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# Political Institutions and the Opinion–Policy Link

CHRISTOPHER WLEZIEN and STUART N. SOROKA

*The link between public opinion and policy is of special importance in representative democracies. Policymakers' responsiveness to public opinion is critical. Public responsiveness to policy itself is as well. Only a small number of studies compare either policy or public responsiveness across political systems, however. Previous research has focused on a handful of countries – mostly the US, UK and Canada – that share similar cultures and electoral systems. It remains, then, for scholars to assess the opinion–policy connection across a broad range of contexts. This paper takes a first step in this direction, drawing on data from two sources: (1) public preferences for spending from the International Social Survey Program (ISSP) and (2) measures of government spending from OECD spending datasets. These data permit a panel analysis of 17 countries. The article tests theories about the effects of federalism, executive–legislative imbalance, and the proportionality of electoral systems. The results provide evidence of the robustness of the 'thermostatic' model of opinion and policy but also the importance of political institutions as moderators of the connections between them.*

A growing body of literature addresses the relationships between public opinion and public policy. Much of the literature focuses on policy responsiveness to opinion. Research also considers public responsiveness to what policymakers do – an equally important condition for effective representation. Results suggest that representative democracy functions rather well, at least in certain countries. Governments regularly react to public opinion, not just via election results but dynamically over the election cycle (e.g. Erikson *et al.* 2002; Soroka and Wlezien 2010). And citizens adjust their preferences alongside policy. As policy goes up, preferences for policy change go down, and vice versa. The 'thermostatic' model of public opinion and policy (Wlezien 1995) works, at least in Canada, the United Kingdom and the United States.

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There are however some caveats and limitations. Opinion and policy move together in salient policy domains, but this is not the case for non-salient domains.<sup>1</sup> The evident connections are likely strongest only at a highly aggregated level, e.g. welfare or health or education. The preferences of poorer citizens may be less well represented in the domain in which they have the greatest stake – welfare (see also Enns and Wlezien 2011; Soroka and Wlezien 2008). And the strength of the opinion–policy link, even in highly salient domains, can be constrained or enhanced by political institutions.

The argument that some institutions are more conducive to a link between opinion and policy has been made in work by comparative institutionalists (e.g. Lijphart 1999). It has also been investigated by those interested in the effects of electoral systems in particular (e.g. Powell 2000). This work does not focus on policy per se, however; nor does it examine dynamics – that is, relationships between opinion and policy over time. So while the vote–seat function is well understood, as are, for instance, the advantages of proportional representation and/or federal institutions in managing ethnolinguistic diversity, the impact of these institutions on the ways in which opinion and policy interact is still rather mysterious.

Recent research has begun to address this issue. We build on that work here: specifically, research that develops an argument about the functioning of the thermostatic model under varying degrees of both vertical and horizontal divisions of power (Soroka and Wlezien 2004, 2005, 2010; Wlezien and Soroka 2007, 2011; also see Hobolt and Klemmensen 2008).<sup>2</sup> A desire for directly comparable measures of both opinion and policy over the long term meant that our previous work was constrained to three Anglo-American democracies – the US, the UK and Canada. Here, we relax our longitudinal requirements in an effort to gain cross-national and, especially, cross-institutional variance.

Our goal is to examine differences in opinion–policy connections across political-institutional environments. What makes the analysis possible is the availability of public preferences for spending data from the four Role of Government waves of the International Social Survey Program (ISSP). We combine these data with measures of government spending from OECD spending datasets. For the analysis, we focus on total government spending. As in our previous work, we analyse both policy representation (the reflection of public preferences for spending in actual spending change) and public responsiveness (the tendency for public preferences to adjust, thermostatically, to changes in spending). Doing so across a wider range of countries means that we can explicitly test existing theories about vertical decentralisation and the executive–legislative balance of power as well as the proportionality of electoral systems. The results provide evidence of the robustness of the thermostatic model, but also the importance of political institutions as mediators of the connection between public opinion and public policy.

### The Thermostatic Model

The thermostatic model of public opinion and policy describes a system of two equations – one for public preferences and the other for policy (Soroka and Wlezien 2010; Wlezien 1995, 2004).

#### *The Public Responsiveness Equation*

The public's preference for 'more' or 'less' policy – its relative preference,  $R$  – represents the difference between the public's preferred level of policy ( $P^*$ ) and policy ( $P$ ) itself:

$$R_t = P_t^* - P_t. \quad (1)$$

Thus,  $R$  can change because either  $P^*$  or  $P$  changes; a change in  $P^*$  positively influences  $R$  and a change in  $P$  negatively influences  $R$ . The negative feedback of policy on opinion is the crux of the thermostatic model. It provides the basis for effective accountability and control.<sup>3</sup>

In practice, the theoretical equation cannot be directly estimated. Most importantly, we typically do not observe  $P^*$ . Survey organisations rarely ask people how much policy they want. Instead, these organisations usually ask about relative preferences – whether we are spending 'too little', whether spending should 'be increased' or whether we should 'do more'.<sup>4</sup> This, presumably, is how people think about most policies. (Imagine being asked about your own preferred level of health or education spending.) The public preference, however defined, is also necessarily relative. This is important, as we can measure the thermostatic signal the public sends to policymakers. Because we cannot directly measure  $P^*$ , and the fact that the metrics of  $R$  and  $P$  also differ, we must rewrite our equation 1 as follows:

$$R_t = a + \beta_1 P_t + \beta_2 W_t + e_t, \quad (2)$$

where  $a$  and  $e_t$  represent the intercept and the error term, respectively and  $W$  designates the instruments for the public's preferred level of policy ( $P^*$ ). The most critical part of equation 2 is  $\beta_1$ . If the public responds thermostatically to policy,  $\beta_1$  will be negative.

We already know that the thermostatic model works well in certain spending domains in the US (Wlezien 1995, 1996), the UK (Soroka and Wlezien 2005), and Canada (Soroka and Wlezien 2004).<sup>5</sup> (For a general assessment across the three countries, see Soroka and Wlezien 2010.) That is, the public adjusts its preferences in response to spending, other things being equal: when spending increases, relative preferences decrease; when spending decreases, relative preferences increase. The thermostat does not work in all policy domains, however (Soroka and Wlezien 2010). To begin with, the public salience of the policy domain matters – the

public pays more attention to policymaking in domains it considers to be important. The effect of policy on preferences depends on the salience ( $S$ ) of different policy domains  $j$ ; formally, it equals  $\beta_1$  times  $S_j$ . In some very low salience domains, there may be no public responsiveness to policy.

### *The Policy Representation Equation*

Now if there is representation, policy change ( $\Delta P_t$ ) will be a function of relative preferences for policy ( $R_{t-1}$ ), which reflect support for policy change. Other things also matter for policy, of course, including the partisan control of government ( $G_{t-1}$ ). Note that both  $R$  and  $G$  are lagged so as to reflect preferences and party control when budgetary policy, the focus of our empirical analysis, is made.<sup>6</sup> For any particular domain, then, the equation is:

$$\Delta P_t = \rho + \gamma_1 R_{t-1} + \gamma_2 G_{t-1} + \mu_t, \quad (3)$$

where  $\rho$  and  $\mu_t$  represent the intercept and the error term, respectively. This equation captures both indirect and direct representation. The former – representation through election results and subsequent government partisanship – is captured by  $\gamma_2$ , and the latter – adjustments to policy reflecting shifts in preferences – is captured by  $\gamma_1$ . Other variables can be added to the model, of course.<sup>7</sup>

The coefficient  $\gamma_1$  is most critical for our purposes. It captures policy responsiveness, the kind of dynamic representation that we expect to differing degrees across policy domains. A positive coefficient need not mean that politicians literally respond to changing public preferences, of course, as it may be that they and the public both respond to something else, e.g. changes in the need for more spending. All we can say for sure is that  $\gamma_1$  captures policy responsiveness in a statistical sense – the extent to which policy change is systematically related to public preferences, other things being equal. This is of (obvious) importance, as we want to know whether public policy follows public preferences.

As public responsiveness varies across domains, so may policy representation. Indeed, there is reason to expect the two relations to be symmetrical – in domains where the public responds to policy, policymakers are more likely to reflect public preferences. There are two reasons. First, public responsiveness is more likely in publicly salient domains, where policymakers have a stronger incentive to represent preferences. Second, where the public responds to policy, expressed preferences actually contain meaningful information. Thus, we expect that the coefficient of direct policy representation ( $\gamma_1$ ) in equation 3 varies across domains  $j$  with the coefficient of public responsiveness ( $\beta_1$ ) in equation 1. (For more details, see Soroka and Wlezien 2010).

## **Political Institutions and Opinion–Policy Dynamics**

There also is reason to think that representation and feedback differ across countries. Indeed, as noted earlier, there is some evidence to suggest that they do, partly due to differences in political institutions. Recent research has examined the influence of government institutions. Electoral systems also may matter.

### *Government Institutions*

We have suggested in previous work that the division of powers – both vertical and horizontal – structures the relationships between opinion and policy over time. First, the vertical division of powers, or decentralisation, makes it more difficult for the public to gauge and react to government policy change, and thus dampens public responsiveness. Second, the horizontal division of powers, as in ‘Madisonian’ presidential systems, makes governments more responsive to changes in public opinion. Let us briefly trace the reasoning.

*The vertical division of powers.* Thermostatic public responsiveness requires that people acquire accurate information about what policy-makers are doing. This clearly depends on the supply of information, as we have discussed. It also depends on the clarity of that information. More precisely, it depends on the extent to which responsibility for policies is clear, and this is in part a function of how government itself is organised. Federalism, the vertical division of powers, increases the number of different governments making policy and thus makes less clear what any particular level of ‘government’ is doing (see e.g. Downs 1999). Put differently, the government policy signal may be confused – i.e. there may be different signals from multiple sources. This can dampen public responsiveness.

Different federal arrangements may have different effects on public responsiveness, of course, and there are two ideal types worth considering briefly here. Where governments have complete control for different domains – what is in the American context referred to as dual federalism – there is no mistaking the source of policy in each policy area. Multiple governments may still produce complications, but we might expect a comparatively high level of responsiveness on the part of the public in politically important domains, regardless of which level of government is in charge. Even so, the existence of multiple governments may make for a more complicated information environment, and public responsiveness may suffer.

In most federal systems, governments actually share responsibilities in a number of policy areas. There may be direct involvement in a policy domain by multiple levels; there may also be transfers – ‘conditional’ or

‘unconditional’ – from one level of government to the other. In either case, the actions of governments are more difficult to discern. The point is not that federalism destroys the potential for representative democracy but that it presents challenges. The most fundamental challenge is the ‘confusion’ it creates.

We expect that a high level of federalism makes it harder for citizens to assign responsibility for policy, to know what any one level of government is doing. This makes it more difficult for citizens to express informed preferences about what different levels of government should do.<sup>8</sup>

*The horizontal division of powers.* The horizontal division of powers also may structure the relationship between opinion and policy over time. The concentration of powers in parliamentary systems – as opposed to presidential systems – affords voters more direct control over government on Election Day. This may aid indirect representation: To the extent election outcomes reflect public opinion, policy representation will follow quite naturally, at least to the extent we have responsible parties.

The same seemingly is not true about direct representation, however. Indeed, there is reason to suppose that parliamentary governments are less reliable in their attendance to public opinion in between elections. Scholars have long noted the dominance of cabinets over parliaments (see e.g. the classic statements by Bagehot 1867 and Jennings 1959; also see Cox 1987; Laver and Shepsle 1996; Tsebelis 2002). These scholars portray a world in which cabinet governments exercise substantial discretion, where the cabinet is the proposer – it puts legislation to the Commons – and the legislature ultimately has only a limited check on what the government does. Strom (2003) concludes that parliamentary government deals much better with ‘adverse selection’ than it does ‘moral hazard’. Once established, the cabinet is difficult to control on a recurring basis.

This has fairly direct implications for government responsiveness. When there are differences between what the cabinet and parliament want, the latter cannot as effectively impose its own contrary will. The process of amendment and veto is compromised, at least by comparison with Madisonian presidential systems. In the latter the executive cannot effectively act without the legislature, at least with respect to statute. The legislature is the proposer – it puts statute to the executive – and, while the executive can veto legislation, the legislature can override it. Most changes in policy require agreement between the executive and legislature, or else a supermajority in the latter. This is likely to reduce disjunctures between public opinion and policy change, even when the executive attempts to represent changing public opinion. In effect, Madisonian systems allow for ‘error correction’ during the policymaking process. There already is some support for this supposition from the United States, where Congress has been shown to alter presidential proposals to better reflect changing public opinion (Wlezien 1996).

Although the separation of powers makes presidential systems more deliberate in their actions, it may also make them more reliably responsive to public opinion over time. Research comparing the US, UK and Canada bears out these expectations, as policy is more responsive to changing public opinion in the former (Soroka and Wlezien 2004, 2005, 2010; Wlezien, 2004). Hobolt and Klemmensen's (2008) different examination further shows that policy representation in Denmark is comparable to that in the UK and lower than in the US. The combined evidence is thus far supportive but clearly limited, as it concerns but four countries. It also does not consider differences in the executive–legislative balance of power within presidential and parliamentary systems. Presidents are advantaged in some presidential systems, after all, and here we would expect opinion to be a less significant predictor of policy change. Likewise, the executive has less discretion in some parliamentary systems, and there we would expect a more reliable connection between public preferences and policy change. These possibilities can be settled empirically.

### *Electoral Institutions*

Electoral systems are the emphasis of most of the broader literature on representation. Most of this research focuses on differences between the majoritarian and proportional visions, using Powell's (2000) language, and how these differences matter. Lijphart (1984) provides the first direct statement on the matter. He distinguishes between 'consensual' democracies – characterised by, most notably, proportional representation, multi-party systems and coalition governments – and 'majoritarian' systems – characterised by simple plurality election rules, a two-party system and single-party government (exactly as Duverger (1951) would predict). Most importantly, Lijphart suggests that consensual democracies provide better descriptive representation and general policy congruence than do majoritarian systems.

Powell (2000) provides further empirical support, focusing specifically on the differences between majoritarian and proportional election rules and their implications for representation. Powell finds that proportional representation tends to produce greater congruence between the government and the public; specifically, that the general ideological disposition of government and the ideological bent of the electorate tend to match up better in proportional systems. According to Powell, this reflects the greater, direct participation of constituencies the vision affords (also see Miller *et al.* 1999).

Recent research challenges Powell's findings. Blais and Bodet (2006) argue that, while proportional systems do encourage coalition governments, thus pulling the government more to the centre, they also encourage a greater number and diversity of parties in the first place, which promotes representation of more extreme positions. Their analysis reveals little

difference in the congruence between citizens and governments in proportional and majoritarian systems. Golder and Stramski (2010) show much the same.<sup>9</sup> Powell's (2011) own very recent analysis, which encompasses a broader period than his original work, also demonstrates little difference between electoral systems.<sup>10</sup>

Even accepting Powell's original (2000) results, they pertain to elections and their immediate consequences. What about in the periods between elections? Are coalition governments more responsive to ongoing changes in opinion? Although proportional systems may provide more indirect representation, it is not clear that they afford greater direct representation. In our previous work (Soroka and Wlezien 2004, 2005, 2010), we have argued that there is reason to think that governments in majoritarian systems are more responsive to opinion change.<sup>11</sup> First, it is presumably easier for a single party to respond to changes than a multi-party coalition, as coordination in the latter is more difficult and costly. This partly reflects the increased transaction costs but also the constraints posed by coalition agreements. Second, majoritarian governments may have more of an incentive to respond to opinion change. Since a shift in electoral sentiment has bigger consequences on Election Day in majoritarian systems, governments in these are likely to pay especially close attention to the ebb and flow of opinion.<sup>12</sup>

Thus, it may be that the two systems both work to serve representation, but in different ways, where proportional systems provide better indirect representation via elections and majoritarian systems better direct representation in between elections. In this paper, we are especially interested in the latter. Unfortunately, there is little empirical work on the subject. Only Hobolt and Klemmensen's (2005, 2008) research directly addresses the issue, and their findings are inconclusive. They show that government rhetoric in one proportional system (Denmark) is more responsive than in one majoritarian system (the UK) but not in another (the US). Perhaps most importantly, actual policy is more responsive in the US than the two other countries, as noted above. As for analysis of government institution effects, it is hard to tell what these results could tell us given the focus on only three countries.<sup>13</sup>

### **Data and Methodology**

Here we test our three conjectures relating to political institutions. The measure of relative public preferences – the variable *R* in the equations above – is critical. For this, we rely on the International Social Survey Program 'Role of Government I–IV cumulative file', combining results from the four years in which the survey has included a battery of questions on government policies, namely, 1985, 1990, 1996 and 2006.<sup>14</sup> The surveys include questions about spending in a number of different policy domains. While we intend to address these in subsequent work, we focus here on a

single measure of relative preferences (*R*) – namely, a question about government spending in general: ‘Here are some things the government might do for the economy. Please show which actions you are in favour of and which you are against: Cuts in government spending (strongly in favour, in favour, neither in favour nor against, against, strong against).’<sup>15</sup>

We produce a net support for spending measure by taking the (weighted) average of responses, where responses are scored strongly in favour (–100), in favour (–50), neither in favour nor against (0), against (+50), strongly against (+100). The measure ranges in theory from –100, meaning that all respondents strongly favour spending cuts, to +100, meaning that all respondents oppose spending cuts. Of course, the actual results do not have quite this range; indeed, the net support measure tends to be negative, meaning that on average respondents are more likely to agree to cuts than to oppose them. This allows measures in 17 countries over the period. The data are listed by country and year in Appendix Table A1.

From the ISSP datasets we also draw a measure to tap the public’s underlying preferred levels of policy (*P\**) in the public responsiveness equations. The measure is based on the question,

On the whole, do you think it should be or should not be the government’s responsibility to: (1) Keep prices under control, (2) Provide health care for the sick, (3) Provide a decent standard of living for the old, (4) Provide a job for everyone who wants one, (5) Provide industry with the help it needs to grow, (6) Provide a decent standard of living for the unemployed, (7) Reduce income differences between the rich and poor, (8) Give financial help to university students from low-income families, (9) Provide decent housing for those who can’t afford it, (10) Impose strict laws to make industry do less damage to the environment.

Each item is scored as follows: definitely should not be (0), probably should not be (34), probably should be (67), definitely should be (100); country-level scores take the (weighted) average of this measure, ranging in theory from 0, meaning no support for government action, to +100, meaning clear support for government action in all cases. Support for Government Action scores are listed by country and year in Appendix Table A2.

All opinion data are adjusted to account for the fact that the ISSP is not fielded at exactly the same time in all countries. For waves 1–3, one or two countries fielded the survey one year late; for wave 4, field dates range from 2005 to 2008. We make the appropriate adjustments, so that opinion data are used here in the year in which they were actually measured (and so that they are both driving and reacting to policy at the appropriate times).

To measure government spending, we rely mainly on OECDStat ‘Table 11. Government expenditure by function’. The table lacks data for Australia, so we add those from the Australian Bureau of Statistics, ‘5204.0

Australian System of National Accounts, Table 35. Government Final Consumption Expenditure, by Level of government and purpose'. All data were initially recorded in national currency units (NCUs) at current prices. We convert them to constant NCUs using inflation (average consumer prices, 2000 = 100) available from the International Monetary Fund's (IMF) World Economic Outlook Database (2010; <http://www.imf.org/external/data.htm>).

Spending data present a particular difficulty in these time-series cross-sectional models, since NCUs differ considerably both in level and in variance.<sup>16</sup> For models of policy representation, we deal with the problem by using a percentage change measure of spending. For models of public responsiveness, where we need levels rather than changes in spending, we rely on spending as a proportion of GDP. GDP also is drawn from the IMF World Economic Outlook Database.

Measures of institutional variation are from a variety of sources. For the proportionality of the electoral system, we use the effective number of electoral parties (ENPP) for national elections from 1985 to 2000, drawn directly from Golder (2010).<sup>17</sup> To capture the executive–legislative balance, we use Lijphart's (1999) measure of executive dominance, which is available for 14 of the 17 countries. For federalism, we use Rodden's (2002, 2004) measure of own-source state–local revenue as a proportion of total government revenue. Although our theory is a general one, we employ a fiscal-specific measure because our empirical analyses focus on fiscal policy and preferences. The measure is based on revenues because they reflect the decentralisation of fiscal policymaking authority more clearly than spending.<sup>18</sup> Values for all institutional variables are listed by country in Appendix Table A3.

While the institutional variables are constant by country, the other variables used in the analysis vary across both space and time. Much of the variance still is cross-national. This is clear in Table 1, which summarises a space–time analysis of variance for each variable. Note that we include all the variables discussed above, as well as unemployment, which appears below in models of public responsiveness. The numbers in the table are the percentages of variance explained by year and country dummy variables.

TABLE 1  
THE VARIABLES: AN ANALYSIS OF VARIANCE ACROSS SPACE AND OVER TIME

	Year	Country	<i>N</i>
Net preferences	12.33*	72.05*	46
Support for government action	0.01	76.74*	46
Unemployment	21.42*	59.83*	44
% government spending/GDP	1.80	77.28*	42
%Δ total government spending	50.88*	11.02	42

\* $p < 0.05$ . Cells contain the proportion of the total variance explained by year and country, based on ANOVAs including the two variables. Spending and unemployment results include cases for which preferences data are available only.

The results indicate that most of the variance we observe in the ‘level’ variables is cross-national, approximately 70 per cent on average. It does differ somewhat, however, being most pronounced for the spending measure and less so for unemployment. Importantly, our measure of relative preferences (though not our instrument for the public’s preferred level of spending) also shows significant temporal variation. The differenced measure of spending does too – see the last row of Table 1. This allows us to assess dynamics, at least to some degree. We want to see whether the thermostatic model works in this broader set of countries and whether and how political institutions matter.

### **The Analysis of Public Responsiveness**

Recall that we are interested in seeing whether the thermostatic model applies generally and whether and to what extent the public’s response to spending is a function of the vertical division of powers. This can be assessed directly, by extending equation 2 from above across countries  $k$  as follows:

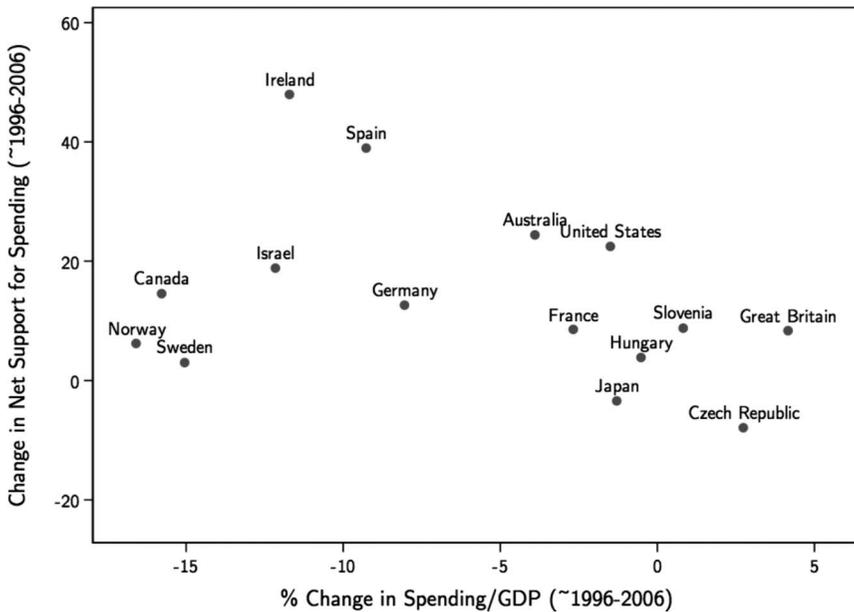
$$R_{kt} = a_k + \beta_1 P_{kt} + \beta_2 D_{kt} + \beta_3 D_{kt} * P_{kt} + \beta_4 W_{kt} + e_{kt}, \quad (4)$$

where  $D$  is the level of fiscal federalism. We are especially interested in the coefficients  $\beta_1$  and  $\beta_3$ , which capture the direct and interactive effects of policy ( $P$ ). If there is thermostatic responsiveness and federalism dampens it,  $\beta_1$  would be less than 0 and  $\beta_3$  would be greater than 0. This would tell us that policy feeds back negatively on preferences but that the tendency declines as the decentralisation of policymaking authority increases. That is, we would find that the public is more responsive in the UK and Ireland, on the one hand, than in Canada and the US, on the other.

Figure 1 displays the simple bivariate relationship between policy change and opinion change in the 15 countries for which we have data between 1996 and 2006. Here we can see a weak negative relationship between the two. In general, when spending goes up (down), preferences for more spending go down (up) – the Pearson’s  $r$  is  $-0.35$  ( $p=0.20$ ). To the extent there is thermostatic public responsiveness to policy over the decade, it is coarse and unreliable. To provide a more rigorous estimate over the four waves of the ISSP, we estimate pooled models of spending preferences for all 17 countries and four years – the distribution of the variable is shown in Appendix Table A1. Because some of our independent variables are a constant in each country, we estimate a random effects model using maximum likelihood.<sup>19</sup> Table 2 presents the results of different models.

The first column in the table summarises the results of estimating a basic model of spending preferences including just the spending measure. Consistent with what we saw in Figure 1, spending has a negative effect on preferences. The effect does meet minimal levels of statistical significance, though it is not highly reliable. It also accounts for little (6 per cent) of the

FIGURE 1  
CHANGE IN GOVERNMENT SPENDING AND CHANGES IN NET PREFERENCES  
(~ 1996–2006)



variance in preferences, even less across countries.<sup>20</sup> Of course, we have yet to incorporate our proxy variables for the public's preferred levels of spending. The main variable is the index of public attitudes toward the role of government (Support for Government Action) described above. Other variables may matter, and one likely suspect is the economy. Durr (1993) showed that support for policy is positively related to economic conditions: when the economy improves, people become more liberal; when things worsen, people become more conservative (see also Soroka and Wlezien 2010). To measure conditions, we rely on unemployment, which is available in all of our countries.<sup>21</sup> We expect it to be negatively related to spending preferences, that is, when unemployment worsens (improves), support for more spending decreases (increases).<sup>22</sup> Of course, it may be that the public responds counter-cyclically to economic conditions. To the extent this is true, preferences will be positively related to unemployment. The empirical analyses will reveal which, if either, is true.

The results of estimating a model including the two proxies for  $P^*$  are reported in the second column of Table 2. Here we see that both variables impact on preferences in expected ways. Support for Government Action positively influences support for spending while the level of unemployment negatively influences it, and both effects are statistically significant. When these variables are included, moreover, spending continues to have a

TABLE 2  
PUBLIC RESPONSIVENESS, USING TOTAL GOVERNMENT SPENDING/GDP

	DV: Net preferences <sub>kt</sub>		
% government spending/GDP <sub>kt</sub>	−0.878*	−0.754**	−0.707**
	(0.450)	(0.379)	(0.258)
<i>P* Instruments</i>			
Support for government action <sub>kt</sub>	−	0.552**	0.597**
		(0.225)	(0.202)
Unemployment <sub>kt</sub>	−	−3.011**	−1.755
		(0.574)	(1.349)
Net preferences <sub>kt−l</sub>	−	−	0.766**
			(0.117)
Constant	−7.506	−17.118	8.270
	(20.114)	(18.504)	(11.808)
sigma u	16.734**	18.184**	0.000
	(3.784)	(3.448)	(5.836)
sigma e	11.722**	7.229**	11.749**
	(1.859)	(1.133)	(1.570)
N	38	38	28
N (panels)	17	17	17
LR Chi2	4.022	23.936	33.809
rho	0.671	0.864	0.000

\**p* < 0.10; \*\**p* < 0.05. Cells contain MLE coefficients with standard errors in parentheses.

significant negative effect. Of course, the two variables only imperfectly tap differences in the public’s preferred levels of spending across countries and time. Taking into account lagged preferences allows us to better capture the influence of other omitted variables. As can be seen in the third column of Table 2, doing so alters the coefficients in isolated ways. (It also substantially reduces the number of observations.) Specifically, the effect of unemployment is smaller and unreliable. The size and significance of the other coefficients are largely unchanged.

Now, we have explicit hypotheses about differences across countries. We expect that public responsiveness to policy change varies with the level of fiscal federalism. The greater (lesser) the decentralisation of policymaking authority, the lesser (greater) the responsiveness. This is easy to test following equation 4. Recall that our measure of federalism is the ratio of state and local revenue to total government revenue from Rodden (2002, 2004). To test the effects of federalism on public responsiveness, we include this measure as well as its interaction with spending in our model.<sup>23</sup> Table 3 summarises the results. The first column shows the model without lagged preferences. Here we see that the spending still has a negative direct impact on preferences, but it is much larger and more reliable. We also see that it has an interactive effect with federalism. This effect is positive. In other words, as federalism increases, the thermostatic influence of spending declines. This is exactly as we hypothesised. The effects do not change when lagged preferences are included in the model – see the second column of Table 3.

The influence of fiscal federalism on public responsiveness is in fact quite pronounced. This is clear in Table 4, which shows how public responsiveness varies across different levels of federalism – for this illustration, we show results for countries at the 25th, 50th and 75th percentiles. In highly unitary countries, estimated responsiveness is three times what we found (in Table 2) when not taking federalism into account. In modestly federalised countries, responsiveness is twice what we saw previously. Perhaps most notably, in highly federalised countries we expect no responsiveness whatsoever. The vertical division of powers really matters for thermostatic public responsiveness.<sup>24</sup>

TABLE 3  
PUBLIC RESPONSIVENESS, MODERATED BY FEDERALISM

	DV: Net preferences <sub>kt</sub>	
% government spending/GDP <sub>kt</sub>	-3.169** (1.152)	-2.298** (0.979)
Federalism <sub>k</sub>	-3.920** (1.840)	-2.357 (1.485)
Spending <sub>kt</sub> * Federalism <sub>k</sub>	0.094** (0.040)	0.060* (0.033)
<i>P* Instruments</i>		
Support for government action <sub>kt</sub>	0.635* (0.385)	0.617** (0.308)
Unemployment <sub>kt</sub>	-2.991** (0.894)	-0.506 (1.751)
Net preferences <sub>kt-1</sub>	-	0.644** (0.141)
Constant	88.622 (61.346)	62.541 (46.210)
sigma u	12.814** (3.813)	0.000 (6.139)
sigma e	11.976	11.517** (1.698)
N	31	23
N (panels)	13	13
LR Chi2	22.875	29.812
rho	0.534	0.000

\* $p < 0.10$ ; \*\* $p < 0.05$ . Cells contain MLE coefficients with standard errors in parentheses. Federalism is a revenue-based measure (rescaled from 0 to 100) from Rodden (2004).

TABLE 4  
IMPLIED FEEDBACK COEFFICIENTS, BY LEVEL OF FEDERALISM

	Implied feedback coefficient
Federalism	
Low	-2.327**
Medium	-1.952**
High	-0.173

\*\* $p < 0.05$ . Levels of federalism correspond to the 25th, 50th and 75th percentiles in the data, i.e. 9, 13 and 32. Based on results in column 1 of Table 4.

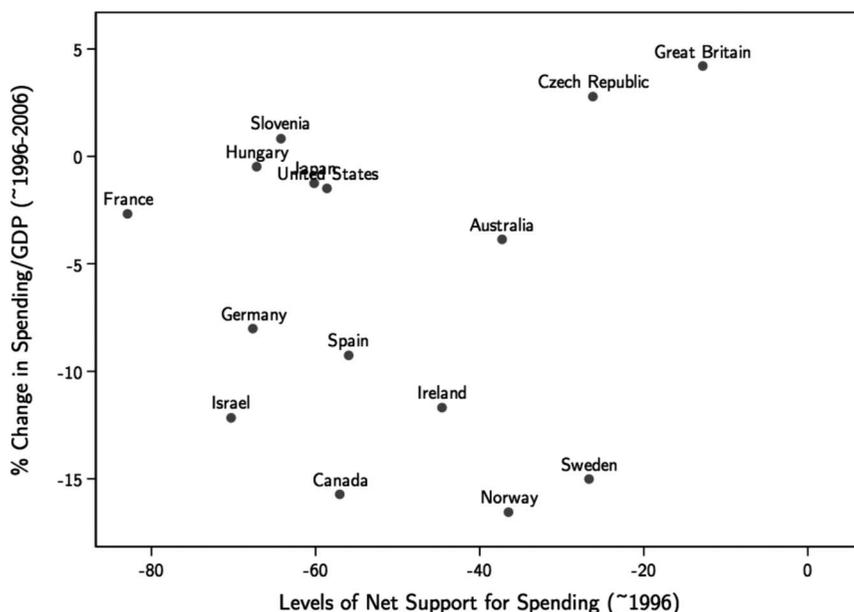
### The Analysis of Policy Representation

We also are interested in assessing policy representation and whether and how it is regulated by political institutions. As we have noted, one hypothesis is that the horizontal division of powers increases representation. The other is that the proportionality of electoral systems weakens representation. Whether one or the other is true needs to be settled empirically. The form of our tests follows our assessment of the effects of federalism on public responsiveness. Specifically, we incorporate the additive and interactive effects of institutions into our representation equation (3). In the case of the proportionality hypothesis, we would estimate the following model:

$$\Delta P_{kt} = \rho_k + \gamma_1 R_{kt-1} + \gamma_2 E_{kt-1} + \gamma_3 E * R_{kt-1} + \gamma_4 G_{kt-1} + \mu_{kt}, \quad (5)$$

where  $E$  taps the electoral system’s proportionality. If there is representation and it varies negatively with proportionality, then  $\gamma_1$  will be greater than 0 and  $\gamma_3$  will be less than 0. This would tell us that preferences positively influence policy, but that the relationship declines as proportionality increases. That is, we would find that governments are more representative

FIGURE 2  
LEVELS OF NET PREFERENCES (~1996) AND CHANGE IN GOVERNMENT SPENDING (~1996–2006)



in the US and UK than in France. Of course, it may be that proportional systems are more responsive to opinion change, as some might infer from Powell (2000) and Lijphart (1999).<sup>25</sup> If so, then both  $\gamma_1$  and  $\gamma_3$  will be greater than 0 – the sum of  $\gamma_1$  and  $\gamma_3 * E$  will increase as  $E$  increases. We can settle the issue empirically.

To begin with, Figure 2 plots the bivariate relationship between public preferences in 1996 and the change in spending between 1996 and 2006. There is no clear pattern here – the Pearson's  $r$  is just 0.04 ( $p = 0.87$ ). If there is representation of preferences, it is barely in evidence here. That said, the figure illustrates changes in spending over a 10-year period, while our estimation focuses on much more fine-grained (annual) effects. We turn to those estimations now.

Table 5 shows results from our basic model of policy representation.<sup>26</sup> The first column shows results from regressing the annual change in spending in year  $t$  on net preferences in year  $t - 1$ . Here there is evidence of policy representation – the coefficient (0.074) is positive and easily exceeds conventional levels of statistical significance. It is necessary to include other controls, of course. For this analysis, we do not include a measure of government partisanship of government ( $G$ ) – thus, the models in Table 5 cannot capture whether representation really is direct or indirect, mediated by the partisan composition of government. The reason is that comparable measures of government partisanship are not available for all countries and time points encompassed by our analysis. For instance, the Armingeon *et al.* (2010) data set does not include Israel or figures for Australia and the United States before 1990. That said, preliminary tests using this measure show no impact of percentage of left seats in the cabinet – see Appendix

TABLE 5  
POLICY REPRESENTATION

	DV: % $\Delta$ Total government spending <sub>kt</sub>		
Net preferences <sub>kt-1</sub>	0.074** (0.024)	0.060** (0.026)	0.043* (0.024)
% $\Delta$ GDP (deflated NCUs) <sub>kt-1</sub>	–	0.291 (0.244)	0.506** (0.230)
% $\Delta$ Debt (deflated NCUs) <sub>kt-1</sub>	–	–	–0.075 (0.059)
Constant	5.278** (1.220)	3.686** (1.742)	2.404 (1.565)
sigma u	1.725** (0.582)	1.198 (0.782)	–
sigma e	2.195** (0.347)	2.331** (0.403)	2.624** (0.323)
$N$	36	35	33
$N$ (panels)	16	16	16
LR Chi2	8.428	12.068	12.391
rho	0.382	0.209	0.000

\* $p < 0.10$ ; \*\* $p < 0.05$ . Cells contain MLE coefficients with standard errors in parentheses.

Table A4. This may be because government partisanship does not matter, or, more likely, because the impact is difficult to capture across a wide range of countries with very different party systems, pooled together in a dataset with a very limited number of observations over time.<sup>27</sup> Because the government partisanship variable is insignificant, we opt to drop partisanship from the analysis, allowing us to retain more cases.

We do however add other important control variables. In the second and third columns of Table 5, we incorporate indicators of fiscal capacity – the percentage change in GDP, and the percentage change in debt, both measured in the previous year. Our expectation is that an expanding economy will tend to increase spending and that growing public debt will tend to decrease it.<sup>28</sup> The coefficients for the variables are in the expected direction here, though only GDP is significant in the final model. That debt is not significant says something about how little governments have been constrained by it over the years, and also may challenge interpretations of the impact of the current global fiscal crisis.

The institutional variables are added in Table 6. The first column includes executive–legislative balance, using Lijphart’s (1999) measure of Executive

TABLE 6  
POLICY REPRESENTATION, MODERATED BY PROPORTIONALITY AND  
PRESIDENTIALISM

	DV: % $\Delta$ Total government spending <sub>kt</sub>		
Net preferences <sub>kt-1</sub>	0.053 (0.103)	0.136* (0.072)	0.504** (0.166)
Executive dominance <sub>kt</sub>	-1.318* (0.740)	-	-2.913** (0.869)
Prefs <sub>kt</sub> * Executive dominance <sub>kt</sub>	-0.022 (0.015)	-	-0.043** (0.015)
ENPP <sub>kt</sub>	-	-0.471 (1.573)	-5.248** (2.023)
Prefs <sub>kt</sub> * ENPP <sub>kt</sub>	-	-0.005 (0.034)	-0.099** (0.043)
% $\Delta$ GDP(deflated NCU <sub>s</sub> ) <sub>kt-1</sub>	0.565** (0.251)	0.515** (0.234)	0.555** (0.210)
% $\Delta$ Debt(deflated NCU <sub>s</sub> ) <sub>kt-1</sub>	-0.078 (0.058)	-0.064 (0.058)	-0.044 (0.052)
Constant	3.486 (4.524)	7.893** (3.743)	28.747** (8.560)
sigma u	0.000 (0.000)	0.000 (0.000)	0.000 (0.790)
sigma e	2.610** (0.321)	2.292** (0.306)	2.021** (0.270)
N	33	28	28
N (panels)	16	13	13
LR Chi2	12.728	17.265	24.332
rho	0.000	0.000	0.000

\* $p < 0.10$ ; \*\* $p < 0.05$ . Cells contain MLE coefficients with standard errors in parentheses. ENPP is the effective number of parliamentary parties from Golder (2010), and Executive dominance is from Lijphart (1999).

Dominance. Recall that we estimate both its direct impact and its interactive effect with preferences, but that the latter is of special interest to us. In the table we can see that the preferences coefficient remains positive and significant and the interactive coefficient is negative, implying that representation decreases as executive power increases. The effect of executive balance on representation is not quite statistically significant ( $p = 0.07$ ), so we stop short of crediting the relationship.

In the second column of the table, we see a similar set of results for proportionality, using Golder's ENPP measure. The coefficient is negative, suggesting that representation decreases with proportionality, though the effect is not significant.<sup>29</sup> Although proportional systems do not reliably dampen the representation of public preferences over time, it is fairly clear that they do not enhance the representation connection.

The third column of Table 6 shows the effects of incorporating both institutional variables in the same model.<sup>30</sup> Here we see much more definitive evidence, as the additive effect of preferences remains positive and significant and both the interactive coefficients are negative and significant ( $p < 0.05$ ). The results imply that there is policy representation but that high levels of executive power and electoral system proportionality decrease it.<sup>31</sup> It is not clear from these results just how much institutions matter, however. To get some sense of this, we simulate the effects of the two variables. To do so, it is necessary to model the joint effects of the variables, as every system is a combination of the two.

Table 7 shows the implied representation coefficients at different institutional combinations. The results are for countries at the 25th, 50th and 75th percentiles of the data, using coefficients from model 3 in Table 6. From our estimates, representation clearly decreases sharply as the proportionality (ENPP) of the system increases. Indeed, going from low to high levels of proportionality, the effect of representation completely disappears regardless of the level of executive dominance. Executive dominance has a slightly less pronounced effect. Consider that countries with high levels of executive power still are expected to be significantly responsive to public preferences in low proportionality systems. This is not true as proportionality increases, however.

The estimates in Table 7 help us characterise dynamic representation in different types of systems. It is expected to be strongest in Madisonian presidential systems that use plurality elections, as in the US. By contrast, representation is expected to be weakest in systems where the executive is dominant and electoral systems are highly proportional. That said, none of the countries in our data set have both of these characteristics – i.e. the lower right-hand quadrant of the Table 7 is empty. A number do have highly proportional systems and weak executives, namely, Israel and Italy, and these are expected to be largely unresponsive to changing public preferences. By contrast, in countries with low proportionality and dominant executives, such as the United Kingdom, we still expect some

TABLE 7  
IMPLIED REPRESENTATION COEFFICIENTS, BY EXECUTIVE DOMINANCE  
AND ENPP

	Executive dominance		
	Low	Medium	High
ENPP			
Low	0.142**	0.110**	0.045**
Medium	0.083**	0.050	–0.014
High	0.025	–0.008	–0.072

\* $p < 0.10$ ; \*\* $p < 0.05$ . Levels of institutional variables correspond to the 25th, 50th and 75th percentiles in the data; for ENPP, 2.74, 3.34, 3.93; for Executive dominance, 2.09, 2.86, 4.36. Based on results in column 3 of Table 6.

policy representation. That is, both types of institutions influence representation but electoral systems appear to matter more.

### Discussion and Conclusions

This is the first time that the thermostatic model has been tested across such a wide range of countries. That the model works, then, is an important finding all on its own. Publics can and do react to policy change, and governments can and do respond to changing public preferences.

The strength of both public responsiveness and policy representation is conditioned, however, by political institutions. We have previously provided evidence that federalism constrains public responsiveness and that executive–legislative balance enhances policy representation. Both effects are in evidence here as well. We thus see this work in part as a further testing and confirmation of hypotheses we have developed elsewhere. And we also examine hypotheses that have been posited in previous research but not subjected to empirical scrutiny, specifically about the effects of electoral systems on dynamic representation. Our results indicate that governments in proportional systems are less responsive to changing public opinion. Indeed, we see this work as the start of a larger research agenda focused on the ways in which a wide range of institutions can condition opinion–policy relationships.

There clearly is more to do. First, we need to extend our models from overall levels of spending to government activity in specific policy domains for which data are available in the ISSP. Second, we can consider additional institutional measures. Each of the institutions we explore here can be measured in different ways and, while we have already tested several versions of each, there are more to consider. There are other political institutions to consider as well, including party systems themselves. Finally, we can explore the effects of government institutions, which are far more complex than we have shown here. Take federalism; although the decentralisation of policymaking authority dampens the clarity of policy

responsibility, at some point it may prove to be beneficial – that is, where the public only needs to monitor what the local (rather than national) governments are doing. Likewise, while executive dominance and proportionality may reduce the direct representation of public preferences, they may improve indirect representation through elections. The value of these systems ultimately seems to depend on the net effect of direct and indirect representation. These and the other issues discussed above remain subjects for future research.

In the meantime we have additional support for the thermostatic model and the conditioning effects of vertical and horizontal divisions of power and new evidence of the effects of electoral systems. These institutions impact on dynamic representation. The effect of executive power and proportionality is direct, as it makes governments less responsive to public preferences. The former – federalism – is indirect, through preferences. As federalism dampens thermostatic public responsiveness of the public to policy, it compromises representation as well. That is, because they are less informed by policy, the public preference inputs into the policymaking process are less meaningful to begin with. Political institutions evidently do matter and in different ways.

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### **Notes**

1. Indeed, we have little sense for the connection between opinion and policy in very low salience domains, i.e. domains in which we do not even gather opinion data (Burstein 2003). A lack of a connection between opinion and policy in non-salient domains would be neither surprising nor a bad thing, since public preferences in these domains surely are less informed.

2. We have in addition developed an argument about the effects of electoral systems (Soroka and Wlezien 2010), which we summarise and test below.
3. Unlike the thermostat that governs the heating (and/or air conditioning) units in our homes, which sends a dichotomous signal,  $R$  is a continuous variable, and captures both direction and magnitude.
4. There are some exceptions such as abortion or desegregation. Consider, e.g. the GSS question on ‘whether or not you think it should be possible for a pregnant woman to obtain a legal abortion’ under six different conditions. These instances are rare, however – very few policy domains lend themselves to questioning about specific levels of policy.
5. There is other evidence of thermostatic public responsiveness as well, including Franklin and Wlezien (1997), Erikson *et al.* (2002), and Jennings (2009).
6. Note that this dovetails with public responsiveness to spending. Public opinion in year  $t$  reacts (negatively) to policy for year  $t$  and policymakers adjust policy (positively) in year  $t + 1$  based on current (year  $t$ ) opinion. Now, if studying policy that, unlike budgetary policy, is not lagged, then policy change could represent year  $t$  public opinion, which in turn responds to lagged (year  $t - 1$ ) policy. That is, the model can be adjusted to reflect the reality of the policy process.
7. Note that different economic variables, including unemployment, inflation and business expectations, were included in the model though to little effect.
8. For a more extended (and nuanced) discussion, see Wlezien and Soroka (2011).
9. They do, however, show that proportional systems produce more representative legislatures.
10. Powell finds that what mostly matters is the polarisation of the party system.
11. For related work considering dynamic representation in majoritarian (and non-majoritarian) systems, albeit using MIP responses or ideology rather than policy, see Hakhverdian (2010) and Hobolt and Klemmensen (2005, 2008).
12. This generalises Rogowski and Kayser’s (2002) argument relating to the comparatively higher seats–votes elasticities in majoritarian systems.
13. Also note that Hobolt and Klemmensen do not actually assess responsiveness to public preferences for policy and focus instead on public mentions of the ‘most important problem’ facing the country.
14. The file is distributed by GESIS, ZA file #4747/4748.
15. Note that the question used here is about ‘cuts’ rather than ‘spending’ (‘more’, ‘less’, or ‘about the same’), the latter of which is the focus of our own past work. The ISSP asks questions about spending ‘more’ or ‘less’ in various specific policy domains (e.g. health, defence), but the only question capturing overall spending preferences asks about ‘cuts’. Results for the question used here nevertheless move alongside the average across all eight specific-domain ‘spending’ questions.
16. Converting to a constant currency, such as US dollars, presents other difficulties – namely, it means that trends in spending are affected by shifts in exchange rates over time.
17. We use ENPP instead of the effective number of electoral parties (ENEP) because of our conceptual focus on how electoral systems influences parliamentary control. Using ENEP makes little difference, however, as does using (logged) median district magnitude.
18. That is, state and local spending includes funds from the national government that are difficult to disentangle. Note also that there are other alternative measures of federal revenues, including in particular Vatter’s (2009), but the one used here has the practical advantage of being available for more of the countries in our sample.
19. Employing generalised least squares (GLS) techniques makes no substantive difference.
20. This is not surprising given the difficulty of comparing responses to the items across countries, that is, they may not be registering the same things.
21. The measure is from the International Monetary Fund’s (IMF) World Economic Outlook Database (2010). We have described this in the data section, above.
22. Our previous research on preferences for spending has included a linear time trend to account for increases in the underlying preferred levels of spending over time that would

reflect growing economic capacity over time. We do not include such a variable here because our measure of spending takes into account GDP. When included, trend is not a robust predictor and it makes little difference for the estimated effects of the other variables.

23. Note that Rodden's measure is not available for all 17 countries, so these estimations rely on 13 only. The excluded countries are: Czech Republic, Hungary, Japan and Slovenia.
24. There is reason to suppose that it does not matter as much as our analysis implies – i.e. that the results overstate the size of federalism's effect. Consider that they imply little public responsiveness in highly federalised countries, such as the US and Canada, where our previous research of time-serial dynamics has demonstrated a significant amount.
25. Recall that Powell and Lijphart focus on the congruence between the median voter and government position in the wake of elections, not the responsiveness of governments to shocks to preferences in between elections.
26. Note that this model relies on 16 countries – Poland is excluded from models of representation because the field date for the final ISSP survey was late, in 2008, and our spending data end in that year.
27. Consider findings in other work exploring the impact of partisanship with more data, e.g. Blais *et al.* (1996).
28. This would be in line with past work, including, e.g. Blais *et al.* (1996) and Soroka and Wlezien (2004).
29. The same is true when we use the median district magnitude. This again points towards the possibility that more proportional electoral systems decrease rather than increase dynamic representation, but the pattern also is too unreliable to credit.
30. Again, some countries are excluded due to missing data: in addition to Poland (see Note 26), Hungary, Japan and Slovenia.
31. The US is an extreme case on both dimensions, and so it is worth noting that the effects are larger and more reliable when it is excluded from the analysis.

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APPENDIX

TABLE A1  
NET PREFERENCES FOR TOTAL GOVERNMENT SPENDING

	1985	1990	1996	2006
Australia	-48.0	-45.3	-37.3	-12.8
Canada			-56.9	-42.4
Czech Republic			-26.1	-34.1
France			-82.8	-74.4
Germany	-53.0	-51.8	-67.5	-54.9
Great Britain	-1.5	-7.9	-12.8	-4.5
Hungary		-63.3	-67.2	-63.4
Ireland			-44.6	3.4
Israel		-73.0	-70.3	-51.5
Italy	-44.9	-42.2	-43.5	
Japan			-60.2	-63.7
Norway		-40.8	-36.4	-30.2
Poland			-43.8	-68.6
Slovenia			-64.2	-55.5
Spain			-56.0	-17.0
Sweden			-26.6	-23.6
United States	-55.7	-53.6	-58.5	-36.1

Question wording: Here are some things the government might do for the economy. Please show which actions you are in favour of and which you are against: Cuts in government spending ('strongly in favour of' to 'strongly against'). Coded so that positive values reflect support for increases in spending (that is, opposition to cuts).

TABLE A2  
SUPPORT FOR GOVERNMENT ACTION

	1985	1990	1996	2006
Australia	37.1	26.8	32.8	41.7
Canada			31.2	39.2
Czech Republic			45.9	33.9
France			54.0	50.1
Germany	39.8	41.0	42.7	39.3
Great Britain	62.0	55.4	52.2	41.5
Hungary		55.6	51.8	56.2
Ireland		64.4	61.0	61.5
Israel		53.6	57.7	59.1
Italy	66.0	59.2	57.9	
Japan			39.0	28.2
Norway		54.0	54.7	54.6
Poland			58.2	61.2
Slovenia			67.9	63.7
Spain			74.3	67.1
Sweden			50.4	42.6
United States	16.4	23.6	22.5	36.1

Question wording: On the whole, do you think it should be or should not be the government's responsibility to: Keep prices under control, Provide health care for the sick, Provide a decent standard of living for the old, Provide industry with the help it needs to grow, Provide a decent standard of living for the unemployed, Reduce income differences between the rich and poor, Give financial help to university students from low-income families, Provide decent housing for those who can't afford it, Impose strict laws to make industry do less damage to the environment ('definitely should be' to 'definitely should not be'). Coded by taking the average across all questions, where positive values reflect support for increasing levels of government responsibility.

TABLE A3  
INSTITUTIONAL VARIABLES

	ENPP (Golder)	Executive Dominance (Lijphart)	Federalism (Rodden)
Australia	2.42	4.02	33
Canada	2.55	4.17	47
Czech Republic	3.93		
Germany	3.31	5.52	13
Spain	2.75	4.36	17
France	3.34	5.52	12
Great Britain	2.19	5.52	8
Hungary	3.59		
Ireland	3.08	2.49	8
Israel	5.77	1.40	9
Italy	5.87	1.10	5
Japan	3.01	2.98	
Norway	3.93	2.56	22
Poland	5.90	2.09	9
Sweden	3.81	2.73	32
Slovenia	5.56		
United States	1.96	1.00	39

TABLE A4  
POLICY REPRESENTATION, WITH PARTISANSHIP

	DV: % $\Delta$ Total government spending <sub>kt</sub>		
Net preferences <sub>kt-1</sub>	0.076** (0.025)	0.053** (0.024)	0.046* (0.025)
% Left seats in cabinet	-0.003 (0.012)	-0.011 (0.012)	-0.010 (0.012)
% $\Delta$ GDP (deflated NCUs) <sub>kt-1</sub>	-	0.417* (0.226)	0.510** (0.236)
% $\Delta$ Debt (deflated NCUs) <sub>kt-1</sub>	-	-	-0.067 (0.059)
Constant	5.325** (1.324)	3.405** (1.557)	2.819* (1.610)
sigma u	1.730** (.610)	-	-
sigma e	2.216** (0.377)	2.669** (0.334)	2.616** (0.327)
N	32	32	32
N (panels)	15	15	15
LR Chi2	8.162	11.431	12.707
rho	0.379	0.000	0.000

\* $p < 0.10$ ; \*\* $p < 0.05$ . Cells contain MLE coefficients with standard errors in parentheses.