before the Bank of England became independent, also monetary policy.

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It is a fundamental idea of modern democratic politics that citizens evaluate their government and hold it accountable for its performance. Citizens can do this in different ways. In a recent, major contribution, Duch and Stevenson (2008) applied a competence model to this problem. They stressed the importance of outcomes, which are realizations of policies subject to random shocks and thus containing noisy signals about policymakers' competence. An alternative hypothesis is that citizens primarily evaluate policies that governments choose to draw conclusions about the quality of government decisions.

We use an empirical framework that allows us to examine these hypotheses. It is based on a Bayesian structural vector autoregression model for the British economy, aggregate public opinion, and economic evaluations. We use this framework to examine the mechanism connecting observable and unobservable government policies, economic performance and citizens' evaluations of economic developments. Because its economy is only moderately open to trade and capital flows, it has a relatively small state, its regulation density is low, and wage bargaining is decentralized, democratic accountability, based on the competence model(s), ought to exist in Britain (Duch and Stevenson, 2008).

We find that in Britain, voters respond to policies more than to the outcomes that result from these policies. Specifically, vote intentions and prime minister approval respond strongly to changes in monetary and fiscal policies, but considerably less to measures of economic outcomes. Voters also respond to policies differently when institutions change. When the Bank of England became politically independent, citizens shifted their attention toward fiscal policy, and the role of monetary policy in evaluations decreased significantly. Politicians respond to voting behavior by adjusting their policies in a sensible way. When vote intentions and approval decrease, the government reacts to the public by adjusting fiscal policy and, before the Bank of England became independent, also monetary policy. These results suggest that theoretical models should assign greater relevance to the role of policies for government evaluations.

Theory

Competence model(s) of democratic accountability emphasize macroeconomic outcomes that allow citizens to draw conclusions about the quality of decisions made by their representatives (Persson and Tabellini, 1990; Alesina and Rosenthal, 1995; Duch and Stevenson, 2008) If citizens perceive that economic performance has been good, then they infer that their incumbent is competent, and are more likely to support that incumbent. The nature of the information that citizens infer from economic performance—especially, the strength of the incumbent's competency signal—differs across countries and time, in part, because of the workings of political and economic institutions.

In essence, competence model(s) rely on retrospective evaluation of economic outcomes weighted by a signal extraction about competence within a given institutional setting. Citizens know the natural rate of growth in an economy and the competency of the incumbent in the past. To a certain degree, they also have information about the current competence of the incumbent, although not the complete information that they possess about past competence. This knowledge allows them to form rational expectations about their expected utility of supporting the incumbent over a challenger. Specifically, if current, observed economic performance is good relative to the natural rate of growth and past competence level, and the current competency signal is strong, then citizens rationally choose to vote for the incumbent; voting for the incumbent is more likely to benefit them in the future in comparison to the benefit that might accrue from voting for the challenger.[1]

[1]Duch and Stevenson (2008) derive the expected utility of voting for an incumbent as opposed for a challenger whose competence is unknown using

$$E\big[\sum_{l=1}^{\alpha}\mu_{i|t+1}|v_i\big] - E\big[\sum_{l=1}^{\alpha}\mu_{k|t+1}|v_k\big] = b\big(\frac{\alpha\sigma_\mu^2}{\alpha\sigma_\mu^2+\beta\sigma_\psi^2}\big)\big(y_{it}-\bar{y}-\sum_{l=1}^{\alpha}\mu_{i|t-1}\big)$$

where y_{it} is the observed current growth under incumbent i, $\bar{y}$ is the natural rate of growth and μ_{t-1} is past competence of the incumbent, all of which are known to the voters. The variables v_i and v_k are votes for the incumbent or the challenger, respectively and the parameters α and β capture the number of decisions made by elected and non-elected decision-makers, respectively. The variances σ_μ^2 and σ_ψ^2 capture the volatility in the political (competency) and

In these models, the larger idea of democratic accountability is embedded in two interconnected causal links. The first is a citizen-evaluation link that specifies how citizens judge government performance based on observed and unobserved behavior (characteristics) of elected officials. The second is the competence-outcome link that reflects incumbents' skills or expertise. The latter is grounded in a Lucas supply function, a single equation that stipulates that current growth can depart from the natural rate when the inflation rate deviates from the expected inflation rate, when incumbents produce surprise shocks of various (unspecified) kinds, or when an unexpected nonpolitical shock is experienced by the economy. Incumbents and challengers know that the inflation rate negatively enters the voters' value function, and, regardless of their partisan identity, they generally choose zero inflation. Because voters anticipate this, inflation does not play a major role for their vote. The accountability mechanism therefore works through the unexpected shocks that voters observe.

The shock has two components, a nonpolitical (exogenous) shock that is beyond the control of public officials and (past and current) competence shocks that can be assigned to incumbents.[2] By producing positive shocks, competent incumbents can increase economic growth above the natural rate. Voters know only the variance of the shocks that incumbents produce relative to the variance of nonpolitical shocks. The ratio of the former variance to the sum of the two variances is the competence signal that they use to weight their retrospective evaluations of the economy. If this ratio is relatively large and retrospective evaluations are positive (negative), then they hold their incumbents accountable for past performance, voting to retain (replace) them. If the ratio is small, i.e., the size of the variance of political shocks is small relative to the size of the variance of the nonpolitical shocks, then voters do not hold incumbents responsible for past performance; little or no economic voting is observed in this case.

Duch and Stevenson (2008) show that voters' abilities to extract competence signals from ob-

nonpolitical shocks that the economy experiences.

[2]In Duch and Stevenson's (2008) investigation, the economic shock in the Lucas supply function, $y_{it} = \bar{y} + \pi_{it} - \pi^{e}_{it} + \eta_{it}$, can be divided into two parts, $\eta_{it} = \epsilon_{it} + \xi_t$, where ϵ_{it} is the competency shock and ξ_t is the nonpolitical shock, both at time t. Competency depends on policymakers' past and current competence, $\epsilon_{it} = \mu_{it} + \mu_{it-1}$.

served economic performance varies across contexts. The more non-elected officials are involved in economic decision-making, the less elected incumbents are held accountable for economic outcomes: in terms of the model, the competency signal weight is smaller in this case, hence the expected value of voting for the incumbent over the challenger is relatively smaller. The relative importance of elected decision-makers decreases and hence the competency signal is necessarily weaker, the more the domestic economy is integrated into the world economy, the greater the size of government, the greater the regulatory density of government activity, and (or) the more wage bargaining is centralized. These factors restrict the ability of elected officials to influence economic performance and increase the influence of bureaucrats, non-governmental officials or private economic actors on the economy. Citizens take this into account and assign less weight to past economic performance in the respective contexts.

An implication of many competence model(s) is that they assign importance to economic outcomes. The competence of policymakers can be most reliably inferred from past macroeconomic developments, specifically economic growth. Observable policies, specifically monetary and fiscal policies, play a negligible role for citizens' evaluations in these models. Monetary policy decisions do not bear on competence because incumbents and challengers always choose zero inflation. Fiscal policy, the most important policy tool of governments in a country with an independent central bank, does not appear in these models at all.

Previous research, however, suggests that citizens take into account a broader range of information that also includes policy choices when they evaluate governments. Many policies are easily observable and can be instantaneously evaluated by citizens. For instance, interest rates, a major component of monetary policy, are constantly reported in the news. Similarly, many, if not most, fiscal decisions are publicly known because they are debated in parliaments and in the media. Accordingly, there is evidence that citizens respond to changes in easily observable monetary policy instruments, such as interest rates, at least in institutional settings where elected policymakers have control over monetary policy (Sanders, 1991). Publicly known fiscal policy decisions, such as tax rates, play an important role in citizen evaluations of their governments, especially when elected

officials are not in charge of monetary policy (Sanders, 2005). The implication is that evaluations and hence accountability may depend on both policy choices and macroeconomic outcomes or even policy alone.

Unlike an evaluation mechanism that focuses on outcomes only, the possibility that citizens evaluate policies instead of outcomes requires a discussion of the institutional framework within which economic policy is made. In the past when central banks were not independent, monetary policy decisions can be attributed to the elected government and thus should matter for evaluations Bernhard, Broz and Clark (2002). When central banks became independent, we should observe a shift towards fiscal policy, which then becomes the main policy tool of the elected government. In this way, institutional change can affect citizens' evaluations and accountability, but through policy evaluation and not outcome evaluation.

Empirical Assessment of Democratic Accountability

A General Open Political Economy Framework

To assess how citizens evaluate governments and how government respond to these evaluations, we construct an empirical model that encompasses the three essential parts of an open political economy. These three parts include the public, an economy, which is divided into a domestic and the international economy, and a government. First, the public reflects how citizens *continuously* assess the economic developments and policies. It is represented by different measures of public opinion, specifically vote intentions (v_t), approval of the chief executive's work (a_t), and national economic and personal financial expectations (ne_t and pe_t). Second, the economy is divided into domestic and international sectors to model the economic interdependence of a contemporary economy, the former represented with d superscripts, the latter, with i superscripts. The domestic and international economic variables are domestic and international prices and output (p_t^d, p_t^i, y_t^d and y_t^i), foreign monetary policy (r_t^i), and an exchange rate (e_t). Third, the government consists of two distinct actors, a monetary and a fiscal policy authority conducting monetary and fiscal policy

(r_t^d and g_t). Depending on central bank independence, the polity and the economy are expected to receive different weights in the monetary and fiscal reaction functions. We also include an election counter.

The polity in our framework includes the most important components of existing models of economic evaluations of governments and government popularity in general (Erikson, MacKuen and Stimson, 2002; Clarke et al., 2004; Sanders, 1991, 2005; Duch and Stevenson, 2008). Research on representation in economic policy that links policy outcomes to public opinion addresses government behavior (Stimson, MacKuen and Erikson, 1995; Wlezien, 2004; Soroka and Wlezien, 2005). We extend this literature by connecting policy, economic outcomes, and government evaluations. This complete evaluation mechanism has not been explicitly modeled in previous research. This nexus between policy and outcomes coincides with research from New Open Macroeconomics that analyzes policy effects and interdependencies in open economies (Obstfeld and Rogoff, 1995; Cushman and Zha, 1997; Kim, 2001). Our framework thus accounts for international factors that have been omitted from political models of economic policymaking despite a general consensus that globalization has important effects on domestic policymaking. In essence, our framework allows us to sort out more completely the linkages between citizens' evaluations, observed economic policies and macroeconomic outcomes.

Empirical Approach

Modeling the multiple time series described in the last section requires a system of equations. In the econometrics and time series literature there are three generally accepted options for analyzing such a dynamic system: a) simultaneous equation models, b) (vector) error correction models and c) vector autoregressions. Freeman, Williams and min Lin (1989) and Brandt and Williams (2007) outline the relative tradeoffs in the selection of these models. A simultaneous equation specification requires the analyst to make assumptions about the (weak) exogeneity of the variables in the model. The theoretical accounts of democratic evalutions outlined earlier do not provide these kinds of identification restrictions. Further, simultaneous equation models are special cases of un-

restricted vector autoregression models (Sims, 1972, 1980). A vector error correction specification requires that the analyst investigate the error correction relationships among the unit root variables in the model. This is not the goal of this analysis and is a special case of vector autoregression models (Brandt and Williams, 2007; Sims, Stock and Watson, 1990). Finally, one could adopt a reduced form perspective that does not model the relevant contemporaneous relationships. But this is contrary to the over decade-long literature in applied macro-economics that uses (Bayesian) structural vector autoregression models to account for these relationships (e.g., Cushman and Zha, 1997; Leeper, Sims and Zha, 1996; Sims and Zha, 1998; Sims, Waggoner and Zha, 2008).[3]

To assess the causal relationships among the variables in the open political economy framework, we construct a Bayesian, structural vector autoregression (B-SVAR) model (Brandt and Freeman, 2006, 2009). This model treats the system of variables as fully endogenous. The model takes the following form:

$$A_0 Y_t + \sum_{j=1}^{p} A_j Y_{t-j} = D Z_t + \epsilon_t, \quad \epsilon_t \sim N(0, I), \quad t = 1, \ldots, T. \tag{1}$$

The A_0 is a 12×12 matrix that defines the contemporaneous relationships among the endogenous variables and Y_t is a 12×1 vector of endogenous variables at time t. The vector Y_t contains the polity, policy, and open economy variables discussed previously. The A_j are the 12×12 matrices of the structural coefficients for the lagged endogenous variables Y_{t-j} at lag $t - j$, Z_t is a 2×1 vector of the electoral counter and a constant, D is a 12×2 matrix of the structual coefficients for the exogenous variables, and ϵ_t is a 12×1 vector of normal i.i.d. structural shocks. The details of the estimation of this model are outlined in the appendix.

To draw inferences about the causal relationships among the endogenous variables in Y_t, we

[3]Many specious criticisms of vector autoregression modeling exist in political science. Nevertheless, vector autoregression models are workhorses in the empirical macroeconomics, time series analysis, and statistics. The vector autogression model is not inherently atheoretical: it captures the baseline correlations among the time series in the model. The interpretation and decomposition of these correlations depends on the theoretical insights brought to the analysis by the researcher (Williams, 1990; Brandt and Williams, 2007).

impose restrictions (a structure) on the contemporaneous relationships among the variables, A_0 (Brandt and Freeman, 2009). This structure corresponds to the theoretical and empirical results about which endogenous variables influence each other within the same time period, and which do not. We use monthly data to estimate the model, which means that the A_0 matrix specifies how the endogenous variables influence each other *within* the same month. Imposing restrictions on the contemporaneous relationships does not exclude the possibility that variables can influence each other with a lag or delay. We do not impose restrictions on the lagged relationships among the endogenous variables, which are captured by the matrices A_j, $j = 1, \ldots, p$.

To assess citizens' evaluation mechanisms, we proceed in two steps. First, we define different structural specifications for the *contemporaneous* relationships among public opinion, economic and policy variables. These structural specifications reflect different hypotheses about public evaluations and policy derived from the theoretical discussion and the broader political economy literature. For instance, the competence models(s) imply that public opinion does not react to changes in observable economic policy and therefore observable policy does not necessarily respond to public opinion. We first test this hypothesis against the alternative that citizens closely monitor government behavior as represented by observable policy choices. As suggested by Duch and Stevenson (2008), we also construct different specifications that reflect the idea that the impacts of monetary and fiscal policies vary with and without central bank independence.

Second, we examine the causal linkages among the variables for the best performing empirical specification, which allows us to discriminate between the different causal evaluation mechanisms. If we observe only a weak link between observable economic policy and evaluations, then this would be evidence in favor of the hypothesis that citizens mostly focus on economic outcomes instead of policies. If we are able to establish a strong connection between evaluations and observable policy and (or) between these evaluations and specific policy innovations (shocks), then this would be evidence in favor of the alternative hypothesis.

For the first part of the analysis, we allow for varying contemporaneous relationships *across* the polity and the economy, while the contemporaneous relationships *within* the polity and the

economy are fixed. Thus, we focus on the intersections between the polity and the economy and partition the A_0 matrix and Y_t vector into four parts. These partitions describe the endogenous relationships among the economy and polity variables in our model. We do this by partitioning the A_0 matrix and Y_t as follows:

$$A_0 Y_t = \left[\begin{array}{c|c} A_0^E & A_0^{PE} \\ \hline A_0^{EP} & A_0^P \end{array}\right] \left[\begin{array}{c} Y_t^E \\ \hline Y_t^P \end{array}\right] = \left[\begin{array}{c} A_0^E Y_t^E + A^{PE} Y_t^P \\ A_0^{EP} Y_t^E + A^P Y_t^P \end{array}\right], \tag{2}$$

where the vectors Y_t^E and Y_t^P are the variables for the economy and polity in Y_t,

$$Y_t^E = \left[\begin{array}{cccccccc} e_t & r_t^d & r_t^i & g_t & p_t^d & y_t^d & p_t^i & y_t^i \end{array}\right]' \tag{3}$$

$$Y_t^P = \left[\begin{array}{cccc} ne_t & pe_t & a_t & v_t \end{array}\right]'. \tag{4}$$

The matrices A_0^E and A_0^P capture the contemporaneous relationships *within* the economy and the polity, respectively. The matrix A_0^E describes how the economic and economic policy variables react to each other within the same month. The matrix A_0^P indicates how the public opinion variables respond to each other within the same month. The contemporaneous relationships among the variables within the polity and the economy are fixed for all models. The matrices A_0^E and A_0^P thus are the same for the different specifications. The justifications for their structures are discussed in detail in the Appendix.

The matrices A_0^{PE} and A_0^{EP} represent the contemporaneous relationships across the polity and the economy. The A_0^{PE} matrix describes contemporaneously how politics affects the economy, or how economic and policy variables react to changes in opinion variables. The A_0^{EP} matrix reflects how the economy contemporaneously affects politics, i.e., how political opinion variables react to changes in the economy and economic policy. So consider these as the first superscript contemporaneously causes the second—in a very specific way. These two matrices differ for the different specifications and we discuss them in detail below.

The first step of the democratic accountability mechanism examines how citizens and hence public opinion reacts to government policy and the economy. The contemporaneous reactions of

the public opinion equations to economic policy are captured in the A_0^{EP} submatrix of Equation 2. We specify the relationships in A_0^{EP} as

$$
\begin{aligned}
A_0^{EP} Y_t^E &= \begin{bmatrix} 0 & \alpha_{EP,1}^M & 0 & \alpha_{EP,5}^F & 0 & 0 & 0 & 0 \\ 0 & \alpha_{EP,2}^M & 0 & \alpha_{EP,6}^F & 0 & 0 & 0 & 0 \\ 0 & \alpha_{EP,3}^M & 0 & \alpha_{EP,7}^F & 0 & 0 & 0 & 0 \\ 0 & \alpha_{EP,4}^M & 0 & \alpha_{EP,8}^F & 0 & 0 & 0 & 0 \end{bmatrix} \begin{bmatrix} e_t \\ r_t^d \\ r_t^i \\ g_t \\ p_t^d \\ y_t^d \\ p_t^i \\ y_t^i \end{bmatrix} \\
&= \begin{bmatrix} \alpha_{EP,1}^M r_t^d + \alpha_{EP,5}^F g_t \\ \alpha_{EP,2}^M r_t^d + \alpha_{EP,6}^F g_t \\ \alpha_{EP,3}^M r_t^d + \alpha_{EP,7}^F g_t \\ \alpha_{EP,4}^M r_t^d + \alpha_{EP,8}^F g_t \end{bmatrix}. \qquad (5)
\end{aligned}
$$

Equation 5 represents the contribution of the two policy variables, interest rates and spending (r_t^d and g_t), to the equations for the four political variables in Equation 4: national economic expectations (ne_t), personal financial expectations (pe_t), chief executive approval (a_t) and vote intentions (v_t), respectively. None of the coefficients on policy in the public opinion equations is restricted to be zero. Both policy variables (potentially) contemporaneously affect the public opinion.

The second and fourth columns of matrix A_0^{EP} that produce Equation 5 determine how the four opinion variables react to monetary and fiscal policy. The coefficients $\alpha_{EP,1}^M$ through $\alpha_{EP,4}^M$ reflect how monetary policy changes influence national economic expectations, personal financial expectations, chief executive approval and vote intentions, respectively. The coefficients $\alpha_{EP,5}^F$ through $\alpha_{EP,8}^F$ show how fiscal policy affects the same public opinion variables. As an example, $\alpha_{EP,4}^M$ is the contemporaneous coefficient for how domestic monetary policy, r_t^d affects the vote intention function. It tells us how vote intentions change within the same month when domestic monetary policy changes.

The competence model(s) implies that citizens do not monitor government policy and do not reward the government with more support if the government adjusts observable policies. If citi-

zens nonetheless observe and evaluate policy, then they would mostly care about monetary policy because inflation negatively enters their value functions. Monetary policy choices that increase inflationary expectations would lead to lower political support for the government, (but such a behavior is not explicitly predicted by the competence model(s)). In our empirical model, this means that the coefficients in A_0^{EP} should be restricted because the opinion variables should not respond to policy variables. With respect to monetary policy, this means that the following restrictions hold:

$$\alpha_{EP,1}^{M} = \alpha_{EP,2}^{M} = \alpha_{EP,3}^{M} = \alpha_{EP,4}^{M} = 0. \tag{6}$$

While the implications of competence model(s) for monetary policy are clear, the model is not explicit about the exact role of observable fiscal policy. Besides monetary policy which determines inflation, government's fiscal decisions and their effects are also unobservable. We infer from this setup that observable fiscal policy choices are not important for accountability and citizens' evaluations. Public opinion thus should not react to fiscal policy choices. This means that opinion variables do not respond to the fiscal policy variable, or that in Equation 5,

$$\alpha_{EP,5}^{F} = \alpha_{EP,6}^{F} = \alpha_{EP,7}^{F} = \alpha_{EP,8}^{F} = 0, \tag{7}$$

for the opinion variables' contemporaneous responses to the fiscal variables.

As noted above, the competence model(s) has no reaction functions *per se*. But much of the political economy literature suggests that the government infers from public opinion what citizens expect in terms of economic policy and adjusts policy accordingly. Monetary and fiscal policy variables thus should respond immediately to changes in national economic and personal financial expectations, prime ministerial approval and vote intentions. In our model, this policy responsiveness is captured in the matrix A_0^{PE}. The submatrix for the $A_0^{PE}Y_t^P$ relationships for our model in Equation 2 are given by

$$
\begin{aligned}
A_0^{PE} Y_t^P &= \begin{bmatrix}
\alpha^X_{PE,1} & \alpha^X_{PE,2} & \alpha^X_{PE,3} & \alpha^X_{PE,4} \\
\alpha^M_{PE,5} & \alpha^M_{PE,6} & \alpha^M_{PE,7} & \alpha^M_{PE,8} \\
0 & 0 & 0 & 0 \\
\alpha^F_{PE,9} & \alpha^F_{PE,10} & \alpha^F_{PE,11} & \alpha^F_{PE,12} \\
0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0
\end{bmatrix}
\begin{bmatrix} ne_t \\ pe_t \\ a_t \\ v_t \end{bmatrix} \\
&= \begin{bmatrix}
\alpha^X_{PE,1} ne_t + \alpha^X_{PE,2} pe_t + \alpha^X_{PE,3} a_t + \alpha^X_{PE,4} v_t \\
\alpha^M_{PE,5} ne_t + \alpha^M_{PE,6} pe_t + \alpha^M_{PE,7} a_t + \alpha^M_{PE,8} v_t \\
0 \\
\alpha^F_{PE,9} ne_t + \alpha^F_{PE,10} pe_t + \alpha^F_{PE,11} a_t + \alpha^F_{PE,12} v_t \\
0 \\
0 \\
0 \\
0
\end{bmatrix}. \qquad (8)
\end{aligned}
$$

Equation 8 captures the contribution of the four polity variables to the equations eight economic variables in Equation 3. The first four economic are the exchange rate (e_t), domestic monetary policy (r_t^d), foreign monetary policy (r_t^i) and domestic fiscal policy (g_t). Note that none of the domestic polity variables contemporaneously enter the equations for foreign monetary policy. All four of the polity variables (potentially) contemporaneously affect the exchange rate, domestic monetary policy, and fiscal policy equations.[4]

In the matrix in Equation 8, the second and fourth rows reflect how the public opinion variables affect monetary and fiscal polices, respectively. The coefficients $\alpha^M_{PE,5}$ through $\alpha^M_{PE,8}$ are the coefficients on national economic expectations, personal financial expectations, chief executive approval and vote intentions, respectively, in the monetary reaction function. The coefficients $\alpha^F_{PE,9}$ through $\alpha^F_{PE,12}$ are the coefficients on the same variables in the fiscal policy reaction function equation. In other words, the coefficients capture how monetary and fiscal policies contemporaneously react to public opinion. Finally, the first row of matrix A_0^{PE} indicates how the exchange rate responds to the public opinion variables via the α^X_{PE} coefficients. Following Bernhard and Leblang (2006) who find that political evaluations and exchange rate movements are causally related, we

[4]The economy influences policy through matrix A_0^E which is discussed in the Appendix.

leave the parameters in this row unrestricted.

Finally, in the competence model(s), the government's competence and therefore economic decisions are exogenous. In this setup, we would expect that observable macroeconomic policy does not respond to changes in public opinion and citizens' evaluations of government performance. Moreoever, in institutional settings where the elected government does not control monetary policy, domestic interest rates should not react to public opinion because the conservative central bank exclusively focuses on price stability. In our model, this means that the coefficients in Equation 8 are restricted as follows:

$$\alpha^{M}_{PE,5} = \alpha^{M}_{PE,6} = \alpha^{M}_{PE,7} = \alpha^{M}_{PE,8} = 0. \tag{9}$$

When the central bank is independent, it is plausible that fiscal responsiveness increases. The government then resorts to its only remaining economic policy instrument—fiscal policy—to respond to citizens' evaluations. In other words, the coefficients $\alpha^{F}_{PE,9}$ through $\alpha^{F}_{PE,12}$ are expected to be non-zero when the bank is independent and zero when it is directly responsible to elected officials. The larger implications of the model therefore suggest that coefficients on the opinion variables in the fiscal reaction function in Equation 8 are zero as well, or

$$\alpha^{F}_{PE,9} = \alpha^{F}_{PE,10} = \alpha^{F}_{PE,11} = \alpha^{F}_{PE,12} = 0. \tag{10}$$

Estimation and Testing

A Bayesian estimator is used to fit the model in Equation 1, subject to the identification restrictions in Equations 8 and 5. We then use the results to evaluate the hypotheses about 1) monetary policy being unaffected by public opinion (Equation 9), 2) fiscal policy being unaffected by public opinion (Equation 10), 3) public opinion being unaffected by monetary policy (Equation 6), and 4) public opinion being unaffected by fiscal policy (Equation 7). The evaluation of the hypotheses is done using Bayes factors, computed from the posterior distribution of the model's parameters (Details

are in the Appendix).

We estimated four specifications of the Bayesian structural vector autoregression (B-SVAR) models. The first of these is the full Policy Linkage specification that allows for contemporaneous feedback from monetary and fiscal policy to the public opinion measures and *vice versa*. This model uses the specification based on Equations 8 and 5. The second, Monetary Linkage specification allows only for contemporaneous effects of public opinion in monetary policy, but not fiscal policy. This imposes the restrictions in Equations 7 and 10. The third, Fiscal Linkage specification allows only for contemporaneous effects of public opinion in fiscal policy, but not monetary policy. This imposes the restriction in Equation 6 and 9. Finally, we estimate a specification that allows for No Linkage by imposing all four sets of restrictions on the A_0 matrix. Models emphasizing the role of outcomes instead of policies are most consistent with the last of these specifications.

The Bayesian estimation methods for B-SVAR model have been well described elsewhere, and the interested reader should consult Waggoner and Zha (2003*a*,*b*) and Brandt and Freeman (2006, 2009). The only issues specific to the implementation of the Bayesian estimation here are 1) the specification of the prior, and 2) the characterization of the posterior sample. The prior employed for our models is a Sims-Zha prior for a structural VAR (Sims and Zha, 1998; Brandt and Freeman, 2006, 2009). This prior is centered on a random walk model (though the posterior need not be) and assumes that higher order lag terms have smaller variances than lower ordered lag terms.[5]

Our final results are based on a posterior sample drawn via a Gibbs sampling method for B-SVAR models (Waggoner and Zha, 2003*a*). The burn-in for the sampler was 10,000 draws, which were discarded before drawing a final posterior sample of 25,000 draws, which passes standard convergence diagnostics. All of the results reported below are based on this posterior sample.

Finally, to compare our four models we computed the log marginal data density for each of the models. This is the log posterior density measure for a specification (Policy Linkage, Monetary

[5]These prior beliefs are specified using a series of seven hyperparameter values. Specifically, we set the hyperparameter values at $\lambda_0 = 0.6$, $\lambda_1 = 0.1$, $\lambda_3 = 1$, $\lambda_4 = 0.1$, $\lambda_5 = 0.05$, $\mu_5 = \mu_6 = 5$. These (and similar) values have been widely used in the macroeconomics and political economy literature (e.g., Sattler, Freeman and Brandt, 2008; Sims and Zha, 1998; Cushman and Zha, 1997). The resulting posterior inferences are robust to alternative values.

Linkage, etc.) in a given sample period. It is used to assess whether the specification generated the sample. Log marginal data density values can be compared to generate Bayes factors which measure the relative evidence or weight that should be given to a model in comparison to another, exactly like a likelihood ratio statistic in frequentist analyses (Kass and Raftery, 1995).

We use impulse response functions (IRFs) to assess the impact of policy innovations (shocks) on citizen evaluations and macroeconomic outcomes. The IRFs are an especially useful tool to assess the predictions of the theoretical models. More detail about the estimation of the Bayesian structural vector autoregression model is supplied in the Appendix.

Application to a Critical Case: Great Britain

Background

According to theories of macropolitical economy, democratic accountability should be most evident in countries whose economies are only moderately open to international trade and investment, whose public sectors are relatively small, whose regulatory density is limited and whose wage bargaining institutions are relatively decentralized (Duch and Stevenson, 2008, Ch. 5 and 7). The UK is a country that satisfies most of these conditions. Its clarity of responsibility is very high because the UK is governed by a single-party government that can design economic policy without interventions by other pivotal actors (Powell and Whitten, 1993). The shift to central bank independence in 1997 also allows us to test whether under different institutional settings the changing role of monetary and fiscal policy in the democratic evaluation mechanism. It is for this reason that we split the sample and conduct analyses for the periods of Tory and Labour control of the government. We recognize that this does not allow us to separate out the effects of partisan change from central bank independence, but it does allow us to evaluate the presence of monetary and fiscal policy responsiveness.

Importantly, the UK is an example of fiscal delegation (Hallerberg and Von Hagen, 1999, 223). It has had strong finance ministers who have taken orders from prime ministers. The degree of

fiscal transparency is also high.[6] British governments therefore should be able to use fiscal policy to respond quickly to political evaluations and then effectively stimulate the economy. The role of fiscal policy becomes even more central when we take into account that monetary policy in liberal market economies, like Britain, may not be fully effective (Iversen, 1998*a*,*b*), an aspect that previous research has neglected (Sattler, Freeman and Brandt, 2008).

We use monthly data from 1984:4 to 2006:9 for our analyses. This time span allows us to capture the increasing economic openness of the British economy and also to reassess citizens' evaluations in the run-up to the 1997 British election, an election that figures prominently in the assessment of the competence model(s) (Duch and Stevenson, 2008, 168ff).[7] The four public opinion indicators for ne_t, pe_t, a_t, and v_t are the standard measures used in studies on government popularity.[8] As proxies for the international economic variables, we employ time series for the United States. This choice is motivated by the international dominance of the US economy and the strong economic ties between the US and the UK during our period of analysis from 1984 to 2006. Economic output, price levels and the exchange rate are measured using Indices of Industrial Production, Consumer Price Indices and the \$/£ exchange rate. Foreign and domestic monetary policies are represented by U.S. and British short-term interest rates.[9]

Following a number of political scientists (e.g., Hallerberg and Von Hagen, 1999; Clark and Hallerberg, 2000; Alt and Lassen, 2006; O'Mahony, 2008), fiscal policy is measured by the level of public sector debt. This public sector debt index is based on the debt level reported by the

[6]The UK ranks with France near the top of the Open Budget Index for the world's governments (The Economist, October 28, 2006: 114; Alt and Lassen (2006)).

[7]The analysis starts when the British economy is relatively open to trade and finance (Duch and Stevenson, 2008, Figure 7.1 and p. 184). The start date is also constrained by the availability of an appropriate fiscal measure, which begins in 1984.

[8]The political time series data are from MORI polls, except personal expectations that are from Gallup and YouGov. The Gallup data for personal expectations are available until October 2003 only. YouGov began collecting this series in 2002. For information how the Gallup and YouGov series are combined, consult Sanders (2005, 69-70). We thank Harold Clarke for kindly providing these series.

[9]The economic data are from the IMF's International Financial Statistics, the U.S. Bureau of Labor Statistics and the U.K. Office for National Statistics.

government at the beginning of the sample period. We construct a monthly indicator of government debt using data on the public sector net cash requirement. The net cash requirement indicates the amount that the British government borrows from investors to finance the difference between public sector expenditures and receipts.[10]

Discrimination Among Specifications

For a first test of how democratic accountability works, we estimate and compare the four different structural specifications derived earlier for two different time periods. To account for the changing role of fiscal and monetary policy under different institutional settings, we split the sample into a Tory period (1984:4–1997:4) when the Bank of England was directly responsible to elected officials, and a Labour period (1997:5–2006:9) when the Bank was independent. In terms of Duch and Stevenson's (2008) analysis, the number of decisions made by elected officials decline in Britain after 1997.

Our benchmark is the full Policy Linkage specification in which citizens react contemporaneously to changes in policy and macroeconomic outcomes, and government reacts contemporaneously to changes in public opinion. The Monetary and Fiscal Linkage specifications represent differences in these contemporaneous evaluations and reactions that reflect the change to central bank independence in 1997. Last, the No Linkage specification holds that there are not such reactions contemporaneously by citizens or governments to changes in policies and outcomes. This No Linkage specification is closest to models emphasizing the role of outcomes instead of policies for evalutions.

Table 1 shows the log marginal data densities (MDD) for the four specifications in the two subsamples. Larger values indicate that the specification fit the data better. The difference of

[10]In contrast to our four political series which essentially are real time estimates of public opinion (within the time frame of the respective survey), macroeconomic time series often are revised several times before final estimates are established (Garratt and Vahey, 2006). The degree of revision varies among economic series. Some series exhibit breaks but others, like monetary aggregates, are not substantially revised over time. We return to this problem in the conclusion.

the log MDDs for two specifications is the log Bayes' factor measuring the posterior odds of one specification versus another. We estimate the log Bayes' factor of the benchmark versus an alternative specification by subtracting the log MDD of the respective alternative specification in rows two through four of Table 1 from the log MDD of the Policy Linkage specification in the first row. Positive (negative) values of the Bayes' factor favor the Policy Linkage specification (alternative specification).

[Table 1 about here.]

The evidence from the log MDDs favors the Policy Linkage specification. In both periods, this specification shows considerably higher log MDD values than the No Linkage specification. The log Bayes' factors are 72 for the Policy versus the No Linkage specification in the Tory period and 59 for the same pairing, in the Labour period. The Policy Linkage specification also performs better than the Monetary and Fiscal Linkage specifications with log Bayes' factors of 19 and 21 for the Tory period, and factors of 25 and 23 for the Labour period, all in favor of the Policy Linkage specification. A log Bayes factor value of absolute value 2 is considered moderate evidence for a specification (Kass and Raftery, 1995).

The strong differences in log Bayes' factors for the two partial Linkage specifications across periods confirms our expectations about the changing role of policy instruments. In the Tory period, the log Bayes' factor for the Monetary versus the Fiscal Linkage specification is 2 indicating that before 1997, monetary policy played a role for the citizen evaluation mechanism in economic policy. The log Bayes' factor for the same specification pair shrinks to a value of -2 in the Labour period. This shows that monetary policy lost its predominant role in an evaluation chain and fiscal policy became significantly more important after the institutional change in 1997 when monetary policy was delegated to a more politically insulated Bank of England.

We conclude from this first test that citizen evaluations do depend contemporaneously on observed policies and that there is a government (contemporaneous) reaction function that depends at least, in part, on public opinion. What this analysis of specification fit does not tell us is the impact

of policy innovations or shocks. This also is a key element of many competence models, which mostly focus on outcomes, but not policies. This is addressed in the next part of our investigation.

The Impact of Policy and Other Types of Shocks

The dynamics of the Policy Linkage specifications for the Tory versus Labour periods can be evaluated using impulse response functions (IRFs). IRFs display the responses to a standardized shock in each variable in each equation over time. These impulse response functions are computed from the structural VAR for the two Policy Linkage specifications, one each for the Tory and Labour periods, subject to the initial identification of the contemporaneous effects in A_0. The IRFs presented here are computed from the fitted B-SVAR specifications and summarized with likelihood-based error bands (Sims and Zha, 1999; Brandt and Freeman, 2006, 2009). The responses are mean estimates over 12 months with 68 percent likelihood-based posterior confidence intervals.[11]

The analysis of democratic accountability concerns a subset of the $12 \times 12 = 144$ impulse responses for each of the four B-SVAR specificationsh. These subsets are: 1) fiscal and monetary policy reactions to shocks in citizens' economic expectations; 2) public responses, specifically vote intentions and prime minister approval, to monetary and fiscal policy shocks; 3) reactions of the real economy to fiscal and monetary policy shocks, and 4) reactions of the public to shocks to the real economy. The first two sets of IRFs show how governments and the public interact directly with each other in the responsiveness–evaluation mechanism. The last two sets of IRFs analyze whether evaluating governments based on real economic developments is justified, i.e., whether government policy innovations affect macroeconomic outcomes as competence model(s) contend.

For each of these four sets of IRFs, the Tory and Labour period responses from the respective specifications are presented together. The Tory period (1984:4-1997:4) Policy Linkage specifica-

[11]The responses are based on the 25000 draws from the posterior distribution of the model. The likelihood-based error bands are from the eigendecomposition of each IRF, which accounts for the serial correlation of the responses. The eigendecomposition's first component of each IRF shock-response combination is used to compute the width of the error bands. These first components explain 85–99% of the variation in the responses over 12 months.

tion responses are represented with solid lines with 68 percent error bands. The Labour period (1997:5-2006:9) Policy Linkage specification responses are depicted with dashed lines and 68 percent error bands. We normalize the signs of the shocks to the equations in the IRFs to reflect key aspects of the debate about the government's willingness and ability to satisfy public preferences about economic policy.[12] We start our presentation with an analysis how governments react when citizens suddenly express dissatisfaction, or the effect of negative political shocks to the fiscal and monetary policy equations (r_t^d and g_t). We then analyze how positive policy shocks affect the responses in the polity and the economy. The shocks have the same signs across the two sample periods.

Figure 1 shows the responses of the UK interest rates (r_t^d) and UK fiscal policy index (g_t) to negative shocks in economic expectations. These responses are the reactions to sudden one standard deviation *declines* in national economic and personal financial expectations. Overall, fiscal and monetary policies react to surprise changes in national economic expectations more than to such changes in personal financial expectations in both the 1984-1997 and 1997-2006 periods. A sudden decline in national economic expectations leads to a decrease in interest rates in both periods, which means that the central bank attempts to stimulate the economy when economic prospects for the whole country worsen. The reverse happens for personal expectations shocks, which lead to higher interest rates in the Tory period, but to no significant interest rate changes in the Labour period.

[Figure 1 about here.]

The size of the response of the central bank to shocks in economic expectations diminishes slightly after the Bank of England was granted independence. The reaction of monetary policy to a surprise decline in national economic expectations largely remains the same in the Tory to the Labour period. But the response of interest rates to surprise changes in personal expectations in

[12]The full pattern of the signs for the 12 equations of the B-SVAR model is (+ , – , + , –, +, +, +, +, +, +, +, +). The order of equations is (e_t, r_t^d, r_t^i, g_t, p_t^d, y_t^d, p_t^i, y_t^d, ne_t, pe_t, a_t, v_t). A + (–) means that shocks enter the respective equation positively (negatively).

the Tory period reduces to the negligible amount of less than 0.025 percentage point change in the Labour period.

The responses of the fiscal policy index to shocks in economic expectations yield similar results. The impact of a negative standard deviation shock in national economic expectations in the Tory period is a decrease in government spending by an initial 2 percent decaying over 12 months. A one standard deviation negative shock in national economic expectations in the Labour period increases fiscal debt initially by nearly 4 percent, decaying slowly over 12 months. The implication of this response is that fiscal policy became more responsive to shocks in national expectations after 1997, because the magnitude of the response is larger and decays more slowly in that period. The negative response of fiscal policy to a negative shock in personal expectations is present in both periods. The fiscal responses to personal expectations hardly differ in size across the two periods, but are very small and significantly smaller than the responses to shocks in national expectations.

These results generate three conclusions. First, the government is responsive to sudden changes in public opinion. Moreover, fiscal and monetary policies primarily react to citizens' evaluations of the country's overall economic welfare and less to opinions about individuals' personal well-being. Second, there was a shift in responsiveness from monetary to fiscal policy after the Bank of England gained independence. This is consistent with the idea that the government had to rely on fiscal policy rather than monetary policy to satisfy citizens after the Bank of England became independent. Third, Tory and Labour governments used fiscal policy differently. While Tory governments decreased debt when citizens became less satisfied with the economy, Labour governments did the opposite. This confirms the view that different ideas guided the economic policies of the different governments. In response to sudden expressions of public dissatisfaction with economic developments Tory governments tried to spur economic growth with orthodox fiscal policies, while Labour governments used an expansionary fiscal strategy.

Figure 2 shows the responses of the political variables, prime minister approval (a_t) and vote intentions (v_t) to policy shocks in interest rates (r_t^d) and fiscal policy (g_t). The policy shocks enter all equations as positive one standard deviation changes in the two samples. Surprise increases in

interest rates lead to no significant response in prime ministerial support in the Tory period and to higher PM support in the Labour period, although the latter is rather small. Vote intentions respond in a different fashion: positive shocks in interest rates increase vote intentions for the government party in the Tory period and have a negligible impact on vote intentions in the Labour period. Overall, this means that the effect of interest rate innovations on government support is weaker in the latter period, presumably because citizens know that elected officials enjoy less control over monetary policy.

[Figure 2 about here.]

The responses of vote intentions and approval to surprise fiscal policy shocks are shown in the second column of Figure 2. Shocks to these two equations again are fiscal expansions in both periods. So a surprise expansion in fiscal policy generates a decline in prime ministerial support in the Tory period because the public expects a more orthodox fiscal policy from the Tory government in times when the budget deficit is already high and perceived as a problem. In the Labour period, an unexpected fiscal expansion increases prime ministerial support because citizens reward fiscal expansions by the Labour government, especially in a period where the deficit is not a serious problem. This supports the argument that the impacts of fiscal policy are inverted in the Labour versus Tory periods because surprise contractions (expansions) in fiscal policy generate different approval responses across the two periods. Overall, we conclude from these findings that citizens observe policy choices by the government and take them into account when evaluating the government's performance. This is consistent with our results of our analysis of our models' fits.

The response of vote intentions to fiscal shocks is similar in both periods. It declines when there is a surprise fiscal expansion. This is not consistent with *standard* expectations for the Labour period. However, it may be an expectational response. Given the UK history with inflation, citizens may be skeptical of fiscal stimuli and therefore punish the government at election time. Note, however that this response is never more than a whole point decline in vote intentions over 12 months.

Figure 3 shows the UK real economy (y_t^d and p_t^d) responses to positive shocks in monetary and fiscal policy.[13] Although we find that policy innovations influence output and prices, these effects are tiny. A one standard deviation change in the policy variables does not cause a change in price levels for monetary policy and a change of about 0.08 percent —a maximum—for fiscal policy over 12 months. Output does not change noticeably in response to monetary policy shocks. The results suggest that policy was largely ineffective and that the governments' capacities to shape real economic outcomes were limited. The magnitudes of the impacts of fiscal and monetary policy innovations are very small. The governments' policy innovations have virtually no impact on the real British economy.[14]

[Figure 3 about here.]

Figure 4 shows the final part of the causal chain, the impacts of positive shocks to the domestic real economy (p_t^d and y_t^d) on the vote intention (v_t) and prime ministerial approval (a_t) equations. Overall the responses of v_t and a_t to real economic developments are fairly weak. The reaction of prime ministerial approval to shocks in prices include zero in both periods. The reactions of these equations to industrial production shocks are very small and do not exceed 0.1 percentage points in either period. The effect of industrial production shocks on approval has non-zero credible intervals during the first three to four months. We see similar results for the impact of the real economy shocks on vote intentions. Price shocks have small effects on vote intentions during both periods. Domestic output shocks have no sizeable effects in either period.[15]

[13] In Figure 3, the error bands cannot be distinguished from the modal impulse response because of the very small credible region around the response.

[14] Over 92% of the forecast variation in y_t^d and p_t^d is due to their *own* innovations in both sample periods (results not reported). Fiscal and monetary policy innovations explain at most 0.5% of the variation in these two variables in the Tory period and at most 1.6% of the variation in both variables in the Labour period. So there is strong evidence that the results in Figure 3 are trivial in the UK economy.

[15] In the Tory period, the decompositions of the forecast variance (not reported) show that interest rate and fiscal shocks generate at most 10% and 67% of the variance in a_t and 0.2% and 52% of the variance in v_t. In the Labour perod, the decompositions of the forecast error variance show that the interest rate and fiscal shocks generate at most

[Figure 4 about here.]

Conclusion

Although the connection between economic evaluations and political support for governments was established a long time ago, the exact accountability mechanism underlying this relationship is still unclear. Many competence models stress the importance of economic outcomes for evaluations. Citizens infer the competence of incumbents from economic developments and rationally choose one policymaker over another in a democratic election. Alternatively, it is possible that policies play a more important role than often implied by theoretical models. We evaluate these hypotheses in a Bayesian multivariate time series analysis of the British political economy since the 1980s.

Our results strongly support the idea that contemporaneous monetary and fiscal policies are essential parts of the accountability mechanism. In comparison, observable economic outcomes have a much smaller effect on evaluations of governments. Citizens not only take into account observable policy adjustments when evaluating government performance, but governments also are responsive to shifts in political evaluations. Moreover, the institutional setting determines which information citizens use when evaluating governments. The focus on monetary policy disappears and fiscal policy becomes primary when the central bank is granted political independence.

Our findings have implications for theoretical models of accountability and government evaluations. Many competence model(s) stress the importance of outcomes for these evaluation mechanisms, but ignore or assign little relevance to policies. This is inconsistent with our findings. One implication is that the role of observable and unobservable policies and their exact impact on the economy should be specified more clearly. In particular, how incumbents can vary in their unobservable "decisions" (Duch and Stevenson, 2008) and how these decisions affect economic performance is unclear. We need a better understanding of what the options of incumbents are, which of their decisions are observable and which ones are not. The role of fiscal and other poli-

0.2% and 81% of the variance in a_t and less than 0.1% and 62% of the variance in v_t. These results are consistent with the shift from monetary to fiscal policy tools after 1997.

cies should be specified in this context. As it is formulated now, the nature of economic policies bearing on democratic accountability remains obscure.[16]

With respect to future empirical research, additional cases should be studied. The first step is to analyze democratic accountability in countries where there still is some a moderate level of clarity of responsibility and policy transparency like the U.S. Recent research suggests that, unlike their British counterparts, a majority of Americans believe in their government's capability to manage economic developments (Hellwig, Ringsmuth and Freeman, 2008). Building and analyzing a B-SVAR model for the American political economy would provide a test of these beliefs. Our time series model also should be integrated more fully with a political, dynamic stochastic general equilibrium model of the UK (Houser and Freeman, 2001). This could allow for deeper historical and policy counterfactual analyses. In this context, it is important that, when (if) they become available, we analyze real time macroeconomic time series for the U.K. and U.S. We do not include an analysis of such time series here because it possible that many citizens use some kind of 'bias adjustment' in assessing reports of policy choice and policy outcomes (Garratt and Vahey, 2006) and real time macroeconomic data for several of our key variables are available only in more temporally aggregated (quarterly) form. Also real time data sets do not include all the series we need to replicate our analysis. For instance, real time British data are not available for fiscal measure before 1990 (cf. Egginton, Pick and Vahey, 2002). Nonetheless, revision of macroeconomic time series is an important methodological issue. It should be addressed by political economists in the future.

[16]The finding that fiscal policy plays a major role for the evaluation of government competence is consistent with the early model by Rogoff (1990).

Appendix: Estimation Details of the B-SVAR Model

The Bayesian structural vector autoregresison (B-SVAR) models outlined earlier and this appendix were estimated using the methods discussed in Brandt and Freeman (2006, 2009). The models are estimated with the following steps:

1. Specify the restrictions in the A_0 matrix. These allow us to determine which contemporaneous effects enter which equations (see the next section for more details).

2. Specify the hyperparameters for the prior distribution of the models' parameters. The mean for the prior distribution of the parameters is centered on a random walk model where the prior mean for A_1 is an identity matrix and the prior mean on the lag coefficients for lags 2 through p are zero. The prior variance of these parameters are based on the values of the standard deviations discussed in footnote 8. The prior variance for the coefficient for the ℓ^{th} lag of variable j in equation i is

$$\left(\frac{\lambda_0\lambda_1}{\sigma_j\ell^{\lambda_3}}\right)^2$$

   where λ_0 is a discount factor for the sample variance, λ_1 is the standard around the first lag coefficients, ℓ^{λ_3} is a factor that shinks the prior variance for higher order lags toward zero and σ_j is the sample standard deviation of variable j. In the analysis presented multiple priors were analyzed and the main conclusions vary sensibly for larger and smaller prior variances.

3. Use numerical optimization to find the peak of the posterior distribution of the models' parameters. Because this is a non-recursive SVAR model, the maximum likelihood or Bayesian posterior solution cannot be found using the standard equation-by-equation estimator used for reduced form VARs.

4. Sample from the posterior mode identified in the previous step using the Gibbs sampler algorithm for B-SVAR models proposed by Waggoner and Zha (2003*a*). After an appropriate

burnin period, a sample of 25000 draws is taken from the posterior distribution of each model.

5. Compute the marginal data density using the posterior sample. These allow us to construct the Bayes factors and the elements in Table 1.

6. Based on the posterior sample of coefficients, compute and plot the moving average responses and their error bands using the methods in Brandt and Freeman (2006). The moving average responses allow us to track out the impact of standardized shocks to see the dynamic responses of any equation to a shock to a given variable. These are presented graphically since they provide concise way of capturing the information in the estimated m equations with p lags. In total, there are $m^2p + 2m = 12^26 + 24 = 888$ regression parameters plus those estimated in A_0.

A significant effort went into the sensitivity analysis of these models. Other values for the prior hyperparameters were evaluated. The sensitivity analyses also tried different lag length specifications (6 versus 12 lags), models without the national and personal economic expectations measures, models without the open economy equations for the US time series, and models with a measure of UK debt rather than the net cash position variable reported here. The results from these other specifications are consistent with those reported here.

Appendix: Specification of the SVAR models

Deriving the different, theoretically motivated structural relationships for the endogenous variables in the polity and the economy in A_0, relies on existing research in political science and the new open macroeconomics. The submatrices of Equation 2 define the political and economic relations in A_0^P and A_0^E.

For the polity we expect that contemporaneous national economic expectations affect personal economic expectation, but not vice versa. This is because aggregate welfare should affect indi-

vidual well-being, but individual financial wealth does not matter for the whole country. The two economic expectations variables together affect approval to the chief executive and vote intentions for the government (Sanders, 1991; MacKuen, Erikson and Stimson, 1992; Clarke and Stewart, 1995). We treat executive approval as weakly exogenous to vote intentions. This is consistent with results from previous research (Clarke and Stewart, 1995; Clarke, Ho and Stewart, 2000); it is theoretically plausible because citizens are more likely to vote for a government if they are satisfied with its executive. In contrast, the performance of the chief executive should not depend contemporaneously on the percentage of citizens who want to vote for the government.

This reasoning yields the following matrix for the contemporaneous relationships within the polity. The A_0^P submatrix from from Equation 2 is lower-triangular when the variables in Y_t^P are ordered in equation (4):

$$A_0^P Y_t^P = \begin{bmatrix} \alpha_{P,1} & 0 & 0 & 0 \\ \alpha_{P,2} & \alpha_{P,3} & 0 & 0 \\ \alpha_{P,4} & \alpha_{P,5} & \alpha_{P,6} & 0 \\ \alpha_{P,7} & \alpha_{P,8} & \alpha_{P,9} & \alpha_{P,10} \end{bmatrix} \begin{bmatrix} ne_t \\ pe_t \\ a_t \\ v_t \end{bmatrix} \tag{11}$$

For example, the coefficient $\alpha_{P,7}$ shows how national expections (ne_t) affects vote intentions (v_t) within the same month. This coefficient is not restricted to zero because we expect that that national economic expectations have a contemporaneous effect on vote intentions. In contrast, the coefficient in the first row of the last column is restricted to zero, which means that we assume that vote intentions (v_t) do not influence national expectations (ne_t) within the same month for the reasons discussed in the previous paragraph.

The contemporaneous relationships within the economy are based on the assumption that the international economy affects the domestic economy, but not vice versa (Cushman and Zha, 1997). Moreover, for contemporaneous relationship within the real economy, we assume an upper triangular relationship between prices and output proposed by Sims and Zha (2006) and Cushman and Zha (1997). Unlike the exchange rate, which adjusts to all variables immediately, the real economy reacts to the other variables with a delay in our model. Finally, economic policy reflects informa-

tion about prices and output with a delay. But it can reflect exchange rates and foreign economic policy instantaneously. Policy thus reacts to the latter variables within the same month, but not to the former. These assumptions follow research on dynamic simultaneous equation models in economics (op. cit.)

This yields the following matrix A_0^E in the upper-left corner of Equation 2. The vector Y_t^E in Equation 3 shows the ordering of the economic and policy variables in the model.

$$A_0^E Y_t^E = \begin{bmatrix} \alpha_{E,1} & \alpha_{E,2} & \alpha_{E,3} & \alpha_{E,4} & \alpha_{E,5} & \alpha_{E,6} & \alpha_{E,7} & \alpha_{E,8} \\ \alpha_{E,9} & \alpha_{E,10} & \alpha_{E,11} & \alpha_{E,12} & 0 & 0 & 0 & 0 \\ \alpha_{E,13} & 0 & \alpha_{E,14} & 0 & 0 & 0 & 0 & 0 \\ \alpha_{E,15} & \alpha_{E,16} & 0 & \alpha_{E,17} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \alpha_{E,18} & \alpha_{E,19} & \alpha_{E,20} & \alpha_{E,21} \\ 0 & 0 & 0 & 0 & 0 & \alpha_{E,22} & \alpha_{E,23} & \alpha_{E,24} \\ 0 & 0 & 0 & 0 & 0 & 0 & \alpha_{E,25} & \alpha_{E,26} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \alpha_{E,27} \end{bmatrix} \begin{bmatrix} e_t \\ r_t^d \\ r_t^i \\ g_t \\ p_t^d \\ y_t^d \\ p_t^i \\ y_t^i \end{bmatrix} \quad (12)$$

As an example, the coefficient $\alpha_{E,2}$ indicates how domestic monetary policy (r_t^d) affects the exchange rate (e_t) within the same month. The coefficient $\alpha_{E,3}$ shows how international monetary policy (r_t^i) influences the exchange rate within the same month.

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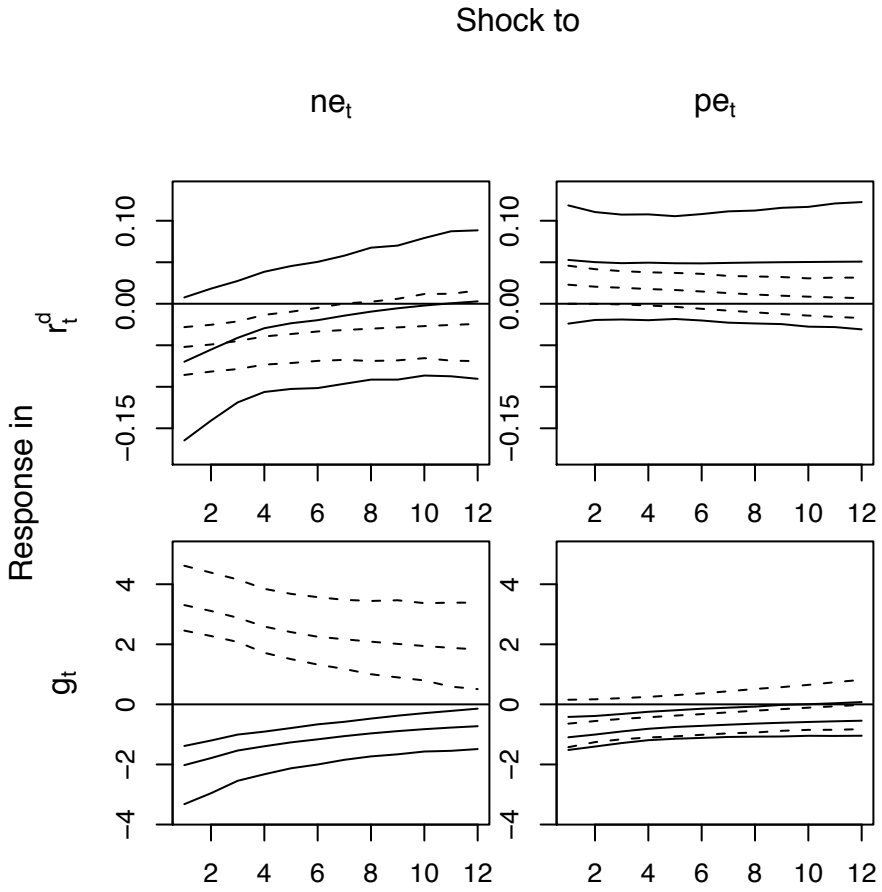

Figure 1: Responses of the UK fiscal policy index (g_t) and UK interest rates (r_t^d) to negative shocks in national economic (ne_t) personal financial (pe_t) expectations. Solid (dashed) lines are responses for the 1984-1997 (1997-2006) sample. Error bands are 68% posterior credible intervals, computed using eigendecomposition methods.

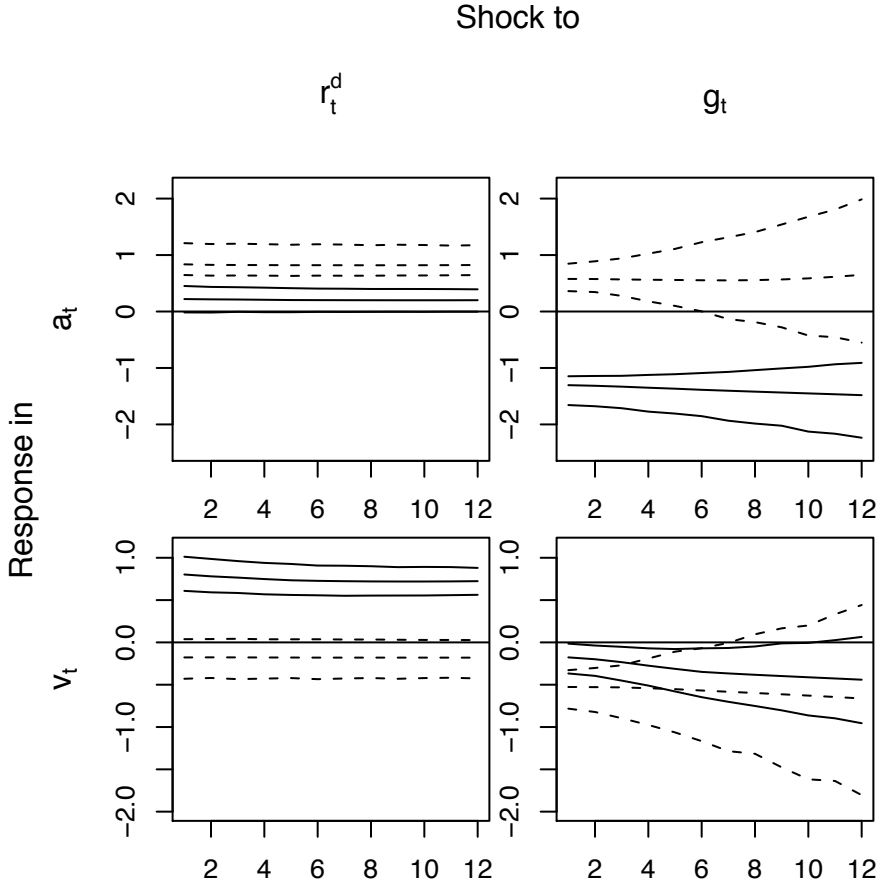

Figure 2: Responses of approval (a_t) and vote intentions (v_t) to positive UK fiscal policy index (g_t) and UK interest rates (r_t^d) shocks. Solid (dashed) lines are responses for the 1984-1997 (1997-2006) sample. Error bands are 68% posterior credible intervals, computed using eigendecomposition methods.

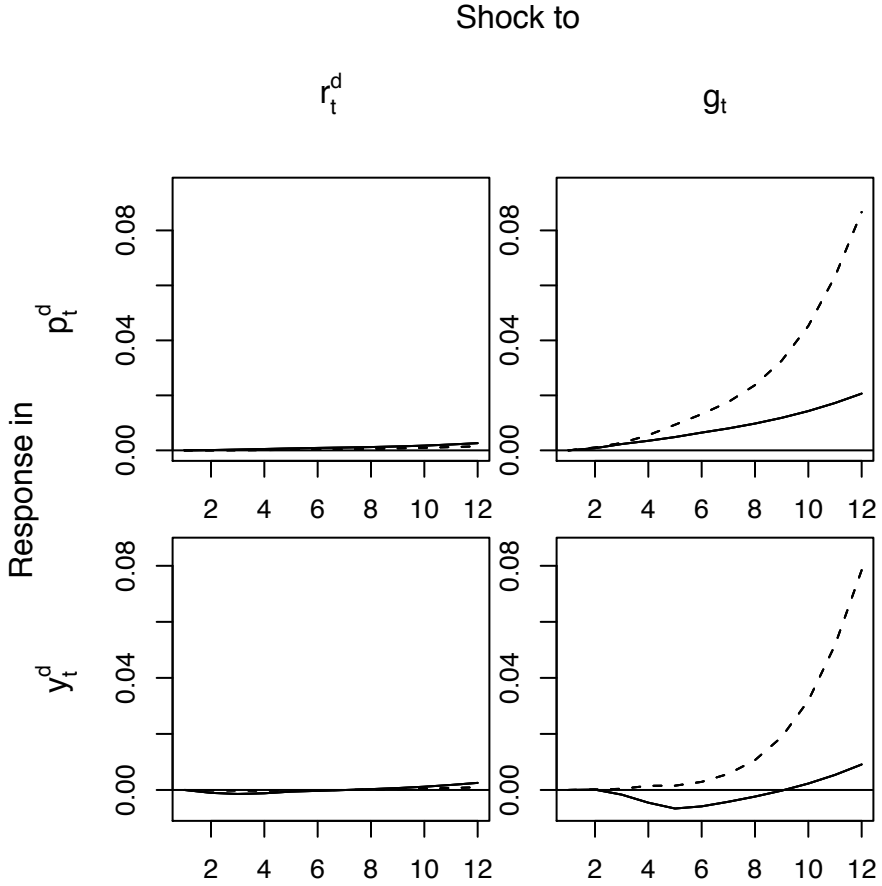

Figure 3: Responses of the UK real economy (p_t^d and y_t^d) to positive UK fiscal policy index (g_t) and UK interest rates (r_t^d) shocks. Solid (dashed) lines are responses for the 1984-1997 (1997-2006) sample. Error bands are 68% posterior credible intervals, computed using eigendecomposition methods.

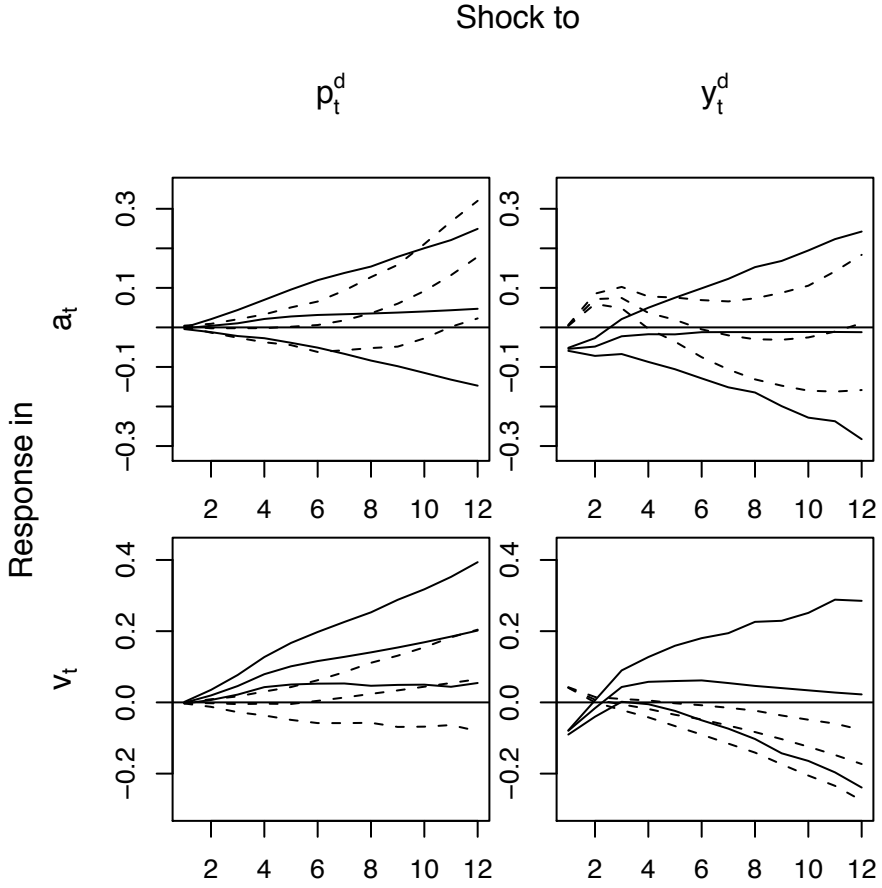

Figure 4: Responses of approval (a_t) and vote intentions (v_t) to positive UK real economy price (p_t^d) and output (y_t^d) shocks. Solid (dashed) lines are responses for the 1984-1997 (1997-2006) sample. Error bands are 68% posterior credible intervals, computed using eigendecomposition methods.

Table 1: Log Marginal Data Densities (MDD) for the four B-SVAR Specifications in the Tory and Labour Periods

	Sample Period	
Specification	Tory (1984:4-1997:4)	Labour (1997:5-2006:9)
Policy Linkage	2727	1076
Monetary Linkage	2708	1051
Fiscal Linkage	2706	1053
No Linkage	2655	1017

Policy Linkage denotes both Monetary and Fiscal Linkage. Log MDD measures the log posterior probability that the specification explains the data. Larger values indicate that the specification fits the data better.