Legislatures, Leaders, and Leviathans: How Constitutional Institutions Affect the Size of Government Spending*

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Objectives. Research has shown that government spending can affect GDP growth rates, yet there is no comprehensive study that looks at how a country's choice of political institutions affects government spending. This article focuses on how the choice of regime type (presidential, parliamentary, or mixed), legislative chamber structure (bicameral or unicameral), legislative chamber size, and electoral rules affect the level of government spending. *Methods.* The methodology used is pooled ordinary least squares for an unbalanced panel of 92 democracies between 1975 and 2007. *Results.* The results show that the relationship between legislative chamber size and government spending is linear in unicameral countries but nonlinear in bicameral countries, plurality electoral rule is always associated with less spending than any other type of electoral rule, and unicameral and bicameral countries should not be modeled together. *Conclusions.* While countries that have long-standing political institutions are less likely to change the characteristics of those political institutions in order to change the level of government spending, the results of this article suggest that countries that are establishing new political institutions (e.g., South Sudan and Libya) stand to benefit from knowing what types of institutions are conducive for growth.

The level of government spending has been shown to have negative effects on per capita GDP growth in many contexts—in both rich and poor countries and at both the state and national levels (Afonso and Furceri, 2008; Barro, 2003; Cooray, 2009; de la Fuente, 1997; Engen and Skinner, 1992; Fölster and Henrekson, 2001; Ghosh Roy, 2009).[1] The persistence of this relationship between government spending and growth highlights the importance of

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[1]My measure of government spending is government consumption as a percentage of real GDP per capita taken from the Penn World tables (Heston et al., 2009). Government spending

SOCIAL SCIENCE QUARTERLY

DOI: 10.1111/j.1540-6237.2012.00895.x

understanding the determinants of the level of government spending. One obvious group of determinants of government spending is the set of political institutions (and their characteristics) a country has in place. In an effort to better understand these factors, I study how various political institutions in a panel of 92 democracies affect the size of government spending. Understanding how political institutions can affect economic growth (directly or indirectly) is an important topic as countries are establishing new political institutions (e.g., South Sudan and Libya). These countries stand to benefit from knowing what types of institutions are conducive for growth.

Previous literature has examined how the structures of political institutions affect the level of government spending. Regime type (presidential vs. parliamentary), electoral rules (plurality vs. proportional representation), legislative structure (unicameral vs. bicameral), and legislature size are among the political institutions and characteristics that have been studied in relation to level of government spending (Bradbury and Crain, 2001; Gilligan and Matsusaka, 1995, 2001; Milesi-Ferretti, Perotti, and Rostagno, 2002; Persson and Tabellini, 1999, 2002, 2003; Ricciuti, 2004). However, there has yet to be a comprehensive investigation of how all of these institutions considered together affect the level of government spending.

In this article, I incorporate a broad range of political institutions/institutional characteristics—regime type, electoral rules, legislative size, and legislative structure—into my analysis. I also allow for a greater degree of heterogeneity in these political institutions and characteristics than the existing literature. When looking at electoral rules for the legislature, the existing literature ignores the possibility that the upper chamber may have a very different set of electoral rules than the lower chamber. I include both lower chamber and upper chamber electoral rules to see what effects the electoral rules of each chamber have on government spending. I also take into account the existence of a third regime type that lies between presidential and parliamentary systems—mixed presidential parliamentary systems. Lastly, I allow for the possibility that the effect of legislative chamber size on the level of government spending may be nonlinear.

The results show that there is a distinct nonlinear relationship between the government share of real GDP and legislative chamber sizes in bicameral countries. More specifically, the relationship between the lower chamber size and government share of real GDP is cubic while the relationship between upper chamber size and government share is quadratic. However, the relationship between unicameral chamber size and government share of real GDP is linear, which corroborates the existing literature (Bradbury and Crain, 2001; Weingast, Shepsle, and Johnsen, 1981). The results consistently show that

and government consumption are not the same thing; however, data on government spending is limited and, because the data on government consumption is available for a greater number country-years, the literature on government size typically uses government consumption as a proxy of government spending.

plurality electoral rule is associated with lower government shares of GDP than any other type of rule. There is also statistical evidence that unicameral and bicameral countries have different estimated coefficients and therefore should be estimated separately.

The rest of the article is organized as follows. The next section reviews the literature on the effect of political institutions on government spending. The subsequent section outlines the definition of democracy chosen for this article and presents the model and the data. The following two sections present the results and the results of some robustness checks. The final section concludes.

Literature on Political Institutions

Chamber Size and Structure

Much of the literature dealing with legislative chamber size is centered on the law of $1/n$, which was formally laid out by Weingast, Shepsle, and Johnsen (1981). The intuition is that if there are n electoral districts, each represented by one legislator, then the tax burden, or cost, of any project to each district is one nth of the total cost. However, the full benefit from each project goes to one district. So the benefit, which is concentrated, is larger than the cost, which is spread over all of the districts. More formally the benefit to district i from project x, $b_i(x)$, is greater than the $1/n$th cost that it bears, $\frac{1}{n}c_i(x)$. As a result, each legislator will favor spending up to the point where the marginal benefit to his or her district equals the marginal cost to that district: $b_i'(x) = \frac{1}{n}c_i'(x)$. From this rule we can see that the optimal level of spending for each legislator increases with n, the number of electoral districts.

This idea suggests that for every additional legislator, the level of government spending should increase linearly (i.e., steadily). However, there is no research that I am aware of on the particular functional form of this relationship. Is the relationship always constant, increasing at a decreasing amount, or at an increasing amount?

There are a few articles that test the law of $1/n$, especially focusing on U.S. state legislatures. Gilligan and Matsusaka (1995, 2001) find that in U.S. states, the level of government spending in the 20th century increases with the size of the legislature. Additionally, they find that the size of the upper chamber is the source of the strongest positive effect on spending. Bradbury and Crain (2001) point out that the underlying assumption of the law of $1/n$ is that there is one chamber making the spending decisions (i.e., unicameral legislature). If this is the case, the use of U.S. states is not truly testing the law of $1/n$ as 49 of 50 states have bicameral legislatures. They, instead, test the theory using a cross-country panel of 35 countries, roughly two-thirds of which are bicameral and one-third which are unicameral, by including the size

of each chamber in the bicameral countries and the size of the only chamber in the unicameral countries all together in their analysis. They find that the size of the lower and unicameral chamber has a positive (linear) effect on spending but that the size of the upper chamber in the bicameral structure has a negative (linear) effect on spending, thereby lessening the effect of the law of $1/n$ present from the lower chamber. However, they still use bicameral legislatures in their specification and assume that bicameral and unicameral countries can be grouped together.

None of the articles testing the law of $1/n$ have considered the possibility of a nonlinear effect between legislature size and government spending. The implication of a linear relationship is that for every additional legislator, the subsequent increase in government spending is always the same and that spending is always increasing. However, there is reason to believe that this relationship cannot hold indefinitely. It is more likely that there is a limit to the increase in spending as a result of an increase in the size of the legislature. Once a certain size is reached, the level of spending either stays constant or decreases. With this kind of relationship, there is also the likelihood that increases in spending as a result of additional legislators do not increase at a constant rate. In other words, instead of a linear relationship, we would expect to see a nonlinear relationship between legislature size and government spending that has a maximum point at the larger end of the chamber sizes in lower or unicameral chambers.

Electoral Rules

There are different types of electoral rules in place throughout the world. Since I am interested in legislatures that are accountable to the population, I only consider democratic countries (as defined by Przeworski et al., 2000) that have free, fair, and competitive elections for the legislature and the executive. This means that at the very least, the lower chamber in a bicameral system and the only chamber in a unicameral system must be elected by the people. However, the upper chamber can be filled either through appointment, direct, or indirect elections.[2] The executive (i.e., president or prime minister) has to be either directly elected (as in some presidential systems) or indirectly elected by elected officials (as in parliamentary systems or the Electoral College in the United States).

Research focusing on the electoral rules of the legislative chamber(s) looks at the different types of constituencies and their effect on different types of government spending (Milesi-Ferretti, Perotti, and Rostagno, 2002; Persson and Tabellini, 1999, 2002, 2003; Scartascini and Crain, 2002). Different electoral rules create different constituencies for politicians.

[2]Appointments to upper chambers can be made by presidents, prime ministers, minority groups, and lower levels of government, to name a few of the ways.

Proportional representation (hereafter PR) electoral rules create nationwide constituencies that are unified either by social class, age, ethnicity, or other types of overarching characteristics, while plurality electoral rules create geographically defined constituencies. As a result, politicians in PR systems target specific subgroups of the national population, while those in plurality systems target groups within a predefined geographical area (Milesi-Ferretti, Perotti, and Rostagno, 2002). Based on the difference in constituencies, we would expect to see that in PR systems, the level of demographic-specific government spending—such as transfers—would be increasing as the number of legislators increases. Similarly, in plurality systems, we would expect the level of geographically targeted government spending—such as goods and services—to be increasing with legislature size. Milesi-Ferretti, Perotti, and Rostagno (2002) and Scartascini and Crain (2002) find evidence that countries with PR electoral rules have higher spending on transfers while countries with plurality electoral rules have higher spending on public goods.

However, the literature that focuses on the electoral rules of the legislature only looks at the unicameral or lower chamber electoral rules, either ignoring the existence of an upper chamber or assuming that the upper chamber has the same electoral rules as the lower chamber. In reality, the rule used for the upper chamber is often different than the rule for the lower chamber. For instance, there are many upper chambers that are not directly elected by the people but are instead indirectly elected by state legislatures, minority groups, or appointed—as in many Commonwealth countries. The literature on bicameralism stresses the fact that the upper chamber serves as a check on the lower chamber (Bradbury and Crain, 2002; Riker, 1992). However, not all upper chambers work the same way. Depending on the type of constituency, which is influenced by the electoral rules, the upper chamber may have different types of influence on the lower chamber. It may indeed check the lower chamber, by having completely different constituents, or it may not work as a check at all and instead support the lower chamber, by having the same set of constituents. Because of their disparate nature, it is important to allow for this discretion when examining the effect that upper chamber electoral rules have on the lower chamber's legislative powers.

The existing literature only tests the effects of different types of lower chamber electoral rules and does not account for upper chamber electoral rules, chamber structure, or legislature size, which, as mentioned above, also have effects on government spending.

Regime Type

Regime type refers to the system of government—presidential, parliamentary, or mixed presidential parliamentary. Presidential systems have a head of government that is elected separately from the legislative branch, creating a distinct separation of powers where the executive's ability to stay in office

is not subject to continued support by a majority of the legislative chamber (Cheibub, Przeworski, and Saiegh, 2004). In this system, the legislative body is forced to bargain with the president in order to assure the passage of legislation (Kunicová and Rose-Ackerman, 2005).[3] In contrast, in parliamentary systems the head of the government is elected by the winning coalition within the parliament and his or her ability to stay in power is subject to continued support of the legislature. In this system there is no clear separation between the head of the government and the legislative branch, as the head of the legislative body is also the head of the government and has considerable power to initiate and push legislation forward (Persson and Tabellini, 2003).

The middle ground between these two systems is a mixed presidential parliamentary system (e.g., the French Fifth Republic). In this system, there is typically both a president who is not subject to continued approval by the legislative branch and a prime minister elected by the winning coalition in the parliament, whose tenure is contingent upon continued support from the parliament. Within this category there are different degrees of power sharing, with some presidents having the ability to dissolve the parliament while in other cases the president is elected by the parliament. However, there is still a separation of power, with the president often having the ability to veto legislation (Persson and Tabellini, 2003).

In presidential systems, as opposed to parliamentary systems, there is a good possibility that the president is from a different party than the majority coalition or party in the legislative branch. Even if they are from the same party the agenda of the executive branch and the legislative branch may not be the same. This can lead to less government spending as the legislative chamber takes time in writing spending legislation that will not be vetoed by the president. In parliamentary systems, the prime minister is essentially the leader of the winning coalition and, as mentioned above, has considerable power to initiate legislation (Persson and Tabellini, 2003). This makes the passage of legislation easier in stable parliamentary systems than in presidential systems. This reasoning suggests that presidential systems will have lower levels of spending than parliamentary systems. Persson and Tabellini (1999, 2002, 2003) find support that presidential systems, ceteris paribus, always have lower levels of government spending.

The literature, however, places mixed system countries into either the parliamentary country grouping or the presidential country grouping (Kunicová and Rose-Ackerman, 2005; Persson and Tabellini, 1999, 2002, 2003; Ricciuti, 2004; Scartascini and Crain, 2002). Persson and Tabellini (2003) argue that the classification of mixed systems is a difficult task and beyond the scope of their study due to the many manifestations of mixed systems and the difficulty in finding information to accurately classify them. Since their work, however, there has been work done on the classification of mixed systems (Cheibub, Gandhi, and Vreeland, 2010).

[3] Unless there is a supermajority that can overturn a presidential veto as in the United States.

Data and Model

In this article, I focus on democratic institutions. In order to identify countries that are democratic, I must first choose a single definition of democracy from the multitude that exists in the literature. I choose the dichotomous measure of democracy laid out in Przeworski et al. (2000) and recently updated by Cheibub, Gandhi, and Vreeland (2010).[4] According to this measure, a country is classified as a democracy provided that: (1) the chief executive is popularly elected or elected by a body that was popularly elected, (2) the legislature is popularly elected, (3) the elections have more than one party participating (i.e., contestation), and (4) there is alternation of power under the electoral rules (Cheibub, Gandhi, and Vreeland, 2010; Przeworski et al., 2000). This dichotomous definition of democracy is the most appropriate for this work because it specifically focuses on electoral requirements and outcomes.[5]

My sample is comprised of democratic countries for the years 1975 through 2007. In order to be included in the sample, a country must have been classified as a democracy for any eight consecutive years within the 33 years the data set covers.[6]

I estimate an unbalanced panel regression using pooled ordinary least squares (POLS) for the 92 countries that comprise the sample for a total of 2,115 country-years.[7] To begin with, I estimate the following model, which is a modified version of Bradbury and Crain's (2001) main specification.

$$G_{it} = \beta_1 Nuni_{it} + \beta_2 Nlower_{it} + \beta_3 Nupper_{it} + \theta HouseElect.Rules_{it} + \gamma SenateElect.Rules_{it} + \varphi RegimeType_{it} + \phi X_{it} + \alpha_0 + \tau_t + \varepsilon_{it}$$

The dependent variable, G_{it}, is the government share of real GDP from the Penn World Tables version 6.3 (Heston, Summers, and Aten, 2009). $Nuni_{it}$ is the size of the unicameral chamber, and $Nlower_{it}$ and $Nupper_{it}$ are the sizes of the lower and upper chambers (and their squares and cubes in the nonlinear

[4]Cheibub, Gandhi, and Vreeland (2010) expanded the 2000 data set up to 2008 and reclassified a few countries based on the political events that occurred in the country after 2000. The complete data set can be found on Cheibub's website.

[5]Other measures of democracy that have been used in the literature include using a cutoff value to denote democracy in the Polity IV democracy variable, the Polity score, or the Gastil index (Persson and Tabellini, 2003). The lists of countries that qualify as democracies using these alternative measures of democracy (and a reasonable cutoff value) are similar to the list of countries classified as democratic using the Przeworski et al. (2000) measure.

[6]One very notable omission is the United Kingdom. It meets the requirement for democracy and all of the other economic and political data are available except for the size of the upper chamber—the House of Lords. That is, the House of Lords has not had a set number of seats historically.

[7]A list of all the data sources used are in an earlier version of the article that can be found on the author's website.

cases).[8] For unicameral countries, $Nlower_{it}$ and $Nupper_{it}$ are equal to zero. For bicameral countries, $Nuni_{it}$ is equal to zero.

$HouseElect.Rule_{it}$ is a dummy that equals one if 50 percent or more of the House is elected through a plurality rule and zero if it is elected through PR. $SenateElect.Rule_{it}$ contains four dummy variables, controlling for the rule that fills 50 percent or more of the upper chamber and one controlling for unicameral countries with no upper chamber. The included electoral rules are plurality, appointed, indirectly elected, PR, and the excluded category is no upper chamber. The vector $RegimeType_{it}$ contains three dummy variables controlling for the system of government. The three regime types are presidential, parliamentary, and mixed presidential parliamentary systems.[9] Presidential and mixed presidential parliamentary are included in the regression and the excluded regime category is parliamentary systems.

The vector X_{it} is a set of control variables. It includes the log of real GDP per capita lagged one period, log of population, population growth, log of trade openness, military expenditure, percentage of population under 15 years of age, percentage of population over 65 years of age, and a set of dummy variables denoting the country's legal origins. GDP per capita is included to control for Wagner's law, which states that government spending increases with GDP (Persson and Tabellini, 2003). Openness, calculated as exports plus imports divided by GDP, is included to control for Rodrik's (1998) finding that more open economies have larger governments in the form of increased government safety net. The log of population is included to control for country size and economies of scale in the production of government services (Alesina and Wacziarg, 1998). Population growth is included to control for the short-run demand for goods and services, such as highways, that are needed to accommodate rapid growth (Gilligan and Matsusaka, 1995). Military expenditure, percentage of the population under the age of 15, and over the age of 65 are included to control for other forms of government services. Countries that spend large amounts on their military tend to have larger government shares of government spending. The age of the population also has an effect on the types and amount of government services that need to be provided. If there is a large young population, more spending on schools is needed while a larger elderly population means that more spending on healthcare is needed. The last controls are a set of dummy variables denoting the country's legal

[8]A full list of the countries included along with the starting and ending year for each, whether they are unicameral, bicameral, or switched between, and the average size of each chamber for the period of inclusion can be found in an earlier version of the article that can be found in the author's website

[9]There is concern that the selection of constitutional structure is not a random choice. There is a concentration of presidential countries in the Americas and parliamentary countries in former British colonies. Persson and Tabellini (2002) compare the results from conventional regresssions against the results using quasi-experimental matching methods and find that the results do not change. Therefore, I do not try to control for this potential problem of endogeneity. In addition, I control for legal origin, which is heavily determined by colonial origin (La Porta, Lopez-de-Silanes, and Shleifer, 2008).

origins. There are four legal origins: English Common Law, French Civil Law, German, and Scandinavian.[10] Legal origin has been shown to affect external finance, which is likely to affect the amount of government spending and is also highly correlated with colonial origin (La Porta, Lopez-de-Silanes, and Shleifer, 2008).[11] The regression also includes time fixed effects, τ_t, to control for time-specific effects. Country fixed effects are not appropriate in this specification because some of the regressors are time invariant. I first estimate the model and test whether unicameral and bicameral countries can be pooled together by running a Chow test for the appropriateness of grouping.[12] The results of the tests reject the hypothesis, at the 1 percent significance level, that bicameral and unicameral countries share the same set of coefficients.[13] In other words, the results of the Chow test suggest that bicameral and unicameral countries should not be grouped together. The majority of the variation between unicameral and bicameral countries is mainly coming from the control variables in the specification. Table 1 shows summary statistics separated by chamber structure. Unicameral countries tend to be poorer, more open to trade, and smaller in terms of population. They also tend to have higher levels of government spending than bicameral countries.

Following the results of the Chow test, I estimate Equation (1) separately for unicameral and bicameral countries. The separate equations are:

For unicameral:

$$G_{it} = \beta_1 Nuni_{it} + \theta_1 HouseElect.Rule_{it} + +\varphi RegimeType_{it} + \phi X_{it} + \alpha_0 + \tau_t + \varepsilon_{it}$$

For bicameral:

$$G_{it} = \beta_1 Nlower_{it} + \beta_2 Nupper_{it} + \theta_1 HouseElect.Rule_{it} + \gamma SenateElect.Rules_{it} + \varphi RegimeType_{it} + \phi X_{it} + \alpha_0 + \tau_t + \varepsilon_{it}$$

The included variables are defined the same as for Equation (1). The major difference here is that the unicameral equation does not include any

[10] In the regressions, English Common Law is the excluded dummy.

[11] Instead of using regional dummies, I use legal origins that are correlated with colonial origin. In the sample of 92 countries, 45 have French legal origins (Latin American countries, former Spanish and French colonies, and a few former Soviet states), 15 have German legal origins, 5 have Scandinavian legal origins, and 27 have English legal origins (mostly former British colonies and Commonwealth countries).

[12] I also test the quadratic (in chamber size) specification of this model and find the same results.

[13] The results from this test are available upon request. I ran the test for the linear specification, the quadratic specification, and the combination of terms that I use later on in the article. In all cases, the test rejects the null that the coefficient for unicameral are zero (i.e., that unicameral and bicameral countries have the same coefficients).

TABLE 1

Summary Statistics by Chamber Structure

Variables	Unicameral $N = 1{,}065$				Bicameral $N = 1{,}050$			
	Mean	*SD*	Min	Max	Mean	*SD*	Min	Max
Government share of real GDP	19.286	7.913	4.203	47.580	15.443	4.871	4.123	30.915
Presidential	0.300	0.458	0.000	1.000	0.287	0.452	0	1
Mixed presidential parliamentary	0.220	0.414	0.000	1.000	0.171	0.377	0	1
Parliamentary	0.481	0.500	0.000	1.000	0.542	0.498	0	1
Log of real GDP per capita	8.622	1.017	6.057	11.287	9.060	0.862	5.953	10.692
Log openness	4.390	0.439	2.827	5.745	4.104	0.621	2.434	5.217
Log population	15.196	1.492	11.697	19.274	16.172	2.204	11.399	20.845
Population growth	1.253	1.206	−2.502	5.637	1.047	0.892	−1.096	3.433
Military expenditure	136.385	280.484	0.000	2,658.8	1,415.335	5,221.168	0	55,256.8
Percent of population below 15 years	29.358	10.341	13.504	47.435	27.771	9.155	13.604	47.165
Percent of population above 64 years	8.828	4.887	1.895	18.479	9.342	4.652	2.119	20.914
British legal origin	0.251	0.434	0	1	0.385	0.487	0	1
French legal origin	0.495	0.500	0	1	0.425	0.495	0	1
German legal origin	0.115	0.319	0	1	0.175	0.380	0	1
Scandinavian legal origin	0.140	0.347	0	1	0.015	0.123	0	1
Unicameral chamber size	155.627	111.811	35	550	-	-	-	-
House electoral rule: plurality	0.345	0.475	0	1	0.467	0.499	0	1
House electoral rule: proportional representation	0.663	0.473	0	1	0.533	0.499	0	1
Lower chamber size	-	-	-	-	235.010	184.262	15	674
Upper chamber size	-	-	-	-	90.425	86.499	8	326
Senate electoral rule: plurality	-	-	-	-	0.324	0.468	0	1
Senate electoral rule: appointed	-	-	-	-	0.230	0.421	0	1
Senate electoral rule: indirect	-	-	-	-	0.164	0.370	0	1
Senate electoral rule: proportional representation	-	-	-	-	0.282	0.450	0	1

bicameral variables and the bicameral equation does not include any unicameral variables.[14]

The next step is to select the optimal specification in terms of legislative chamber size. That is, to see if the models are linear or nonlinear in chamber size. To test for this, I use the Bayesian information criterion (BIC), which allows me to compare models in order to find the model that best fits the data.[15] According to the criterion, the optimal unicameral model is squared in the size of the legislative chamber and the optimal model for bicameral model is cubic in the size of the lower chamber and linear in the size of the upper chamber.[16] In what follows I report only the results for the optimal model (i.e., linear for unicameral and cubic-squared for bicameral).

Results

Unicameral

Column 1 in Table 2 shows the results for the unicameral model.[17] The coefficient on legislature size is positive and significant. This result is in line with the law of $1/n$ and the literature's findings that additional legislators increase the size of government spending (Bradbury and Crain, 2001; Weingast, Shepsle, and Johnsen, 1981). For example, if the size of the legislature increases by one standard deviation, government share of real GDP increases by 1.2 percent, ceteris paribus.

The presidential and House electoral rule coefficients, both negative and significant, support the existing literature (discussed in the previous section). That is, in comparison to parliamentary systems and PR systems, both presidential and plurality systems have lower government shares of real GDP. More specifically, presidential systems' government share of real GDP is smaller than parliamentary systems' share by 2.9 percent and plurality electoral rule

[14]Keep in mind that in the bicameral equation, $SenateElect.Rule_{it}$ now has one less dummy variable, as the dummy for no upper chamber is no longer valid for this vector. The excluded category in this estimation is upper chambers elected through PR.

[15]For the unicameral specification, I compare the linear, quadratic, and cubic models in chamber size and find that the linear model is the optimal choice (i.e., the model with the smallest BIC value). For the bicameral grouping, I compare the nine models that comprise the possible combinations of lower and upper chamber sizes raised up to the third power. BIC is also known as the Schwarz information criterion (SIC) after the author Gideon Schwarz. The optimal dimensionality of the model is the specification that yields the lowest BIC value. For more detail on the test, refer to Schwarz (1978).

[16]These results hold up even when I reduce the sample by averaging the dependent variable in order to try to smooth out the business cycle, which I do in the robustness section later in the article.

[17]I only report the optimal equation based on the BIC in the unicameral and bicameral results. The results for other specifications are available upon request.

TABLE 2

Main Results

Variables	(1) Government Share of Real GDP	(2)
Size unicameral chamber	0.0107***	
	(0.0033)	
Size lower chamber		−0.0609***
		(0.0117)
(Size lower chamber)^2		0.0003***
		(0.0000)
(Size lower chamber)^3		−0.0000***
		(0.0000)
Size upper chamber		−0.0400***
		(0.0132)
(Size upper chamber)^2		0.0001***
		(0.0000)
House electoral rule plurality	−4.6652***	−3.1455***
	(0.5529)	(0.3309)
Senate electoral rule plurality		−8.3359***
		(0.4923)
Senate electoral rule appointed		−0.6314
		(0.6286)
Senate electoral rule indirect		−2.3125***
		(0.6247)
Presidential	−2.8553***	−1.2813
	(0.6931)	(0.8322)
Mixed presidential parliamentary	0.7195	−1.3884*
	(0.5520)	(0.7140)
Lagged log of real GDP per capita	−4.8356***	−2.5358***
	(0.3904)	(0.2980)
Log openness	1.7857*	1.2322***
	(0.9213)	(0.4343)
Log population	−2.3597***	0.4422*
	(0.3378)	(0.2676)
Population growth	−0.6908*	−0.4002*
	(0.3642)	(0.2113)
Military expenditure	0.0043***	0.0000
	(0.0009)	(0.0000)
Percent of population below 15	0.3112***	−0.0901**
	(0.0591)	(0.0452)
Percent of population above 65	0.6689***	−0.1462
	(0.1246)	(0.0955)
French legal origin	−4.8474***	0.4399
	(0.6194)	(0.7486)
German legal origin	−1.7934*	0.9465*
	(0.9695)	(0.5021)
Scandinavian legal origin	−2.3346***	−0.2442
	(0.7768)	(0.9226)
Constant	76.6601***	37.6634***
	(10.3428)	(5.7515)
N	1,065	1,050
R^2	0.3431	0.5142

NOTE : Year dummies not reported to save space. Robust standard errors in parentheses.
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

results in 4.7 percent smaller government share of real GDP than PR electoral rule. The coefficient on mixed presidential parliamentary systems is not significantly different from zero for the full sample of unicameral country-years. This suggests that mixed systems, in unicameral countries, have similar levels of government spending as parliamentary systems.

As for the control variables, the lagged log of real GDP per capita is negative and significant. However, the literature suggests that it should be positive based on the idea that demand for government goods and services increases with income. The coefficient on the log of population is negative and significant, showing that as population increases, the government share of real GDP decreases. This result follows Gilligan and Matsusaka's (1995) argument that there are economies of scale that appear as a negative coefficient on log of population. Openness and military expenditure are both positive and significant as expected. That is, more open countries have higher levels of government spending due to a higher demand for a government-provided safety net and higher levels of military spending naturally translate into higher levels of government spending (Rodrik, 1998). Percentage of the population under 15 and over 65 years of age are both positive and significant. While the coefficients are not similar, a one standard deviation increase in each variable increases government spending by similar amounts (3.2 percent for a one standard deviation increase in the percent of population under 15 and by 3.3 percent for a one standard deviation increase in the percent of population over 65). The last set of controls, the dummy variables for legal origin, is all negative and significant. This means that in comparison to English Common Law (the excluded variable), having French, German, or Scandinavian legal origins decreases the share of government spending. The largest result is for French Civil Law origins; countries that have French Civil Law origins have 4.9 percent less government spending than countries that have English Common Law.

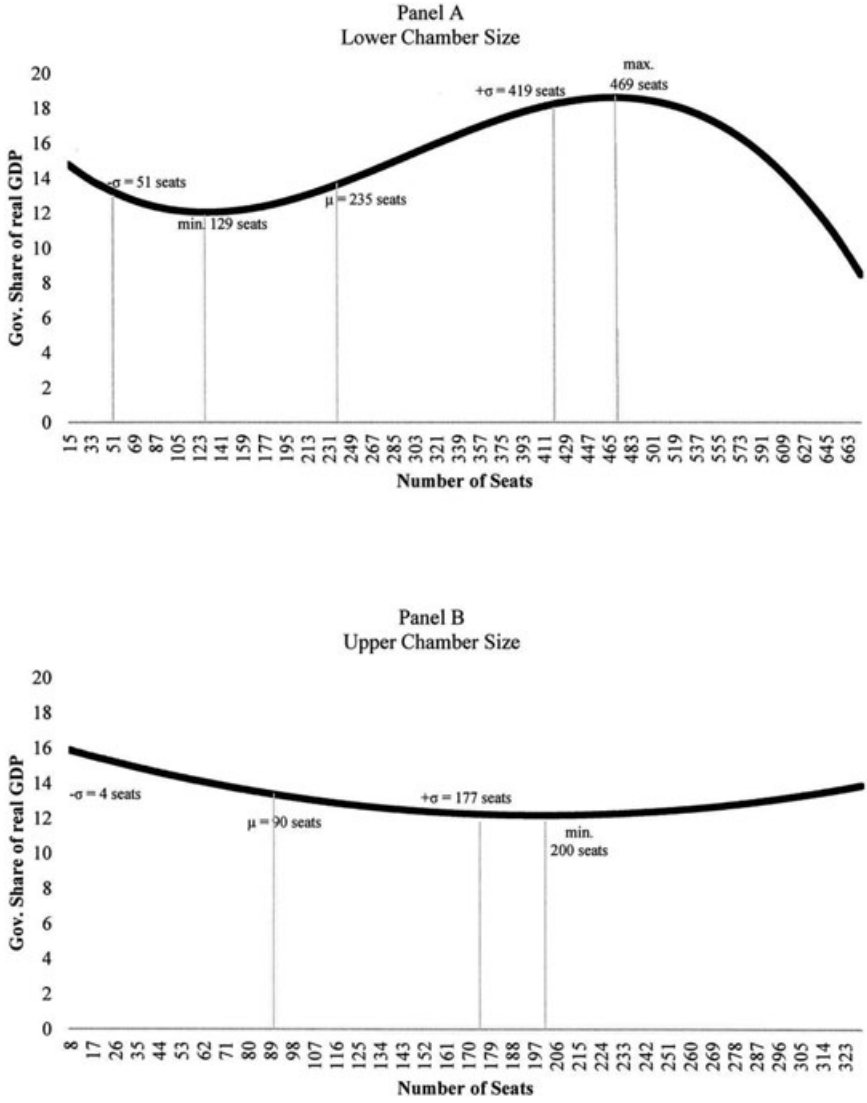
Bicameral

Column 2 in Table 2 shows the results for the bicameral model. The coefficients on the lower chamber size show that there is a nonlinear relationship between the size of the lower chamber and government share of real GDP per capita. Panel A in Figure 1 depicts the results of lower chamber size against government spending holding everything else at mean values, and varying the size of the lower chamber.

From the image, we can see that there is a maximum and a minimum spending point within the range of real-world chamber sizes. The maximum is reached at 469 seats and the minimum at 129 seats, ceteris paribus. It is interesting to note that almost all of the country-years that would fall on the downward sloping part of the curve (at the lower end of the chamber sizes) are small countries and/or island nations. Smaller countries tend to have

FIGURE 1

Panel A: Cubic Relationship Between Lower Chamber Size and Government Share of Real GDP
Panel B: Quadratic Relationship Between Upper Chamber Size and Government Share of Real GDP



lower levels of government spending and may be what are driving the initial downward sloping part of the curve.[18]

The maximum point is well above the average lower chamber size of 235 seats and outside the one standard deviation band (both of these are depicted in Figure 1). Most countries have lower chambers that are smaller than this maximum and most countries fall between the minimum and maximum point on the upward sloping part of the curve. Although the slope of the curve is positive for this section, there is an inflection point at 300 seats. The increase in government spending as a result of an additional legislator, ceteris paribus, increases more than proportionally after the minimum of 129 seats up to 300 seats and then increases at a decreasing rate until it hits the maximum point of 469 seats. This result suggests that, while for most countries there is a positive relationship between lower chamber size and government spending, the relationship is not always constant nor is it always increasing. The nonlinear specification and the resulting inflection points tell a different story than the results for the unicameral chamber. Recall that the law of $1/n$ supports a linear relationship (i.e., always increasing at the same rate) and the findings in the unicameral specification followed this relationship. However, in the bicameral setting, there is a very strong nonlinear relationship and the increase in government share of real GDP is not constant.

The results for the upper chamber also show a nonlinear relationship, which is depicted in Panel B in Figure 1. The government share of real GDP decreases as the size of the upper chamber increases up to a point and then increases. However, most of the upper chambers in the sample lie on the downward sloping part of the graph. There are only five countries that lie above the minimum part of the graph.[19] This result supports Bradbury and Crain's (2002) finding that the upper chamber dampens the spending behavior of the lower chamber.

The electoral rules in this specification are slightly more complicated than in the unicameral case because there are two chambers to account for and there are more upper chamber rules. Lower chambers can be elected either through PR or through plurality. The included dummy for the lower chamber is plurality. Upper chambers can be appointed, indirectly elected, or directly elected through PR or plurality electoral rules. The excluded dummy variable is PR. The coefficient for the lower chamber confirms the literature's finding that the plurality electoral rule yields lower levels of government spending, ceteris paribus, than PR electoral rules. I find a similar and stronger result in the upper chamber. The coefficient shows that, holding everything else constant, the plurality electoral rule for the upper chamber results in 8.3 percent less government share of real GDP than with PR electoral rule. Of all the electoral rules, PR upper chambers (along with appointed upper chambers) appear to be the worst in terms of limiting government share of real GDP.

[18]The list of country-years based on chamber sizes can be provided upon request.
[19]Spain, France, India, Italy, and Japan.

The coefficients on the regime type are not really significant. While the coefficient on presidential regime type is negative it is not significantly different from the parliamentary systems. The addition to the literature is that the mixed presidential parliamentary system is significantly different than the presidential and parliamentary systems (albeit the coefficient is only significant at the 10 percent level). In terms of government share of real GDP, mixed systems have lower shares than the other two systems. The existing literature, due to complications in the classification of mixed systems, ignores the presence on this third regime type by grouping the countries into either the presidential or the parliamentary groups. The results here show that mixed systems are actually different than the other two groups and should be considered separately.

Log of real GDP per capita is, once again, negative and significant and contrary to what the literature predicts. Openness is positive and significant, supporting the idea that more open countries have higher levels of government spending due to a higher demand for a government provided safety net (Rodrik, 1998). Log of population has the expected negative sign but population growth is negative and significant in this specification, which is contrary to the literature. Unlike with unicameral countries, military spending and percentage of the population over 65 are both statistically and economically insignificant. However, percentage of the population under 15 years of age is negative and significant, suggesting that a younger population reduces the share of government spending. The legal origin dummies are mostly insignificant with German legal origin only slightly statistically significant but not economically significant.

The results in this section suggest that the law of $1/n$ appears to apply to unicameral countries. Bradbury and Crain (2001) made the argument that the underlying assumption behind the law of $1/n$ is that one legislative chamber makes the spending decisions. In other words, that the law of $1/n$ requires the legislative structure to be unicameral. The results here confirm that in unicameral chambers the law of $1/n$ does hold. For bicameral countries, however, the relationship between legislative chamber and government share of real GDP is not linear. In fact, the relationship between the size of the legislative chambers and government spending is significantly nonlinear. So, the law of $1/n$ does not apply to bicameral chambers. The results do show that upper chambers do work to dampen the effects of the lower chambers' spending.

The results in this section may be driven by extreme values in the data (i.e., countries with large legislative chambers). In the next section, I perform some robustness checks to see if the results are robust to the removal of outlying chamber sizes.

Robustness Checks

To test for the possibility of extreme values influencing the results, I reestimate the unicameral and bicameral models dropping country-years whose

legislative chamber sizes are larger than two standard deviations from the mean.

Unicameral

The results in the previous section show that there is a strong positive linear relationship between legislature chamber size and government share of real GDP. However, there is a wide range of chamber sizes in the sample with extreme values in the upper end of the chamber sizes. Column 2 in Table 3 shows the results when estimating the unicameral model for only the country years with chamber sizes within two standard deviations of the average chamber size (i.e., unicameral sizes less than 378 chairs).[20] For these country years, the coefficient for unicameral chamber is no longer significant. Almost all of the other variables in the model increased in absolute magnitude.

It appears that the coefficient on unicameral chamber size is sensitive to extreme values in the sample. This really calls into question the validity of the law of $1/n$. Not only does it not apply to bicameral chambers, it does not appear to be robust to the exclusion of extreme chamber size values.

Bicameral

Dropping extreme values for bicameral countries is a bit more complicated since it has to be done for the lower and upper chambers. Columns 3 through 6 in Table 3 show the results for the various estimations of the bicameral model.

I first address the extreme values in the lower chamber. Column 4 shows the results when estimating the bicameral model for only the country-years with lower chamber sizes within two standard deviations of the average lower chamber size (i.e., lower chamber sizes below 655 chairs).[21] Notice that all of the lower chamber size coefficients are still significant and have similar (slightly larger) magnitudes as the original specification (shown in Column 3). A notable difference is that the coefficients on presidential and mixed systems are now highly significant, suggesting that countries with presidential and mixed systems spend 2.4 percent and 2.5 percent less, respectively, than parliamentary systems.

Column 5 shows the results of the bicameral model when removing all the country-years with upper chamber sizes larger than two standard deviations past the average upper chamber size (i.e., excluding chamber sizes greater than 267 chairs).[22] Similar to the results so far, all of the coefficients on the

[20] Excluded countries—Hungary, Turkey, Ukraine, and Indonesia.
[21] Excluded country—Germany.
[22] Excluded countries—France and Italy.

TABLE 3

Bicameral Excluding Extreme Chamber Sizes

	(1)	(2)	(3)	(4)	(5)	(6)
	Government Share of Real GDP					
	Unicameral Results		Bicameral Results			
	All UNI (Table 2)	$\pm 2\sigma$ UNI Size ONLY	All BI (Table 2)	Minus Lower Chamber Extreme Values	Minus Upper Chamber Extreme Values	Minus Lower and Upper Chamber Extreme Values
					(Extreme Values = 2σ Away from Mean)	
Size unicameral chamber	0.0107***	−0.0055				
	(0.0033)	(0.0045)				
Size lower chamber			−0.0609***	−0.0687***	−0.0592***	−0.0606***
			(0.0117)	(0.0118)	(0.0120)	(0.0195)
(Size lower chamber)^2			0.0003***	0.0004***	0.0003***	0.0003***
			(0.0000)	(0.0000)	(0.0000)	(0.0001)
(Size lower chamber)^3			−0.0000***	−0.0000***	−0.0000***	−0.0000***
			(0.0000)	(0.0000)	(0.0000)	(0.0000)
Size upper chamber			−0.0400***	−0.0811***	−0.0459**	−0.0825***
			(0.0132)	(0.0155)	(0.0198)	(0.0199)
(Size upper chamber)^2			0.0001***	0.0002***	0.0001**	0.0002***
			(0.0000)	(0.0000)	(0.0001)	(0.0001)
House electoral rule plurality	−4.6652***	−5.6168***	−3.1455***	−3.5729***	−3.0847***	−3.6326***
	(0.5529)	(0.5848)	(0.3309)	(0.3325)	(0.3861)	(0.3606)
Senate electoral rule plurality			−8.3359***	−9.4567***	−8.4057***	−9.3801***
			(0.4923)	(0.5069)	(0.5494)	(0.5675)
Senate electoral rule appointed			−0.6314	−1.6261***	−0.6099	−1.4400*
			(0.6286)	(0.6299)	(0.6431)	(0.7523)
Senate electoral rule indirect			−2.3125***	−2.8556***	−2.3204***	−2.9392***
			(0.6247)	(0.6166)	(0.6517)	(0.6579)
Presidential	−2.8553***	−3.7291***	−1.2813	−2.3711***	−1.2459	−2.3624***
	(0.6931)	(0.6879)	(0.8322)	(0.8611)	(0.8083)	(0.8244)

TABLE 3—continued

	(1)	(2)	(3)	(4)	(5)	(6)
	Government Share of Real GDP					
	Unicameral Results		Bicameral Results			
	All UNI (Table 2)	±2σ UNI Size ONLY	All BI (Table 2)	Minus Lower Chamber Extreme Values	Minus Upper Chamber Extreme Values	Minus Lower and Upper Chamber Extreme Values
Mixed presidential parliamentary	0.7195	−0.0387	−1.3884*	−2.4613***	−1.2165	−2.4208***
	(0.5520)	(0.5829)	(0.7140)	(0.6968)	(0.8872)	(0.8876)
Log of real GDP per capitat^{-1}	−4.8356***	−5.0649***	−2.5358***	−2.4131***	−2.4988***	−2.4073***
	(0.3904)	(0.3991)	(0.2980)	(0.2965)	(0.3393)	(0.3296)
Log openness	1.7857*	0.4875	1.2322***	1.8491***	1.2627***	1.8377***
	(0.9213)	(0.9659)	(0.4343)	(0.4103)	(0.4214)	(0.4242)
Log population	−2.3597***	−2.1487***	0.4422*	0.7281***	0.4487*	0.6861**
	(0.3378)	(0.3408)	(0.2676)	(0.2697)	(0.2673)	(0.2692)
Population growth	−0.6908*	−0.6126	−0.4002*	−0.6291***	−0.4019*	−0.6687***
	(0.3642)	(0.3848)	(0.2113)	(0.1996)	(0.2144)	(0.2053)
Military expenditure	0.0043***	0.0060***	0.0000	−0.0000	0.0000	−0.0000
	(0.0009)	(0.0010)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Percent of population below 15	0.3112***	0.3145***	−0.0901**	−0.0405	−0.0872*	−0.0306
	(0.0591)	(0.0640)	(0.0452)	(0.0438)	(0.0493)	(0.0470)
Percent of population above 65	0.6689***	0.6663***	−0.1462	−0.0874	−0.1363	−0.0688
	(0.1246)	(0.1384)	(0.0955)	(0.0944)	(0.1005)	(0.0954)
French legal origin	−4.8474***	−4.9876***	0.4399	0.7271	0.5309	0.7252
	(0.6194)	(0.6313)	(0.7486)	(0.7360)	(0.8290)	(0.8615)
German legal origin	−1.7934*	−1.4696	0.9465*	1.4771***	0.8768	1.3260***
	(0.9695)	(1.0557)	(0.5021)	(0.5280)	(0.5355)	(0.5064)
Scandinavian legal origin	−2.3346***	−1.5855**	−0.2442	−0.2753	−0.3861	−0.2613
	(0.7768)	(0.7604)	(0.9226)	(0.9169)	(1.0390)	(0.9742)
Constant	76.6601***	83.9778***	37.6634***	30.2027***	36.8625***	30.0000***
	(10.3428)	(10.6593)	(5.7515)	(5.8589)	(6.3224)	(6.2897)
Observations	1,065	1,001	1,050	1,018	984	952
R^2	0.3431	0.3667	0.5142	0.5439	0.5093	0.5396

NOTE : Year dummies not reported to save space. Robust standard errors in parentheses.
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

chamber sizes remain significant and have similar magnitudes to the original specification. The rest of the coefficients also maintained their significance in this subset of the data.

The last robustness check is to drop extreme values in both chambers at the same time to see if the results still hold up. Column 6 shows the results when dropping the lower and upper chambers that are larger than two standard deviations from the average. The results are very similar to the original results. Overall, it appears that the results are robust to the exclusion of extreme values in bicameral countries.

Conclusion

In this article, I undertake a comprehensive study of the relationship between political institutions and level of government spending. I incorporate both the political institutions that have been used in the literature and go further by accounting for: (1) differences in upper chamber electoral rules, (2) the existence of mixed presidential parliamentary systems, and (3) the possibility of a nonlinear relationship between legislature chamber size and spending. The results show that there is a linear relationship between unicameral chamber size and level of government spending in unicameral countries. However, this result is not robust to the exclusion of extreme values in legislative chamber sizes. The results also show that there is a nonlinear relationship between lower chamber size and level of government spending in bicameral countries and the results are robust to the exclusion of extreme values. In both types of legislative structures, plurality electoral rule is always associated with lower levels of government share of GDP. Lastly, when testing to see if bicameral and unicameral countries should be grouped together, I find that they should not.

The results presented here suggest that the political structure and the characteristics of the legislative chamber have a significant effect on the level of government spending. While countries that have long-standing political institutions are less likely to change the characteristics of those political institutions in order to change the level of government spending, countries that are establishing new political institutions (e.g., South Sudan and Libya) stand to benefit from knowing what types of institutions are conducive for growth.

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