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Legislative Fragmentation and Government Spending in Presidential Democracies: Bringing Ideological Polarization into the Picture

We claim that, in presidential democracies, the effect of increasing fragmentation on government spending should be conditional on polarization, defined as the ideological distance between the government's party and other parties in Congress. We build a model where this result follows from negotiations between the legislature and an independent government seeking the approval of its initiatives—as in presidential democracies. Using cross-country data over time, we test the empirical validity of our claim finding that, in presidential democracies, there is indeed a positive effect of fragmentation only when polarization is sufficiently high. The same is not true for parliamentary democracies.

I need to engage in give-and-take, build consensus, and engage in negotiations without sacrificing principles.

(Indonesian President Susilo Bambang Yudhoyono,
interview aired on CNN, June 15, 2011)

Considerable attention has been given in the literature to the idea that fragmentation affects fiscal discipline (e.g., Bawn and Rosenbluth 2006; De Haan, Sturm, and Beekhuis 1999; Edin and Ohlson 1991; Elgie and McMenamin 2008; Perotti and Kontopoulos 2002; Pettersson-Lidbom 2012; Schaltegger and Feld 2009; Volkerink and de Haan 2001; Weingast, Shepsle, and Johnsen 1981). Fragmentation in this context refers generically to the number of different interests whose demands are reflected in the government's budget. Greater fragmentation is expected to relax fiscal discipline through a standard "common pool of resources" problem. The greater the number of groups benefiting from government expenditure and sharing its costs, the lesser the degree to which any

particular group internalizes the costs of the goods its members receive from the government. As a result, the total amount of spending demanded by participating groups grows with their number. This idea was put forward a long time ago (e.g., Weingast, Shepsle, and Johnsen 1981) and has since been the subject of a large literature.

A good part of that literature has focused on testing empirically whether a specific source of fragmentation, "legislative fragmentation"—the number of legislating parties in a governing coalition—leads to larger public spending or greater deficits.[1] This is also the focus of our article. The first wave of studies on this issue concentrated on samples of countries that have been part of the OECD since its inception, finding a positive effect of fragmentation on government spending (e.g., Bawn and Rosenbluth 2006; Perotti and Kontopoulos 2002; Volkerink and de Haan 2001) or fiscal deficits (Perotti and Kontopoulos 2002; Volkerink and De Haan 2001). While the results mentioned above are consistent with the basic thesis that greater fragmentation implies less fiscal discipline, a second wave of studies covering both OECD and non-OECD countries has found a weaker effect of legislative fragmentation on fiscal balances than that found for the OECD alone (Elgie and McMenamin 2008; Mukherjee 2003; Woo 2003).

We suggest here that the reason why the link between fragmentation and fiscal discipline appears weaker in non-OECD samples of countries than in OECD ones may have to do with the predominant presence of presidential democracies in the former samples and of parliamentary ones in the latter. As Hankla argued recently, "although this is rarely acknowledged in the literature, the theoretical link between party fragmentation and deficit spending implicitly assumes a parliamentary system. In presidential systems, the executive is not drawn from the legislature, and so fragmented assemblies do not translate automatically into fragmented governments. As a result, there are very good reasons to believe that the linear relationship between divided legislatures and budget deficits may not hold for presidential democracies" (2013, 200). In particular, the process of ongoing negotiation that characterizes the relationship between the government and the legislature in a presidential democracy is absent from the aforementioned theoretical argument. Factors influencing that negotiation process may in the end intermediate the relationship between fragmentation and the budget in presidential democracies. In this article, we highlight one such factor: the degree of ideological dispersion between parties that the government negotiates with, termed here "polarization."

Once this dimension is considered, the fragmentation-spending link in presidential democracies should be significant only in the

presence of high enough polarization. The reason is straightforward: In a context where pork barrel is used by an independent government to obtain support for its public policies in the legislature (as is the case predominantly in presidential systems), low polarization around these policy initiatives implies that the government can obtain legislative support paying little attention to the coalition parties' demands for pork. The common-pool problem imposed by these demands is thus minimized. However, if there is high polarization around these policy initiatives, the government party must satisfy at least some of these demands in order to get legislative approval. In this case, the degree of political fragmentation should positively affect the level of public spending.

To test our hypothesis that fragmentation matters only in the presence of high enough polarization, we use information for a panel of presidential democracies for the period 1978–2005. We measure fragmentation based on the number of legislating parties in the governing coalition and polarization based on the ideological distance between them (the details are discussed below). We focus on the effects fragmentation and polarization have on central government spending, as opposed to deficits. As noted by Perotti and Kontopoulos (2002), the theoretical arguments outlined above link fragmentation with government spending; arguments translating the pressure derived from fragmentation into greater deficits are less general. It is worth highlighting that fragmentation and polarization, though likely correlated, are different concepts, as defined above.

Our findings support our hypothesis. We find that the effect of fragmentation on government spending in presidential regimes is increasing in polarization and is significantly different from zero (either in a statistical or economic sense) only when there is a high enough degree of polarization. By contrast, when extending the exercise to a panel of parliamentary democracies, we find that fragmentation has an unconditional (i.e., not intermediated by polarization) positive and significant effect on spending for these countries. Moreover, our argument and evidence are consistent with previous findings showing that the direct effect of fragmentation on government spending holds for parliamentary democracies but not so in samples of presidential ones (Mukherjee 2003).

Other recent analyses have studied how institutional and political differences across types of democracy affect the relationship between fragmentation and fiscal policy (Cheibub 2006; Hallerberg and Marier 2004; Hankla 2013; Wehner 2010). Cheibub (2006) shows that budget discipline varies between presidential and parliamentary democracies and that within presidential democracies stronger presidents keep more

disciplined budgets. Hankla (2013) points out—as we do—that the relationship between fragmentation and fiscal discipline in a presidential democracy should be affected by features of the ongoing process of negotiation between an independent government and the legislature. His focus, though, is on how unified/divided the government is, while ours is on the role of polarization within the context of a unified or a divided government. Wehner (2010) and Hallerberg and Marier (2004) point at the role played by procedural fragmentation and the degree of personalism in the vote, respectively. Our empirical specifications take into account the insights from these different pieces of previous research to help us refine our identification strategy.

The remainder of the article is organized as follows. The first section lays out a simple model of legislative bargaining to illustrate our basic argument. The following section describes the data set and introduces the econometric model. Then, we present our results, first for presidential democracies, and then considering parliamentary ones. The last section presents our conclusions. The online supporting information describes the data set in detail.

Conceptual Framework

We present now a simple model that illustrates the central hypothesis we later test, that is, that the effect of legislative fragmentation on fiscal policy can be intermediated by the degree of political polarization. The result arises, in particular, in a context where an independent government can use pork-barrel spending to build legislative support around policy initiatives for which such legislative approval is necessary—that is, a context consistent with usual practices in presidential democracies.[2]

We follow Nupia (2013) in extending the standard common-pool framework to include a government that bargains with legislators to obtain their support for a public ideological policy in Congress. But because we are also interested in showing that the effect of fragmentation is not independent of the ideological distance between legislative parties, and later taking this idea to the data, our modeling of policy preferences differs from that in Nupia's article in ways that allow us to obtain predictions regarding this distance. These modifications allow us to obtain a previously undocumented prediction regarding how polarization, defined as the ideological distance between legislative parties, might intermediate the effect of fragmentation on pork-barrel spending.

Consider a governing party, G, that wishes to promote a particular public policy in the legislature. G has to obtain the support of n parties in the legislature in order to get its proposed policy approved. Some parties

may only be willing to vote for *G*'s proposal if *G* makes sufficiently large transfers to their constituencies. We will term these transfers "pork-barrel spending." The objective of *G* is to promote its proposed public policy at a minimum pork-barrel cost.

We assume that parties represent constituencies that are policy oriented in their ideological position and that value spending is targeted at them. In particular, each party (and its constituency) has a well-defined position on policy issues, which may differ from those of other parties, and that is known to all other parties and to *G*. Therefore, each party's utility depends on how distant the implemented policy is from its own ideological position. Parties also care about government expenditure targeted at their respective constituencies. A party's voters get benefits from pork-barrel spending targeted at them, but they only have to pay a share $t_i = 1/n$ of the implied tax cost, where *n* is a measure of the number of groups that share the cost of public spending.

Given the government's objective to minimize pork-barrel spending while obtaining *n* votes to get its project approved, spending will be targeted at *n* groups at most. We will refer to the group of *n* parties that the government finds it best to negotiate with as "the coalition." By construction, each party in the coalition is pivotal for the approval of the policy. The total amount of pork-barrel spending will be given by the sum of targeted spending across parties, where only the *n* parties in the coalition are considered.[3]

A party that is invited to join the coalition has two options. It may reject this invitation, with the consequence that the government's proposed public policy is not approved. Alternatively, the party may indeed join the coalition, guaranteeing the approval of the proposed public policy.

The benefit to a party invited to join the coalition of accepting that invitation is given by:

$$\Omega_i = k(d_i) + b(x_i) - \frac{1}{n} x_i, \tag{1}$$

where $d_i \in \left[0, \overline{d}\right]$ is a measure of the distance between the policy proposed by the government and party *i*'s own preferred public policy; $k(d_i)$ is the "ideological" benefit that party *i* perceives from supporting *G*'s proposal vis-à-vis the status quo policy (discussed in greater detail below); x_i is the level of pork-barrel spending allocated to the party's constituency, with $x_i \geq 0 \ \forall i$; and $b(x_i)$ represents the gross benefits party *i* perceives from pork-barrel spending targeted at its voters. As in Weingast, Shepsle, and Johnsen (1981), we assume $b'(.) > 0$, and $b''(.) < 0$. Finally, x_i/n is the tax bill assigned to party *i*'s constituency.

Our central assumption is that $k(d_i)$ is a continuous and strictly decreasing function of d_i with $k(0) \geq 0$ and $k(\overline{d}) < 0$. The distance between the status quo policy and party i's own preferred policy is given by $\hat{d}_i \in [0, \overline{d})$, such that $k(\hat{d}_i) = 0$.[4] Therefore, $\hat{d}_i$ shifts function $k(.)$ for each party according to its status quo utility; if party i prefers the government proposal to the status quo policy, then $k(d_i) > 0$, and if the opposite is true, then $k(d_i) < 0$.

The utility function in Equation (1) takes into account the key element behind bargaining in our model: the potential trade-off parties face between political ideology and the allocation of pork-barrel resources. As in von Hagen and Harden (1995), our utility function takes into account the utility obtained by parties (in their case, spending ministers) from pork allocated to their constituencies, and the fact that only a fraction of its cost is internalized by them. In contrast to the original work by these authors, however, Equation (1) introduces an ideological policy. Moreover, our model also considers the negotiation process between an independent government that proposes this policy and the legislature that must approve or reject it.

It is clear that the government does not need to offer positive pork to party i if $d_i \leq \hat{d}_i$: it is in the party's best interest to join the coalition even if its constituency is not handed pork if the policy being proposed is closer to its preferences than the status quo is.[5] Nevertheless, if the government needs to bring some parties with $d_i > \hat{d}_i$ into the coalition, $x_i > 0$ is necessary to get them to join. In this case, the government enters into a negotiation with each of these parties, the outcome of which determines x_i.

We assume G and each party i with $d_i > \hat{d}_i$ enter the negotiation with a proposed level for x_i. We denote the government's proposal by x_i^G and the party's proposal by x_i^*. The outcome of the negotiation, which corresponds to the amount of spending targeted to i's constituency, can then be written as a Nash solution, given by:

$$\tilde{x}_i = \alpha_i^G x_i^G + \alpha^i x_i^* \quad \text{for each } i \text{ in the coalition}, \tag{2}$$

where $\alpha_i^G \in (0, 1)$ measures the bargaining power of G vis-à-vis i, $\alpha^i \in (0, 1)$ measures the bargaining power of party i, and $\alpha_i^G + \alpha^i = 1$ for all i in the coalition.[6]

What are the optimal pork-barrel proposals spending for G and each party i, x_i^G and x_i^*? For given distance d_i, x_i^* is the level that maximizes i's utility subject to $\Omega_i \geq 0$. The constraint ensures that party i is compensated not only for its share in the tax bill, but also for the potential loss it faces if supporting a public policy that is not the one preferred

by its constituency. When $\Omega_i \geq 0$ binds, as will become clear later on, $x_i^* = x_i^G$. If, by the contrary, the solution is interior, x_i^* must satisfy the following condition:[7]

$$b'(x_i^*) = \frac{1}{n}. \qquad (3)$$

Equation (3) implicitly defines the optimal pork-barrel demand for party i: each party demands pork-barrel spending up to the point where its marginal benefit is equal to its marginal cost. The pork-barrel demand of party i depends on the number of parties in the coalition because the cost of pork barrel is shared by them. From the implicit function theorem, it follows that $\partial x_i^* / \partial n = -1/b''(.)n^2 > 0$, i.e., the pork-barrel spending demanded by those parties negotiating with the government increases as the number of parties in the coalition increases. This is the standard common-pool result.

In turn, G's proposal is the one that minimizes the cost it has to pay to obtain i's support. Thus, x_i^G will be such that $\Omega_i = 0$, so that party i is indifferent between rejecting G's invitation to join the coalition, with the consequence that the government's policy is not approved, and joining the coalition, guaranteeing the approval of the public policy. It follows from Equation (1) that x_i^G must satisfy the following condition:

$$b(x_i^G) - \frac{1}{n}x_i^G = -k(d_i), \qquad (4)$$

where it is worth noticing that an interior solution to the problem of party i implies $x_i^G < x_i^*$, and the corner solution is given by $x_i^* = x_i^G$. Notice also that $-k(d_i) > 0$ since $d_i > \hat{d}_i$ is the only case where bargaining between the government and i takes place. We can now characterize total pork-barrel spending for each party belonging to the coalition. Spending targeted at group i will be given by:

$$x_i = 0 \qquad\qquad \text{if } d_i \leq \hat{d}_i, \qquad (5)$$

$$x_i = \tilde{x}_i = \alpha_i^G x_i^G + \alpha^i x_i^* \quad \text{if } d_i > \hat{d}_i. \qquad (6)$$

Total expenditure on pork barrel is $X = \sum_{i=1}^{n} x_i$, where the parties brought into the coalition by the government are the n parties for which d_i is smallest.

With these elements at hand, we are ready to derive our main results. Our central interest is to characterize how polarization, understood as the ideological distance between parties in the coalition, affects the

relationship between fragmentation and pork-barrel spending. Fragmentation is defined in our model by the number of parties in the coalition; this is consistent with a frequent empirical strategy to capture the number of different interests whose demands are relevant in determining the government's budget. In turn, polarization in our model could be characterized by some measure that summarizes the distribution of d_i across coalition parties. To simplify the algebra, in the following calculations, our measure of polarization is the maximum value of d_i across coalition parties, which in addition is the definition that comes closest to an existing empirical measure of polarization that we use in the empirical section. We thus define polarization, P, as $P = Max\{d_1, \ldots, d_n\}$. Let us also define $\hat{d} \equiv Max\{\hat{d}_1, \ldots, \hat{d}_n\}$.

　　The following results can now be stated and proved:

Result 1. Under a low-polarization regime, defined as one where $d_i \leq \hat{d}_i$ for all parties in the coalition, pork-barrel spending is zero and does not depend on the degree of fragmentation (n). Notice also that $d_i \leq \hat{d}_i$ implies that $P \leq \hat{d}$.[8]

Result 2. An increase in fragmentation (increase in n) changes total pork-barrel spending if polarization, P, is sufficiently large, in particular if $P > \hat{d}$. Moreover, with $P > \hat{d}$, the change in pork-barrel spending resulting from greater fragmentation is positive as long as $\alpha^i / \alpha_i^G > -\frac{\partial x_i^G / \partial n}{\partial x_i^* / \partial n}$ for all i that exhibit $d_i > \hat{d}$.

Proof. The change in pork-barrel spending as a result of an increase in n is given by $\frac{\partial X}{\partial n} = \sum_{i=1}^n \frac{\partial x_i}{\partial n}$. In turn, from Equations (5) and (6):

$$\frac{\partial x_i}{\partial n} = 0 \quad \text{if } d_i \leq \hat{d}_i, \tag{7}$$

$$\frac{\partial x_i}{\partial n} = \alpha_i^G \frac{\partial x_i^G}{\partial n} + \alpha^i \frac{\partial x_i^*}{\partial n} = -\alpha_i^G \frac{x_i^G}{n^2 \left(b'(x_i^G) - \frac{1}{n}\right)} - \alpha^i \frac{1}{n^2 b''(x_i^*)} \quad \text{if } d_i > \hat{d}_i, \tag{8}$$

where Equation (8) uses the implicit function theorem.

　　Result 1 follows from Equation (7). It is also clear that $P > \hat{d}$ implies that there exists at least one party such that $d_i > \hat{d}_i$. Therefore, Result 2 follows from Equation (8). Notice that $\partial x_i^* / \partial n > 0$ and $\partial x_i^G / \partial n < 0$. Thus, the sign of the derivative in Equation (8) is positive, if and only if $\alpha^i / \alpha_i^G > -\frac{\partial x_i^G / \partial n}{\partial x_i^* / \partial n}$. **QED.**

Results 1 and 2 jointly imply that greater fragmentation should not affect government spending if the ideologies of all coalition parties are sufficiently close to the government's ideology to guarantee that those parties will support the government's initiatives without asking for pork in exchange. By contrast, if the ideological preferences of parties in the coalition are sufficiently distant from the government's ideology, then the level of pork-barrel spending is indeed affected by fragmentation, and the correlation is potentially positive. Fragmentation plays a role because it affects the proposals with which the government and each party enter the negotiation and because it implies additional parties must be offered transfers to support the government's proposal. The effect of an increase in n on spending is positive as long as parties are sufficiently powerful that the increase in their demands as a result of greater fragmentation dominates off-setting effects. But, it could even be negative if the relative bargaining power of the government is sufficiently high that it can equate pork-barrel spending directed to the party's constituency to its cost, which decreases with n (see the condition in Result 2).[9]

Before moving on to the empirics, it is worth highlighting that our model only considers expenses derived from the government's efforts to build legislative support for its initiatives. For instance, spending that is built automatically into the budget due to previous commitments or because it is mandated by, say, the Constitution, is not considered in the model. Unfortunately, spending in coalition building is not directly observed, and even coarse disaggregations of spending data are only available for quite limited sets of countries and periods. As a result, our tests focus on overall spending, with the implication that the suggested relationship between fragmentation and spending may be difficult to uncover. To the extent that the results conform to our central hypothesis that fragmentation is indeed important in presidential democracies, but only for sufficiently high levels of polarization, we seem to be able to overcome this difficulty.

It is also important to point out that we have been assuming that all coalition parties are equally important in the bargaining process. This is, of course, not generally the case. When moving to the empirical part of our work, we will consider measures of fragmentation and polarization that recognize some groups both have greater participation in the legislature and contribute a larger share to tax collections. Finally, we point out that we do not have an explicit empirical counterpart for $\hat{d}$ in the data. Instead, we let the data indicate the level of polarization such that fragmentation starts to affect government spending.

Empirical Model and Data

Our aim is to estimate the potential interaction between legislative polarization and fragmentation as determinants of government spending. We concentrate on a panel of annual observations for 18 presidential democracies over the period 1978–2005. The countries included in our analysis are Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Korea, Nicaragua, Peru, Sri Lanka, the United States, Uruguay, and Venezuela.[10] The choice of sample is simply dictated by data availability: We include all of the countries for which there is information using the most comprehensive data sources we found. We follow the World Bank's Database of Political Institutions to determine whether democracies should be classified as presidential (see the online supporting information). In additional tests, we conduct an analogous analysis for a set of 28 parliamentary democracies: Australia, Austria, Belgium, Bulgaria, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Luxembourg, Mauritius, the Netherlands, New Zealand, Norway, Papua New Guinea, Portugal, Romania, the Slovak Republic, South Africa, Sweden, and the United Kingdom.

The direct implication of the model presented above is that fragmentation should only be significant in the presence of a high enough degree of polarization—just how high is an empirical question. Consistently, we estimate an empirical model where government spending depends—among other factors—on fragmentation and an interaction between fragmentation and polarization:

$$g_{it} = \beta_i + \beta_1 F_{it-1} + \beta_2 P_{it-1} + \beta_3 P_{it-1} * F_{it-1} + \beta_4 g_{it-1} + \gamma' X_{it-1} + u_{it},$$
(9)

where i indexes countries and t and $t-1$ index time. Here, g is central government expenditure as a proportion of GDP; F is a measure of fragmentation; P is a measure of polarization; X is a vector of control variables; and u is a random error term.

The inclusion of P without interaction aims at making sure that our interaction term does not simply capture an omitted effect of polarization. Previous studies have pointed at other roles for polarization as a determinant of fiscal outcomes. On the theory side, Alesina and Tabellini (1990) present a model where an incumbent facing replacement by an opponent with different preferences may increase spending in order to undertake his preferred projects before leaving office. A highly polarized

political environment implies the opponent's preferences are far from the incumbent's, increasing incentives for the incumbent to spend on his preferred public goods. On the empirical side, a few studies have tested the relationship between polarization and government spending implied by this and similar models, without finding a robust empirical relationship (e.g., Elgie and McMenamin 2008; Volkerink and de Hann 2001).

We introduce these measures of fragmentation and polarization in the context of a dynamic panel data model, where both country fixed effects (β_i) and the first lag of the dependent variable are included. This approach controls for unobservable sources of heterogeneity that are constant over time and other sources of persistence. To deal with the well-known problems of endogeneity of the lagged dependent variable induced by the presence of fixed effects, we estimate the model using the system GMM estimator proposed by Arellano–Bover/Blundell–Bond (Arellano and Bover 1995; Blundell and Bond 1998). In particular, the lagged dependent variable is instrumented using its own lags.[11] As in Bawn and Rosenbluth (2006) and Hankla (2013), both our variables of interest and controls are lagged one year with respect to the dependent variable in our econometric specification.

We now discuss the most salient features of the data we use (greater detail is provided in the online supporting information). Our data for government expenditure are based on the data set created by Brender and Drazen (2005), which uses information from the IFS and complements it using data from OECD for 1976–2001. We extend Brender and Drazen's data to 2005 using the same sources. The advantages of using this data set compared to each of the original sources are greater coverage and greater consistency (see Brender and Drazen 2005). In fact, a series of recent articles have used this data set as their source for government expenditure data, including those by Brender and Drazen (2005, 2008), Hanusch and Keefer (2013), Streb, Lema, and Torrens (2009), and Barberia and Avelino (2011). Others have used alternative methodologies to also complement the original IFS data with data from other sources (e.g., Hankla 2013). Only those countries that are considered democracies according to the Polity Score constructed by the Polity IV Project are included in our estimates. Following Brender and Drazen, countries with a score larger than or equal to zero are classified as democracies.

A usual approach has been to measure fragmentation by the number of political parties with power over the legislature's approval of the budget (e.g., Bawn and Rosenbluth 2006; Edin and Ohlson 1991; Volkerink and de Haan 2001). The underlying assumption is that different political parties represent different groups: "a party is a

more or less cohesive entity representing the interests of specific groups in government expenditure" (Perotti and Kontopoulos 2002, 195), so that fragmentation (the number of different interests whose demands are reflected in the government's budget) can be captured by the number of parties that have a say relating the budget. In this vein, we use, alternatively, three different measures of fragmentation: the raw number of legislative parties in the governing coalition (RAW); the effective number of parties in that coalition (ENP); and government fractionalization (FRAC).[12] The three variables come from the Database of Political Institutions. The ENP index adjusts the number of parties by taking into account the number of seats each party holds in Congress. This index takes values above 1, where 1 represents legislatures in which a single party holds all of the seats. A problem with both RAW and ENP is that their upper bound is the size of the legislature, implying a range that varies considerably across countries. FRAC addresses this problem. It is defined as the probability that two deputies picked at random from the government coalition will be of different parties and thus varies between 0 and 1. In any case, all specifications control for the total size of the legislature.

We also follow two different approaches to measure ideological polarization. First, we use the measure of polarization proposed by Keefer and Stasavage (2003), which corresponds to the maximum ideological distance—in a left-center-right scale—between the chief executive's party and other parties in the governing coalition (POLAR). We build this measure based on information about the ideology of the executive party and the three largest parties in the governing coalition. POLAR takes on integer values between 0 and 2, where 0 indicates that the main parties in the coalition score the same for ideology, and 2 implies that at least one of the main parties is to the left of the scale and another is to the right. Notice that POLAR fits closely the definition of polarization that we use in the model's proofs. In some specifications, we use separate dummies indicating when POLAR takes a value of 1, or when it takes a value of 2. Following Franzese (2010), our second measure of polarization is the weighted standard deviation of the ideologies of the three largest parties in the governing coalition (*SD*), the number of seats in the legislature being used as weights.

All of our measures of fragmentation and polarization are computed using only the information for the lower chamber of the legislature. We use information from the Database of Political Institutions, produced by the World Bank (see the online supporting information).

For control variables, we first include an array of political and institutional determinants of government expenditure that have been

suggested in the literature as potential determinants of government expenditure and that may correlate with size fragmentation in the legislature.[13] This set of controls is particularly important because the effect of fragmentation on government spending is likely to vary with institutions that affect the power of parties to influence both the budget and the approval of government projects. We control for the electoral rule in the lower house; the president's effective veto power and the legislature's control over the budget process (Cheibub 2006); the extent to which electoral competition revolves around individual candidates rather than political parties, measured by a "personalism" index (Carey and Shugart 1995); the number of chambers in the legislature; a dummy indicating whether the governing party controls the majority of seats in the legislature; and the total number of seats in the lower house.

Proportional electoral rules have been found to generate higher government spending than majoritarian ones (Persson and Tabellini 2004). Within presidential democracies, Cheibub (2006) shows that strong presidents are better able to keep the budget under control; this strength is positively correlated with the president's veto power and negatively related to the legislature's weight in the budgetary process. Electoral systems that provide incentives for politicians to cultivate "personal votes" should generate greater intraparty fragmentation and should thus lead to higher government spending (Hallerberg and Marier 2004). Roubini and Sachs (1989) and others have pointed at the possibility that governments controlling the majority of legislative seats may have to spend less than others as legislative bargaining may become unnecessary. Complementing this view for the specific case of presidential democracies, Hankla (2013) shows that in these countries the effect of unification around the government (captured, among other proxies, by the majoritarian presence of the government in the legislature) is correlated with fragmentation, making it especially important to control in our specification for whether the government controls most of the legislature. In turn, Bradbury and Crain (2001) show that the number of seats and the number of chambers in the legislature are relevant determinants of fiscal outcomes.

Besides the controls just described, we also include standard economic controls used in previous studies: GDP growth, an index of openness to trade, and the proportion of dependent population. Finally, we include a dummy for election years: executive elections for presidential democracies and legislative elections for parliamentary ones. The electoral dummy is included in recognition of a large literature suggesting that government spending may systematically grow during election years.

Panel 1 in Table 1 shows descriptive statistics for the variables of interest in presidential systems. It is worth mentioning that the

TABLE 1
Descriptive Statistics: Presidential and Parliamentary Democracies
Baseline Sample (1978–2005)

Baseline Sample (1978-2005)	Obs	Mean	*SD*	Min	Max
Panel 1: Presidential Democracies					
Central Government Expenditure (% of GDP)	262	19.94	6.34	8.58	39.33
Fragmentation between Government Parties (FRAC)	262	0.18	0.27	0.00	0.71
Effective Number of Parties in the Government Coalition (ENP)	262	1.43	0.71	1.00	3.41
Raw Number of Parties in the Government Coalition (RAW)	262	1.80	1.34	1.00	7.00
Standard Deviation of Ideology of Parties in the Government Coalition (SD)	262	0.18	0.34	0.00	1.31
		Freq. 0	**Freq. 1**	**Freq. 2**	
Polarization in the Government Coalition (POLAR)	262	192	23	47	
Panel 2: Parliamentary Democracies					
Central Government Expenditure (% of GDP)	622	34.97	8.10	15.45	59.10
Fragmentation between Government Parties (FRAC)	622	0.31	0.26	0.00	0.83
Effective Number of Parties in the Government Coalition (ENP)	622	1.74	0.85	1.00	5.52
Raw Number of Parties in the Government Coalition (RAW)	622	2.35	1.40	1.00	12.00
Standard Deviation of Ideology of Parties in the Government Coalition (*SD*)	622	0.27	0.37	0.00	1.08
		Freq. 0	**Freq. 1**	**Freq. 2**	
Polarization in the Government Coalition (POLAR)	622	382	135	105	

correlation between fragmentation and polarization is high but not perfect (around 0.79), while there is almost perfect correlation between the two measures of polarization (above 0.99) and between the three measures of fragmentation (between 0.87 and 0.96).

Results

Presidential Systems

We estimate Equation (9) using the Arellano-Bond system GMM estimator. The first lag of the lagged dependent variable is used as an instrument.[14] Table 2 presents the results for our different proxies for fragmentation and polarization. Even-numbered columns use the maximum distance between parties, POLAR, as a measure of polarization, while odd-numbered ones use the standard deviation of ideology (SD). Columns also differ in the measure of fragmentation being used: fractionalization index (FRAC) in columns 1–2; the effective number of parties (ENP) in columns 3–4; and the raw number of parties (RAW) in columns 5–6.

The coefficients for RAW, ENP, and FRAC, which capture the effects of these variables in the absence of polarization, are not significantly different from zero and display erratic signs across columns. That is, we cannot reject the hypothesis that greater fragmentation in a government coalition has no effect on government spending if there is no polarization, one of the main predictions of our model. On the other hand, we find that greater fragmentation leads to greater spending when there is sufficient positive polarization within the government coalition, which is our other main prediction. The coefficients for the interaction terms are positive, large in size compared to those of the fragmentation variable alone, and significantly different from zero in a statistical sense.

Figure 1 presents the marginal effect of the fragmentation as polarization increases, where, in the interest of succinctness, we present results for a single polarization measure, SD. This effect is in general statistically not different from zero at the mean of SD, but grows with polarization, becoming positive and statistically significant within the range of values that SD takes within our sample. For instance, the marginal effect of the fractionalization index (FRAC) becomes positive and significant at around $SD = 0.3$, which is approximately half a standard deviation above the mean of SD. In terms of magnitudes, a one-standard-deviation change in the fractionalization index implies a sizable increase in government spending as a fraction of GDP of 2.1 percentage points when $SD = 0.5$. But, it has no impact when SD is at its mean.

TABLE 2
Presidential Democracies: Direct and Interacted Effect of Fragmentation in the Government Coalition on
Government Expenditure (% GDP), 1978–2005

Dependent Variable: Government Expenditure as a Percentage of GDP	Fragmentation/Polarization Proxies					
	FRAC/ POLAR (1)	FRAC/ SD (2)	ENP/ POLAR (3)	ENP/ SD (4)	RAW/ POLAR (5)	RAW/ SD (6)
Lagged Dependent Variable	0.299**	0.327**	0.316**	0.343**	0.319**	0.331**
	(0.139)	(0.152)	(0.137)	(0.152)	(0.138)	(0.147)
Fragmentation	0.199	1.220	−0.139	0.270	−1.150	−0.713
	(2.162)	(2.090)	(1.104)	(1.087)	(0.775)	(0.688)
Fragmentation*Polarization	4.913**	11.38**	1.793**	3.515***	1.265**	2.348**
	(2.106)	(4.519)	(0.697)	(1.220)	(0.573)	(1.132)
Polarization	−2.219*	−5.875**	−3.786**	−7.979***	−2.839*	−6.241*
	(1.192)	(2.824)	(1.567)	(2.938)	(1.512)	(3.694)
Government Party with Majority of Seats in the Legislature	−1.163*	−1.107*	−1.122*	−1.051*	−1.671**	−1.485**
	(0.623)	(0.626)	(0.589)	(0.595)	(0.655)	(0.655)
President Effective Veto	−1.298*	−1.488*	−1.278*	−1.447*	−1.539**	−1.679**
	(0.757)	(0.798)	(0.724)	(0.767)	(0.769)	(0.855)
Legislative Budget Dominance	−3.964	−3.445	−3.732	−3.200	−3.454	−2.815
	(2.635)	(2.520)	(2.531)	(2.449)	(2.444)	(2.507)
Total Number of Seats in the Legislature	0.008	0.006	0.006	0.004	0.008	0.006
	(0.010)	(0.009)	(0.009)	(0.009)	(0.011)	(0.011)
Proportional Electoral Rule in the Lower House	3.050**	2.826*	3.047**	2.764*	3.132**	2.184
	(1.438)	(1.604)	(1.375)	(1.563)	(1.420)	(1.611)

TABLE 2
(continued)

			Fragmentation/Polarization Proxies			
Dependent Variable: Government Expenditure as a Percentage of GDP	FRAC/ POLAR (1)	FRAC/ SD (2)	ENP/ POLAR (3)	ENP/ SD (4)	RAW/ POLAR (5)	RAW/ SD (6)
Personalism Index	0.006	0.053	0.018	0.068	0.080	0.123
	(0.302)	(0.286)	(0.272)	(0.259)	(0.288)	(0.301)
Number of Chambers	3.750	3.757	3.638	3.574	2.619	2.612
	(2.778)	(2.599)	(2.548)	(2.368)	(2.556)	(2.465)
Election-Year Dummy	−0.683	−0.632	−0.742	−0.689	−0.772	−0.722
	(0.479)	(0.426)	(0.492)	(0.438)	(0.521)	(0.464)
GDP Growth WDI	−0.021	−0.015	−0.020	−0.014	0.008	0.014
	(0.038)	(0.041)	(0.040)	(0.043)	(0.045)	(0.043)
Trade (% GDP)	0.022	0.022	0.022	0.023	0.020	0.032
	(0.025)	(0.025)	(0.024)	(0.024)	(0.020)	(0.022)
Dependent Population (% of Total)	0.596*	0.516	0.585*	0.506	0.624*	0.510
	(0.353)	(0.352)	(0.346)	(0.351)	(0.360)	(0.361)
Observations	247	249	247	249	246	248
Number of Countries	18	18	18	18	18	18
Arellano-Bond Test for AR(1) in Errors (Pr>z)	0.068	0.067	0.063	0.062	0.063	0.068
Arellano-Bond Test for AR(2) in Errors (Pr>z)	0.558	0.787	0.595	0.884	0.874	0.466
Sargan Test for Overidentifying Restr. (Pr>x2)	0.207	0.094	0.184	0.079	0.300	0.127

Note: This table presents Arellano-Bond system estimators of the dynamic panel data model. The lagged dependent variable is instrumented with its first lag. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

FIGURE 1

Presidential Democracies: Marginal Effect of Fragmentation in the
Government Coalition on Government Expenditure as *SD* Changes

Panel 1: Marginal Effect of FRAC on Government Expenditure as SD changes

$$\frac{\partial g}{\partial F} = \underset{(2.09)}{1.22} + \underset{(4.52)}{11.38 * SD}$$

Panel 2: Marginal Effect of ENP on Government Expenditure as SD changes

$$\frac{\partial g}{\partial F} = \underset{(1.09)}{0.27} + \underset{(1.22)}{3.52 * SD}$$

Panel 3: Marginal Effect of RAW on Government Expenditure as SD changes

$$\frac{\partial g}{\partial F} = \underset{(0.69)}{-0.71} + \underset{(1.13)}{2.35 * SD}$$
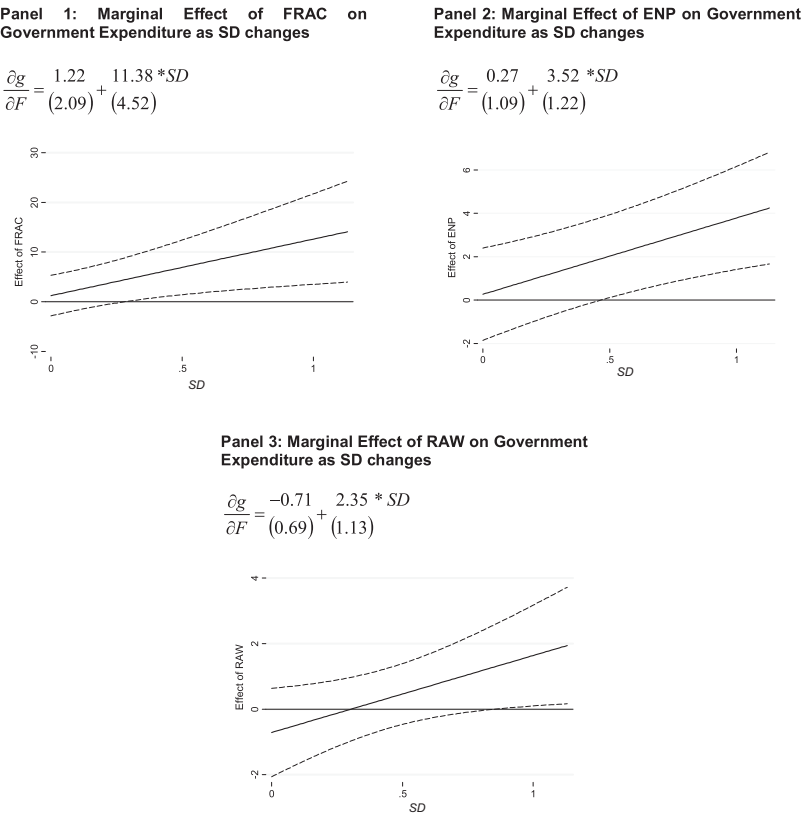

Table 2 also shows the estimated coefficients associated with our control variables. We discuss here our findings for political phenomena other than party fragmentation. First, the net effect of moving from zero to positive polarization is positive for large enough levels of fragmentation (for instance, at the maximum value of the respective measure of fragmentation within our sample), negative and not significant at the mean level of fragmentation, and negative and not significant for low values of fragmentation.[15] While theory in general predicts a positive effect of polarization, failure to identify this effect is relatively common (Elgie and McMenamin 2008; Volkerink and de Hann 2001). Second, a more powerful government vis-à-vis Congress is better able to keep

TABLE 3

Presidential Democracies: Direct and Interacted Effect of Fragmentation
in the Government Coalition on Government Expenditure (% GDP)
using a Nonlinear Specification of POLAR, 1978–2005

Dependent Variable: Government Expenditure as a Percentage of GDP	FRAC (1)	ENP (2)	RAW (3)
Lagged Dependent Variable	0.290**	0.298**	0.295**
	(0.139)	(0.137)	(0.137)
Fragmentation	1.993	0.648	−0.359
	(1.781)	(0.815)	(0.634)
Fragmentation*(Dummy POLAR=1)	11.30	1.520	0.111
	(9.037)	(1.623)	(0.568)
Fragmentation*(Dummy POLAR=2)	8.038**	2.912**	2.353*
	(3.997)	(1.368)	(1.224)
Dummy POLAR=1	−8.765	−5.957	−1.495
	(5.445)	(4.334)	(2.332)
Dummy POLAR=2	−4.132*	−6.779**	−6.450*
	(2.323)	(3.280)	(3.515)
Government Party with Majority of Seats in the Legislature	−0.831	−0.947	−1.634**
	(0.617)	(0.617)	(0.680)
President Effective Veto	−1.119	−1.199*	−1.429*
	(0.722)	(0.720)	(0.746)
Legislative Budget Dominance	−4.049	−3.922	−3.666
	(2.647)	(2.575)	(2.406)
Total Number of Seats in the Legislature	0.008	0.007	0.010
	(0.010)	(0.009)	(0.011)
Proportional Electoral Rule in the Lower House	3.375**	3.337**	3.580***
	(1.398)	(1.354)	(1.366)
Personalism Index	0.159	0.125	0.105
	(0.253)	(0.250)	(0.274)
Number of Chambers	3.805	3.606	2.467
	(2.644)	(2.481)	(2.570)
Election-Year Dummy	−0.728	−0.760	−0.721
	(0.476)	(0.484)	(0.499)
GDP Growth WDI	−0.023	−0.023	0.007
	(0.039)	(0.039)	(0.043)
Trade (% GDP)	0.025	0.026	0.025
	(0.021)	(0.020)	(0.016)
Dependent Population (% of Total)	0.645*	0.636*	0.692*
	(0.349)	(0.344)	(0.361)
Observations	252	252	252
Number of Countries	18	18	18
Arellano-Bond Test for AR(1) in Errors (Pr>z)	0.073	0.069	0.053
Arellano-Bond Test for AR(2) in Errors (Pr>z)	0.507	0.560	0.885
Sargan Test for Overidentifying Restr. (Pr>x2)	0.076	0.113	0.457

Note: This table presents Arellano-Bond system estimators of the dynamic panel data model.
The lagged dependent variable is instrumented with its first lag. Robust standard errors in
parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

budget discipline. This is reflected in negative significant coefficients for the dummies of president's veto power and government with majority in the legislature. We also find that proportional systems are more likely to generate larger governments than majoritarian ones. These findings are consistent with previous literature (Bradbury and Crain 2001; Persson and Tabellini 2004). The personalism index, the number of chambers, the size of the legislature, and the legislative budget dominance dummy have associated coefficients that are not statistically significant, though generally of the expected signs, except in the case of legislative budget dominance. The lack of significance of these coefficients is probably related to the inclusion of the other measures of relative government power and unity and the little variation that many of these measures display within countries.[16]

Table 3 takes a different look at the same question by interacting each proxy of fragmentation with separate dummies for each of the values of POLAR (columns 1–3). The coefficient associated with fragmentation is positive and significant only when POLAR = 2. Moreover, the point estimates tend to increase monotonically with POLAR. The exception is the case of government fractionalization (column 1), where a larger (though insignificant) coefficient is estimated for fractionalization when POLAR = 1 than when POLAR = 2. The specification in columns 1–3 of Table 3, however, is less stable across the three columns than is the case in Table 2 in terms of the significance of the coefficients associated with the control variables. The columns of Table 2 remain our baseline specifications.

Parliamentary Systems

We now reestimate our empirical model for parliamentary democracies. We see this exercise as close to a placebo test, where our expectation is that no evidence of an intermediating role of polarization in the fragmentation-spending relationship should be found in this context. Unfortunately, the variables on the president's veto power and legislative budgetary power from Cheibub (2006) are not available for this set of countries. In the sample of parliamentary democracies, we include in their place controls for the power of the legislature in the budgetary process from the Budget Practice and Procedures Surveys.[17] We include a dummy for the power of the president to veto the budget approved by the legislature and dummies for the ability of the legislature to amend the budget proposed by the government (either full or intermediate, with low power being a left-out category).

TABLE 4
Parliamentary Democracies: Direct and Interacted Effect of Fragmentation in the Government Coalition on Government Expenditure (% GDP), 1978–2005.

Dependent Variable: Government Expenditure as a Percentage of GDP	Fragmentation/Polarization Proxies					
	FRAC/ POLAR (1)	FRAC/ SD (2)	ENP/ POLAR (3)	ENP/ SD (4)	RAW/ POLAR (5)	RAW/ SD (6)
Lagged Dependent Variable	0.510**	0.514**	0.520***	0.524***	0.518**	0.520**
	(0.201)	(0.202)	(0.199)	(0.200)	(0.203)	(0.202)
Fragmentation	1.604*	1.482*	0.435	0.393	0.249*	0.233*
	(0.943)	(0.887)	(0.364)	(0.359)	(0.137)	(0.132)
Fragmentation*Polarization	0.0597	0.731	0.0738	0.249	0.0316	0.0925
	(1.588)	(4.079)	(0.235)	(0.508)	(0.243)	(0.533)
Polarization	−0.278	−0.738	−0.407	−0.905	−0.327	−0.601
	(0.645)	(1.788)	(0.508)	(1.136)	(0.722)	(1.572)
Government Party with Majority of Seats in the Legislature	1.020*	1.012*	0.844	0.845	1.045*	1.056*
	(0.575)	(0.548)	(0.540)	(0.525)	(0.611)	(0.604)
Executive Powers to Veto the Budget	4.051*	4.032*	3.892*	3.883*	3.899*	3.894*
	(2.207)	(2.191)	(2.118)	(2.107)	(2.152)	(2.134)
Full Power of the Legislature to Amend the Budget	−0.792	−0.783	−0.858	−0.827	−0.530	−0.478
	(1.587)	(1.587)	(1.620)	(1.623)	(1.579)	(1.593)
Limited Power of the Legislature to Amend the Budget	−3.095	−3.043	−3.118	−3.044	−3.018	−2.936
	(1.951)	(1.985)	(2.018)	(2.032)	(2.003)	(2.007)
Total Number of Seats in the Legislature	0.0047	0.0047	0.0041	0.0042	0.004	0.0041
	−0.0038	−0.0038	−0.0034	−0.0033	−0.0033	−0.0033

TABLE 4
(continued)

Dependent Variable: Government Expenditure as a Percentage of GDP	Fragmentation/Polarization Proxies					
	FRAC/ POLAR (1)	FRAC/ SD (2)	ENP/ POLAR (3)	ENP/ SD (4)	RAW/ POLAR (5)	RAW/ SD (6)
Proportional Electoral Rule in the Lower House	−3.556*	−3.488*	−3.295*	−3.244	−3.187*	−3.180*
	(2.043)	(2.005)	(2.002)	(1.973)	(1.904)	(1.878)
Personalism Index	−0.232	−0.225	−0.189	−0.185	−0.204	−0.201
	(0.238)	(0.230)	(0.219)	(0.216)	(0.224)	(0.221)
Number of Chambers	−0.945	−0.946	−0.921	−0.927	−0.834	−0.843
	(0.952)	(0.949)	(0.934)	(0.928)	(0.923)	(0.915)
Election-Year Dummy	−0.114	−0.130	−0.120	−0.138	−0.130	−0.150
	(0.131)	(0.133)	(0.132)	(0.133)	(0.133)	(0.133)
GDP Growth WDI	−0.0406	−0.0329	−0.0375	−0.0294	−0.0421	−0.0358
	(0.0522)	(0.0514)	(0.0512)	(0.0502)	(0.0520)	(0.0512)
Trade (% GDP)	0.0233	0.0230	0.0210	0.0207	0.0236	0.0235
	(0.0182)	(0.0177)	(0.0160)	(0.0157)	(0.0178)	(0.0175)
Dependent Population (% of Total)	0.122	0.128	0.115	0.120	0.115	0.124
	(0.156)	(0.156)	(0.151)	(0.153)	(0.149)	(0.151)
Observations	609	610	609	610	609	609
Number of Countries	28	28	28	28	28	28
Arellano-Bond Test for AR(1) in Errors (Pr>z)	0.040	0.004	0.004	0.002	0.003	0.004
Arellano-Bond Test for AR(2) in Errors (Pr>z)	0.071	0.052	0.077	0.026	0.053	0.067
Sargan Test for Overidentifying Restr. (Pr>x2)	0.382	0.341	0.371	0.336	0.355	0.535

Note: This table presents Arellano-Bond system estimators of the dynamic panel data model. The lagged dependent variable is instrumented with its first lag. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Descriptive statistics for this sample are presented in Panel 2 of Table 1A. Some of the differences between presidential (see Panel 1 in Table 1A) and parliamentary systems reflect stylized facts documented in previous literature. For instance, central government expenditure as a proportion of GDP and the fragmentation measures are in general larger in parliamentary than in presidential systems (e.g., Persson and Tabellini 2004).

Results from estimating Equation (9) for parliamentary democracies are reported in Table 4. We find that, in this case, the interaction term between fragmentation and polarization is not significant in either economic or statistical terms. On the other hand, unlike the case of presidential democracies where the direct (not interacted) effect of fragmentation shows an erratic sign, in the parliamentary sample this effect is positive, independent of the measures of fragmentation and polarization used in the estimation. The effect is also statistically significant for FRAC and RAW, although not for ENP.

Alternative Hypotheses

We interpret the findings reported above as indicating that the effect of fragmentation is intermediated by the degree of polarization in presidential democracies but not in parliamentary ones. We address in this section the possibility that the contrast between presidential and parliamentary democracies may reflect differences across the countries in the two subsamples other than whether the regime is presidential or parliamentary.

In particular, we look into two alternative possibilities. The first one has to do with the degree of development. Woo (2003) has suggested that the effects of fragmentation and polarization might differ between developed and developing countries. At the same time, most presidential democracies are also underdeveloped countries, while a good fraction of parliamentary democracies are developed countries, so that development levels could indeed be driving the differences across democratic systems in our results. The second possibility we study is whether the documented differences between presidential and parliamentary democracies reflect features of the budgetary process that correlate with the type of democracy.

To address the first question, we reestimate Equation (9) pooling presidential and parliamentary democracies and allowing the effects we are interested on to vary depending on the type of regime (presidential vs. parliamentary). Some of the other systematic institutional differences between the two types of democracies are at least partially dealt with by the control variables in our baseline estimation. We also include OECD

TABLE 5

Pooled Presidential and Parliamentary Democracies: Effect of Fragmentation in the Government Coalition on Government Expenditure (% GDP), 1978–2005.

Dependent Variable: Government Expenditure as a Percentage of GDP	Fragmentation/Polarization Proxies					
	FRAC/ POLAR (1)	FRAC/ SD (2)	ENP/ POLAR (3)	ENP/ SD (4)	RAW/ POLAR (5)	RAW/ SD (6)
Lagged Dependent Variable	0.465*** (0.162)	0.474*** (0.157)	0.478*** (0.159)	0.481*** (0.161)	0.482*** (0.156)	0.483*** (0.157)
Fragmentation*Presidential	1.674 (2.959)	2.493 (2.867)	−0.00960 (1.292)	0.0987 (1.154)	−0.688 (0.767)	−0.620 (0.697)
Fragmentation*Polarization*Presidential	2.159* (1.169)	1.516 (4.500)	1.178** (0.459)	2.809*** (1.079)	0.817** (0.335)	2.205** (0.908)
Polarization*Presidential	−0.778 (0.791)	−0.202 (0.952)	−2.094* (1.119)	−5.133* (2.738)	−1.470 (0.969)	−4.836 (2.949)
Fragmentation*Parliamentary	0.879 (1.152)	0.771 (1.121)	0.573 (0.437)	0.498 (0.440)	0.269* (0.152)	0.239 (0.150)
Fragmentation*Polarization*Parliamentary	0.342 (1.860)	1.516 (4.500)	0.00443 (0.249)	0.170 (0.517)	0.0897 (0.275)	0.282 (0.589)
Polarization*Parliamentary	−0.506 (0.799)	−1.277 (2.045)	−0.449 (0.580)	−1.095 (1.254)	−0.672 (0.865)	−1.488 (1.845)
Political System	1.898 (1.589)	1.861 (1.500)	1.293 (2.155)	1.501 (2.023)	0.914 (1.687)	1.056 (1.638)
OECD Dummy	2.573 (1.684)	2.391 (1.633)	2.778* (1.645)	2.512 (1.657)	2.887* (1.642)	2.664 (1.652)

TABLE 5
(continued)

Dependent Variable: Government Expenditure as a Percentage of GDP	Fragmentation/Polarization Proxies					
	FRAC/ POLAR	FRAC/ SD	ENP/ POLAR	ENP/ SD	RAW/ POLAR	RAW/ SD
	(1)	(2)	(3)	(4)	(5)	(6)
New Democracy Dummy	−0.472	−0.398	−0.379	−0.274	−0.224	−0.138
	(1.241)	(1.224)	(1.210)	(1.223)	(1.178)	(1.196)
Government Party with Majority of Seats in the Legislature	0.202	0.244	0.234	0.260	0.198	0.223
	(0.396)	(0.380)	(0.371)	(0.368)	(0.393)	(0.386)
Total Number of Seats in the Legislature	0.0012	0.0099	0.0009	0.0007	0.0005	0.0002
	(0.00314)	(0.00314)	(0.00301)	(0.00298)	(0.00285)	(0.00286)
Proportional Electoral Rule in the Lower House	0.126	0.0825	0.184	0.122	0.292	0.00109
	(1.297)	(1.296)	(1.258)	(1.283)	(1.213)	(1.229)
Personalism Index	0.0711	0.0839	0.0861	0.101	0.0923	0.0969
	(0.185)	(0.182)	(0.174)	(0.176)	(0.173)	(0.173)
Number of Chambers	−0.591	−0.567	−0.559	−0.514	−0.564	−0.540
	(0.978)	(0.963)	(0.938)	(0.934)	(0.917)	(0.909)
Election-Year Dummy	−0.187	−0.170	−0.207	−0.190	−0.225*	−0.221*
	(0.130)	(0.127)	(0.131)	(0.129)	(0.130)	(0.128)
GDP Growth WDI	−0.0903*	−0.0848*	−0.0849*	−0.0770*	−0.0795	−0.0693
	(0.0479)	(0.0443)	(0.0470)	(0.0462)	(0.0487)	(0.0484)
Trade (% GDP)	0.0179	0.0171	0.0159	0.0152	0.0174	0.0171
	(0.0161)	(0.0152)	(0.0141)	(0.0139)	(0.0151)	(0.0149)

TABLE 5
(continued)

Dependent Variable: Government Expenditure as a Percentage of GDP	Fragmentation/Polarization Proxies					
	FRAC/POLAR (1)	FRAC/SD (2)	ENP/POLAR (3)	ENP/SD (4)	RAW/POLAR (5)	RAW/SD (6)
Dependent Population (% of Total)	0.240*	0.227	0.231*	0.210	0.246*	0.224
	(0.144)	(0.139)	(0.141)	(0.141)	(0.138)	(0.139)
Observations	855	858	855	858	854	856
Number of Countries	46	46	46	46	46	46
Arellano-Bond Test for AR(1) in Errors (Pr>z)	0.000	0.000	0.000	0.000	0.000	0.000
Arellano-Bond Test for AR(2) in Errors (Pr>z)	0.167	0.243	0.174	0.213	0.222	0.199
Sargan Test for Overidentifying Restr. (Pr>x2)	0.536	0.275	0.539	0.335	0.369	0.269

Note: This table presents Arellano-Bond system estimators of the dynamic panel data model. The lagged dependent variable is instrumented with its first lag. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

and new democracy fixed effects.[18] With this strategy, the differential effect of fragmentation between presidential and parliamentary democracies is estimated for countries with the same status of OECD and new democracy "membership."[19] We do not control for legislative-presidential dominance in this equation because Cheibub's indices are only available for presidential democracies, while the indices from the Budget Procedures and Practices survey miss a large number of the presidential democracies in our sample.

Results from this estimation, presented in Table 5, are consistent with the story that polarization plays an intermediating role in the relationship between fragmentation and government spending in presidential democracies, but not in parliamentary ones. In particular, for presidential democracies the coefficient associated with fragmentation increases with the level of polarization, eventually becoming positive and significant. By contrast, the interaction term is not significant for parliamentary democracies. We should also mention that the coefficient associated with the fragmentation variable (not interacted) in parliamentary democracies is not significant in most of the estimates. This comes in contrast with Table 4, and with much of the literature. On the other hand, notice that the point estimate is consistently positive across columns and similar in size to that identified in Table 4. The same could not be said for the coefficient on fragmentation alone in the presidential sample. The robustness of this estimate for parliamentary democracies gives us some confidence that the loss of statistical significance is related to the lower identification power in this more saturated specification.

The other question we examine refers to whether the documented differences between presidential and parliamentary democracies may reflect features of the budgetary process that correlate with the type of democracy. Table 6 takes a first look at this question by pooling presidential and parliamentary democracies, and splitting the sample according to the ability of the president to veto the budget approved by the government, from the Budget Practices and Procedures Index. For succinctness, we report these estimates using the interaction between our three measures of fragmentation and *SD* only. Similar results are obtained when using POLAR. Caution should be exercised when interpreting these estimates, as the sample is not the same as in Table 5 because the Budget Practices and Procedures Index misses a number of countries in our sample, mainly presidential.

In terms of statistical significance, the significance of results for the direct and interacted fragmentation terms does not vary systematically between countries where the government has veto power over the budget and those where it does not, while they did between presidential and

TABLE 6

Splitting the Sample According to the Ability of the President to Veto the Budget: Effect of Fragmentation in the Government Coalition on Government Expenditure (% GDP), 1978–2005.

Dependent Variable: Government Expenditure as a Percentage of GDP	Dummy Budget Presidential Veto Power = 1			Dummy Budget Presidential Veto Power = 0		
	FRAC (1)	ENP (2)	RAW (3)	FRAC (4)	ENP (5)	RAW (6)
Lagged Dependent Variable	0.332*	0.347**	0.384**	0.481**	0.495**	0.490**
	(0.178)	(0.174)	(0.167)	(0.222)	(0.220)	(0.218)
Fragmentation	1.587	0.402	0.206	2.510*	0.867	0.164
	(1.198)	(0.340)	(0.194)	(1.295)	(0.553)	(0.140)
Fragmentation*SD	8.275	1.895	0.713*	−0.732	−0.316	0.248
	(10.66)	(1.803)	(0.381)	(4.045)	(0.465)	(0.560)
SD	−4.329	−3.986	−1.635	−0.0281	−1.073	−1.090
	(6.100)	(4.260)	(1.363)	(1.020)	(1.696)	(1.646)
Political System	13.30**	12.85**	13.22***	3.633*	3.601*	3.577*
	(5.528)	(5.070)	(4.227)	(2.107)	(2.092)	(2.102)
Government Party with Majority of Seats in the Legislature	1.428	1.371	1.261	0.520	0.383	0.267
	(0.931)	(0.896)	(0.900)	(0.485)	(0.468)	(0.498)
Total Number of Seats in the Legislature	−0.0186*	−0.0193**	−0.0177*	0.00522	0.00461	0.00413
	(0.0106)	(0.00984)	(0.00993)	(0.00361)	(0.00326)	(0.00311)
Proportional Electoral Rule in the Lower House	2.844	2.855	2.936	−2.094	−1.793	−1.579
	(2.713)	(2.506)	(2.502)	(1.487)	(1.436)	(1.370)

TABLE 6
(continued)

Dependent Variable:	Dummy Budget Presidential Veto Power = 1			Dummy Budget Presidential Veto Power = 0		
Government Expenditure as a Percentage of GDP	FRAC (1)	ENP (2)	RAW (3)	FRAC (4)	ENP (5)	RAW (6)
Personalism Index	1.118**	1.079**	1.051**	−0.269	−0.220	−0.217
	(0.513)	(0.493)	(0.451)	(0.228)	(0.211)	(0.217)
Number of Chambers	7.016***	6.915***	6.843***	−0.748	−0.684	−0.594
	(2.707)	(2.599)	(2.499)	(0.915)	(0.879)	(0.892)
Election-Year Dummy	−0.769	−0.778	−0.773	−0.119	−0.130	−0.129
	(0.503)	(0.500)	(0.542)	(0.133)	(0.134)	(0.132)
GDP Growth WDI	−0.0670***	−0.0674***	−0.0615***	−0.00105	0.00427	−0.00455
	(0.0192)	(0.0185)	(0.0152)	(0.0715)	(0.0724)	(0.0720)
Trade (% GDP)	0.0129	0.00914	0.00718	0.0266	0.0240	0.0258
	(0.0353)	(0.0338)	(0.0278)	(0.0175)	(0.0155)	(0.0173)
Dependent Population (% of Total)	−0.172	−0.163	−0.131	0.208	0.204	0.178
	(0.170)	(0.162)	(0.159)	(0.159)	(0.155)	(0.148)
Observations	178	178	177	639	639	637
Number of Countries	11	11	11	32	32	32
Arellano-Bond Test for AR(1) in Errors (Pr>z)	0.072	0.071	0.052	0.005	0.005	0.005
Arellano-Bond Test for AR(2) in Errors (Pr>z)	0.198	0.214	0.249	0.108	0.117	0.105
Sargan Test for Overidentifying Restr. (Pr>x2)	0.008	0.007	0.006	0.318	0.301	0.339

Note: This table presents Arellano-Bond system estimators of the dynamic panel data model. The lagged dependent variable is instrumented with its first lag. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

parliamentary democracies. In this sense, our findings indicate that it is the type of democracy, rather than the relative power of the government over budget procedures—which correlate with the type of democracy—that makes a difference for the role of fragmentation in the budget.

However, it is interesting to notice that the estimated coefficients for the interaction between fragmentation and polarization are always positive in the case where the president has veto power over the budget, and even positive and significant in column 3, while their signs are erratic in the other sample. Moreover, the coefficient on fragmentation alone is statistically significant in one of the columns for the sample in which the president has no veto power. In these more subtle senses, the division according to budgetary veto power of the president is reminiscent of that according to democratic system. Notice, in fact, that the crucial feature of our theory for the interaction between fragmentation and polarization in presidential democracies is that the executive plays a central role in the definition of the budget that is missing from the traditional models of the common-pool problem. The relative powers of the executive vis-à-vis the legislative power in the budgetary process are thus not completely orthogonal, from a conceptual standpoint, to our argument relating differences between presidential and parliamentary democracies.

Conclusions

A long-standing literature has focused on the link between fragmentation and fiscal discipline without separating the government and the legislature as distinctive players. This article is part of a recent literature highlighting the importance of this distinction to understand fiscal outcomes in presidential democracies, where the government is independent from the legislature and has stronger independent power over the budget than in parliamentary systems. In particular, this article argues that, in contexts with independent governments that have power over the budget (as in presidential democracies), the link between fragmentation and government spending is best represented by a model that includes an interaction between fragmentation and the degree of ideological polarization that exists between coalition parties. We present empirical evidence consistent with this argument.

In our view, our findings reflect the fact that presidential systems are characterized by permanent negotiations between the legislature and an independent government that needs legislative approval to get its initiatives adopted. As we show, party fragmentation still has an effect in these contexts, as the demands of legislators increase with the degree to which they do not internalize the costs of those demands. However, the

extent to which the government needs to satisfy those demands depends on how far other parties in the coalition are from the government to begin with. In the absence of polarization, legislators find it worthwhile to stand by the government's side even without receiving pork. This reflects the political benefits to them of supporting initiatives aligned with the ideologies of their respective constituencies.

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NOTES

1. Others examine the effect of cabinet fragmentation (e.g., Hallerberg and Marier 2004; Schaltegger and Feld 2009).

2. The extensive use of pork in the presidential democracies of Latin America is documented by Hallerberg, Scartascini, and Stein (2009).

3. We are assuming that the tax bill is only paid for by the n parties in the coalition, rather than by all parties in the legislature. Since we are interested in the size of the governing coalition, this assumption simplifies the calculations. Sharing the bill with noncoalition parties should not change the results, as long as an increase in the effective number of parties in the coalition translates into an increase in the overall effective number of parties, which is plausible.

4. More precisely, $k(.)$ should be written $k(d_i, \hat{d}_i)$. We save on notation by not making the second argument explicit, but the analysis below recognizes that a party's decision to join the coalition or not is not independent from $\hat{d}_i$.

5. We aim to analyze whether there is an equilibrium where all members of the coalition vote in favor of the government's proposal, which is also to ask whether a given party has an incentive to unilaterally deviate from voting positively. If it were the case that $d_i = \hat{d}$, there would be no incentive for party i to unilaterally deviate from joining the coalition.

6. A Nash solution is the simplest way to solve for the negotiation outcome. A more sophisticated solution, although with a similar result, can be found in Nupia (2013).

7. Properties of $b(.)$ guarantee second-order requirements are satisfied.

8. Though $d_i \leq \hat{d}_i$ clearly implies that $P \leq \hat{d}$, the opposite is not true.

9. We have focused on the negotiation of the approval of a given policy previously proposed by the government and abstracted from modeling the decision of which policy to propose. If we were to model the government's policy proposal, Results 1 and 2 hold for any new public policy the government promotes. But, it is indeed the case that the government may, by backwards induction, decide to move away from proposing its preferred policies into proposing policies that are more palatable to legislators and, as a result, less costly to pass. Our results concerning pork-barrel spending would hold as long as the incentive to get policies passed does not fully override incentives to promote the government's preferred policies—that is, as long as pork is necessary for the government to obtain legislative support. Previous evidence suggests this is indeed frequently the case (e.g., Hallerberg, Scartascini, and Stein 2009).

10. Details on the years covered for each country are listed in the online supporting information. Though our sample covers 1978–2005, for presidential countries we only have data up to 2003. For some parliamentary democracies, included in additional exercises, we do have data up to 2005.

11. Implemented using Roodman (2009)'s xtabond2 command for Stata.

12. For presidential democracies, legislative parties are coded in the original data as being in the government coalition if they are represented in the cabinet or supportive of the president on substantial issues. Consistent with our model, these are the parties the government is most likely to engage in negotiations with. We, therefore, use the coding of the coalition already present in the data.

13. We thank an anonymous referee for pointing at several of these political and institutional determinants.

14. Results are robust to instrumenting with more lags as well, but Sargan tests become weaker with these richer instrument matrices.

15. These tests are not presented here, but they are available upon request.

16. In fact, when presidential veto powers and legislative budget dominance are not controlled for, the number of chambers and the personalism index are frequently significant, with the expected signs. It is also important to point out that our ability to identify coefficients associated with time-invariant measures comes from the fact that we are estimating a system GMM rather than a difference GMM.

17. We see these measures as imperfect substitutes to Cheibub's, mainly because they refer only to the budget process, while Cheibub's measure of presidential veto power is more comprehensive. Moreover, using them in our estimations for presidential democracies reduces our presidential sample importantly.

18. The new democracy dummy takes a value of 1 for new democracies and 0 for established democracies. This variable is taken from Brender and Drazen (2005). The OECD dummy takes a value of 1 if a country was in the OECD in 2008; otherwise it takes a value of 0. These fixed effects contribute to our GMM system estimation in the levels equation.

19. An alternative approach that would directly get at how the effects of fragmentation and polarization vary with these institutions would be to include a full array of interactions of F_{it}, P_{it}, and $F_{it}*P_{it}$ with institutional indices for all of these dimensions. Estimating this many effects would necessarily lead to an important loss in estimation precision, raising questions about whether insignificant estimates indicate insignificant effects or simply reflect the inability of the regression to precisely estimate the many different effects we would be trying to identify. Furthermore the interpretation of a model with a

large array of interactions, many of them being triple interactions, is quite noisy. Because of these reasons, and given that we have the specific goal of examining the potential interaction of fragmentation with polarization, we stay away from a fully saturated interacted model.

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Supporting Information

Additional Supporting Information may be found in the online version of this article.

Data Appendix Table 1A: Country-Time Sample