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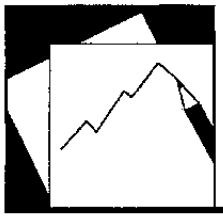

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Electoral Systems and Public Spending

Gian Maria Milesi-Ferretti, Roberto Perotti
with Massimo Rostagno

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Electoral Systems and Public Spending

Prepared by Gian Maria Milesi-Ferretti, Roberto Perotti with Massimo Rostagno*

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Abstract

We study the effects of electoral institutions on the size and composition of public expenditure in OECD and Latin American countries. We present a model emphasizing the distinction between purchases of goods and services, which are easier to target geographically, and transfers, which are easier to target across social groups. Voters have an incentive to elect representatives more prone to transfer spending in proportional systems. The model also predicts higher primary spending in proportional systems when the share of transfer spending is high. After defining rigorous measures of proportionality, we find considerable empirical support for our predictions.

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Author's E-Mail Address: Gmilesiferritti@imf.org

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I. INTRODUCTION

In modern democracies, elected representatives making decisions on fiscal policy face a basic trade-off: that between allegiance to a social constituency and allegiance to a geographic constituency. Elected officials represent a specific district, but also typically advance the interests of specific social groups that spread across many districts or the whole nation. This trade-off is relevant to fiscal policymaking because it parallels the distinction between the two main types of government spending: transfers and purchases of goods and services.[1] The former are mostly targeted to groups of individuals with certain social characteristics, such as the unemployed and the elderly; the scope for targeting them geographically is therefore limited. The latter (which we will call public goods for brevity) instead are typically targeted along geographical lines.

In this paper, we study how the electoral system shapes this trade-off and the incentives of elected officials to allocate revenues to the two types of spending. Loosely speaking, our model captures the widespread notion that "proportional systems allow representation of a greater variety of interests" (a frequent claim by advocates of this system), while "majoritarian systems are more grounded in local interests." Given the different targeting features of the two types of spending highlighted above, we show that proportional systems are more geared to spending on transfers, while majoritarian systems are more prone to public good spending.

The model is based on an extension of the logic of strategic delegation of Chari, Jones and Marimon (1997) and Besley and Coate (1999) to a framework with two types of government spending and with different electoral systems. In a majoritarian system, each district elects one representative. If the geographic distribution of different social groups is similar across districts, all representatives will belong to the same social group. Hence, all elected representatives derive utility from the same type of transfers, but each derives utility from a different public good. It follows that electors will have an incentive to vote for individuals with stronger preferences for public goods relative to transfers, in order to bias government expenditure on public goods towards their district. In equilibrium, the result is just high expenditure on public goods.

In a proportional system, each district elects more than one representative. Hence, more than one social group will be represented in Parliament; in contrast to the majoritarian system, now each representative derives utility from a different type of transfer. Individuals have an incentive to vote for representatives with stronger preference for transfers, in order to bias the spending decisions of the government towards their own type of transfers. In equilibrium, high spending on transfers is the result. The model then predicts that spending on transfers is higher in proportional systems, and spending on public goods is higher under majoritarian systems. Total government spending is higher in proportional systems if the median voter values relatively little the public good and relatively highly private consumption and transfers, lower in the opposite case.

[1]Together, these two items make up about 90% of total primary spending in OECD countries.

One virtue of our model is that it captures common and, we believe, plausible views both of the properties of different electoral systems *and* of different types of government spending. Yet, we do not claim for the model a generality that it cannot have. Basic ingredients of the model are the fiscal instruments used, the distribution of voters' preferences, the rules to aggregate these preferences, the rules for government formation, the rules to aggregate preferences of coalition members, and the government's ability to precommit. Different permutations of alternative assumptions on any of these ingredients can generate an enormous number of predictions.[2]

Still, we can identify a few clear differences with the growing recent literature on the relationship between electoral systems and fiscal policy, surveyed in Persson and Tabellini (1999b and 2000a). A common theme in this literature is that two candidates make binding promises on two types of expenditure, a "universal" expenditure and a more targetable one. These take the form of a universal public good and transfers that are targetable to individuals or localities in Persson and Tabellini (1999a) and Lizzeri and Persico (1999), or a universal transfer and local public goods in Persson and Tabellini (2000a). Our model does not have a universal type of spending, but two types of goods with different targeting characteristics. This is what generates the dichotomy between "allegiance to social constituencies" and "allegiance to geographic constituencies," and that between "greater variety of interests" in proportional systems and "greater importance of local interests" in majoritarian systems. Our model also deals explicitly with the interaction between electoral institutions and government formation.

In principle, one could hope to shed light on the underlying mechanisms, and therefore discriminate between alternative models. We are skeptical that this can be done, however, and certainly we do not attempt this exercise here. Our goal is more modest: we provide some empirical evidence on the *reduced form* relationship between electoral systems and government spending. As such, this evidence can help discriminate between models only to the extent that they have different reduced form predictions.

In fact, the reduced form empirical implications of our model also differ from those of existing models (see Persson and Tabellini (2000b) for empirical results broadly consistent with these models). In general, the latter predict that spending on the more universal type of expenditure will be higher in proportional systems, while spending on the more targetable expenditure will be higher in majoritarian systems; our model predicts that transfers expenditure will be higher in proportional systems, purchases of goods and services in majoritarian systems.[3]

[2]For instance, Austen-Smith and Banks (1988) and Baron and Diermeier (2000) show in different contexts how voters can behave strategically in their electoral decision, internalizing the expected coalition bargaining that will lead to policy formation after the election. Strategic voting can lead electors to pick a party whose preferences or policy platform are more distant from theirs than another party's. Key issues are how the right to propose a government coalition is attributed (typically depending on vote shares) and what is each party's utility out of the status-quo outcome in case an agreement is not reached. As we will see, these issues do not arise in our model, because the right to form a government is attributed randomly in our model and all representatives who refuse an offer to take part in the government receive the same utility.

[3]In Lizzeri and Persico (1999) spending on transfers is the same in the two electoral systems,

These models also imply that total government expenditure will be higher in majoritarian systems, while in our model the effect of the electoral system on total government spending depends on the share of transfers in total spending – and, more deeply, the underlying distribution of voters preferences. In both cross-sectional and panel regressions, we find considerable support for the predictions of our model.

The plan of the paper is as follows. The next section presents the model. Sections 3 and 4 solve it in the majoritarian and proportional systems, respectively. Sections 5 and 6 discuss how to operationalize voting systems in view of an empirical test of the model. Section 7 presents the cross-sectional evidence, section 8 the panel evidence. Section 9 discusses further the relationship with the literature and concludes. Some more technical passages in the solution of the model are presented in Appendix A; the data and the construction of the electoral variables are discussed in the Appendix B.

II. THE MODEL

A. Population and the Fiscal System

The country is populated by a continuum of individuals, with total mass 1. The population is divided into three groups, A, B, and C, with size μ_A, μ_B, and μ_C, respectively. These sizes can be different, but no group can include more than 50 percent or less than 25 percent of the population.[4]The country is composed of three geographic regions. A region can be thought of as the basic subnational unit of the country: hence, government spending cannot be targeted more finely than a region.

There are two types of government expenditure: transfers and purchases of goods and services, or "public goods." Typically, the government fixes the eligibility criteria for a specific transfer, and all citizens who meet the criteria are then eligible for that transfer, regardless of their region of residence. For instance, old age pensions are paid to all national residents above a certain age who have paid enough contributions, and unemployment benefits are paid to all unemployed individuals with a work history. In contrast, spending on goods and services is local in nature. The government can always decide to build a school or to hire more policemen in a city and not in another; it is a matter of policy how evenly distributed these expenditures are on the national territory.

Of course, the distinction is not always precise. Certain goods or services purchased by the government are available virtually to the whole population (for instance, a plane in a state-owned airline company). But it is more rare for transfers to households provided by the central government to be explicitly localized: we do not usually observe a legislation that bars

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while spending on the universal public good can be higher or lower in the majoritarian system depending on the value of the public good to the individuals.

[4]As we will see, this condition ensures that all three groups are represented in a proportional system.

citizens from a certain transfer only because of where they live.[5] Thus, we believe that, by and large, the distinction we have made is conceptually and empirically sound.

We capture this difference between the two types of government spending in a simple way. Because of some different underlying characteristics, individuals in the three groups differ in the types of transfers they are entitled to: an individual in group j benefits from the transfer s_j, but not from the transfers specific to the other groups. In contrast, individuals in region k derive utility from public good spending in region k, g_k, and not from the public goods specific to the other regions.

All individuals have the same productivity, which we normalize at 1. The utility of individual i of group j in region k is:

$$U_{ijk} = (1-t)^{\alpha_i\beta_i} s_j^{\alpha_i(1-\beta_i)} g_k^{1-\alpha_i} \tag{1}$$

where t is the proportional tax rate, and $(1-t)$ is therefore the post-tax income of an individual. Thus, individuals have Cobb-Douglas preferences over public goods and private income, and Cobb-Douglas preferences over the breakdown of disposable income into primary income and transfer income. The index i refers to the fact that, within each group, the parameters α_i and β_i are independently distributed over the interval (0,1).

B. The Electoral System and Government Formation

The values of the tax rate t, of the transfers s_j, and of the public goods g_k, are decided by elected representatives. We need to describe the two stages of the process: first, how representatives are elected; second, how their preferences are aggregated to deliver the policy outcomes on t, s_j, and g_k.

First stage: the electoral system

The first stage corresponds to the electoral system. We fix the total number of representatives at 3, and characterize an electoral system by the number of electoral districts. At one extreme, each of the three regions is a separate electoral district, each electing one representative. We call this the **majoritarian system.** At the other extreme, the whole country makes up a single electoral district, electing three representatives. We call this the **proportional system.**

Representatives of group j from different regions all derive utility from the same transfer s_j, but from different public goods. When a district comprises more than one region, as in the proportional system, it is not necessary for our purposes to specify fully the process by which a given amount of public good spending allocated to the district is then allocated to the regions

[5]Of course, transfers can end up being more concentrated in certain areas because of the demographic or labor market characteristics of these areas: thus, Florida receives more old-age pension expenditure per person than most other states, and high-unemployment areas receive a larger share of unemployment-related transfers.

within the district; we simply assume that, whatever process is in place, the equilibrium outcome is a uniform allocation of total public good spending among the regions. The within-district allocation can be interpreted as a subnational voting or bargaining process that takes as given the total amount of public good spending allocated to that district by the central government; the uniform distribution among regions seems a natural outcome, and would result from many voting and bargaining schemes that one could specify (though, of course, not from all).[6] Our model focuses on the allocation to districts at the central government level; in turn, in deciding its allocation, the central government takes into account that it will be divided equally among the regions in the district.

Second stage: government formation

The second stage describes how governments are formed and how their decisions are taken. The literature has provided a large number of possibilities here. In our set-up, a simple but natural way to formalize government formation is the following. One of the three representatives (the Prime Minister) is selected at random to form a government. He makes an offer to join the government to another representative; if the latter accepts, the government is formed. If the latter does not accept, the Prime Minister makes an offer to the other representative to join the government.

When a representative accepts the offer of the Prime Minister, the government is formed and a policy is decided by maximizing a joint utility function. It should be clear that: *(i)* it is not in the interest of the Prime Minister to offer more than one representative to join the government; *(ii)* it is in the interest of a representative to accept an offer by the Prime Minister.

Besides its simplicity, this formulation of the political process has the important virtue that it separates the electoral system from the formation of government; that is, electoral systems differ only in the way representatives are elected, and not in the way governments are assumed to be formed.

Note also that our model generates only minimum winning coalitions. There is no reason for the two representatives in a government to dilute their policies by asking the third representative to join the government.

III. MAJORITARIAN SYSTEM

In this system each of the three districts elects one representative. We solve the model backward, starting with the policies chosen by the government first.

[6]All the results of this paper would go through exactly even if we treated the subnational governments symmetrically to the national government: namely, the subnational government at the district level is formed by the representatives of a region chosen at random, who then invites the representative from another region to join the government.

A. The Policy Formation in the Government

Because all districts have the same composition, the three representatives will all belong to the same group, the largest one.[7] Assume group B is such group: thus, the government will be composed of two B-individuals, elected in two different districts. Let the districts where the two members of the government have been elected be denoted by k_1 and k_2; and let a "*" denote an elected individual. The government will maximize the joint utility

$$\begin{aligned} V^M(k_1,k_2) &= (\alpha^*_{k_1}\beta^*_{k_1} + \alpha^*_{k_2}\beta^*_{k_2})\log(1-t) + (\alpha^*_{k_1}(1-\beta^*_{k_1}) \\ &\quad +\alpha^*_{k_2}(1-\beta^*_{k_2}))\log s_B + (1-\alpha^*_{k_1})\log g_{k_1} + (1-\alpha^*_{k_2})\log g_{k_2} \end{aligned} \tag{2}$$

where the superscript M denotes a majoritarian system and $\alpha^*_{k_i}$ and $\beta^*_{k_i}$ represent the preferences of the individuals elected in district k_i. These representatives (and their constituencies) want different public goods, but both derive utility only from the transfer s_B.

The maximization of the above objective function is subject to the government budget constraint:

$$t = \mu_B s_B + g_{k_1} + g_{k_2} \tag{3}$$

where t is the proportional tax rate and the aggregate income of the economy is 1. To understand the above expression, recall that the per capita transfer is s_B: only individuals of type B (a fraction μ_B of the population) receive it: there is no reason for the two representatives in the government to vote for a positive transfer that benefits the two other groups.

Let t, s and g denote the shares in GDP of total expenditure, transfers, and expenditure on the public goods, i.e. $s \equiv \Sigma_{j=A}^{C}\mu_j s_j$; $g \equiv \Sigma_{k=1}^{3} g_k$, and $t \equiv s+g$. It is straightforward to show that the government policies that maximize (2) are:

$$\begin{aligned} t^M(k_1,k_2) &= \frac{2-(\alpha^*_{k_1}\beta^*_{k_1} + \alpha^*_{k_2}\beta^*_{k_2})}{2} \\ s^M_B(k_1,k_2) &= \frac{\alpha^*_{k_1}(1-\beta^*_{k_1}) + \alpha^*_{k_2}(1-\beta^*_{k_2})}{2}; \quad s^M_A(k_1,k_2) = 0; \quad s^M_C(k_1,k_2) = 0 \\ g^M_{k_1}(k_1,k_2) &= \frac{1-\alpha^*_{k_1}}{2}; \qquad g^M_{k_2}(k_1,k_2) = \frac{1-\alpha^*_{k_2}}{2}; \qquad g^M_{k_3}(k_1,k_2) = 0 \\ g^M(k_1,k_2) &\equiv g^M_{k_1}(k_1,k_2) + g^M_{k_2}(k_1,k_2) = \frac{2-\alpha^*_{k_1}-\alpha^*_{k_2}}{2} \end{aligned} \tag{4}$$

where $t^M(k_1,k_2)$ indicates the equilibrium value of total primary spending in the majoritarian system when the government is formed by representatives from districts k_1 and k_2, and similarly for the other fiscal policy variables.

[7] The assumption that a group larger than the others exists simplifies considerably the algebra in the majoritarian case, but in no way is it essential to our argument. All our results would go through if we assumed that all groups have the same size 1/3.

B. The Choice of the Representatives

In Appendix A, we show that the individual with median values of the parameters α and β is the decisive voter in each group, despite the fact that the issue space is bi-dimensional. The median voter of group B in region k_1 maximizes with respect to $\alpha^*_{k_1}$ and $\beta^*_{k_1}$ the utility function:[8]

$$\begin{aligned} E(V^M_{mBk_1}) &= \sum_{r=2}^{3}[\alpha_m\beta_m \log(1-t^M(k_1,k_r)) + \\ &\quad \alpha_m(1-\beta_m)\log s^M_B(k_1,k_r) + (1-\alpha_m)\log g^M_{k_1}(k_1,k_r)] \end{aligned} \tag{5}$$

where $t^M(k_1,k_r)$, $s^M_B(k_1,k_r)$ and $g^M_{k_1}(k_1,k_r)$ are given by (4). The first order conditions are:

$$\sum_{r=2}^{3}\left[\frac{\alpha_m\beta_m\beta^*_{k_1}}{(1-t^M(k_1,k_r))} + \frac{\alpha_m(1-\beta_m)(1-\beta^*_{k_1})}{s^M_B(k_1,k_r)} - \frac{1-\alpha_m}{g^M_{k_1}(k_1,k_r)}\right] = 0 \tag{6}$$

and

$$\sum_{r=2}^{3}\left[\frac{\beta_m}{(1-t^M(k_1,k_r))} - \frac{(1-\beta_m)}{s^M_B(k_1,k_r)}\right] = 0 \tag{7}$$

Imposing symmetry in the two districts, the values of α^* and β^* preferred by the median voter in a majoritarian system are:

$$\alpha^{*M} = \frac{\alpha_m}{2-\alpha_m}; \qquad \beta^{*M} = \beta_m \tag{8}$$

Hence, the median voter wants a person with the median value of β to represent him in Parliament, but with a value of α below the median. The logic is similar to that of Besley and Coate (1999), except that now there are two types of public expenditures to take into account. In a majoritarian system, all representatives and members of the government benefit from the same transfer, but from different public goods. Hence, the median voter in district k tries to bias the decision of the government towards his own public good by electing an individual with a preference for high spending on public goods relative to transfers. In equilibrium, the result is just high spending on the two public goods that get funded.

Substituting (8) into (4), one finally gets:

$$\begin{aligned} t^M &= 1 - \frac{\alpha_m\beta_m}{2-\alpha_m} \\ s^M &= \frac{\alpha_m(1-\beta_m)}{2-\alpha_m} \\ g^M &= \frac{2(1-\alpha_m)}{2-\alpha_m} \end{aligned} \tag{9}$$

[8]For simplicity, when this does not create any ambiguity we omit the social group and the region subscripts from the utility parameters.

IV. PROPORTIONAL SYSTEM

Because each group has less than 50 percent of the total population but more than 25 percent, in this system a representative from each group is elected.

A. The Policy Formation in the Government

Suppose the government is formed by representatives of group j_1 and j_2. [9] The two representatives maximize the joint utility

$$\begin{aligned} V^P(j_1,j_2) &= (\alpha^*_{j_1}\beta^*_{j_1}+\alpha^*_{j_2}\beta^*_{j_2})\log(1-t)+(\alpha^*_{j_1}(1-\beta^*_{j_1}))\log s_{j_1} \\ &\quad +(\alpha^*_{j_2}(1-\beta^*_{j_2}))\log s_{j_2}+(2-\alpha^*_{j_1}-\alpha^*_{j_2})\log(g/3) \end{aligned} \tag{10}$$

where $\alpha^*_{j_1}$ and $\beta^*_{j_1}$ are the two utility parameters of the representative from group j_1, and similarly for $\alpha^*_{j_2}$ and $\beta^*_{j_2}$.

The maximization of the above objective function is subject to the government budget constraint:

$$t=\mu_{j_1}s_{j_1}+\mu_{j_2}s_{j_2}+g \tag{11}$$

It is straightforward to show that the solutions to this problem are:

$$\begin{aligned} t^P(j_1,j_2) &= \frac{2-(\alpha^*_{j_1}\beta^*_{j_1}+\alpha^*_{j_2}\beta^*_{j_2})}{2} \\ s^P_{j_1}(j_1,j_2) &= \frac{\alpha^*_{j_1}(1-\beta^*_{j_1})}{2};\quad s^P_{j_2}(j_1,j_2)=\frac{\alpha^*_{j_2}(1-\beta^*_{j_2})}{2};\quad s^P_{j_3}(j_1,j_2)=0 \\ s^P(j_1,j_2) &\equiv s^P_{j_1}(j_1,j_2)+s^P_{j_2}(j_1,j_2)=\frac{\alpha^*_{j_1}(1-\beta^*_{j_1})+\alpha^*_{j_2}(1-\beta^*_{j_2})}{2} \\ g^P(j_1,j_2) &\equiv g^P_{j_1}(j_1,j_2)+g^P_{j_2}(j_1,j_2)+g^P_{j_3}(j_1,j_2)=\frac{2-\alpha^*_{j_1}-\alpha^*_{j_2}}{2} \end{aligned} \tag{12}$$

which is clearly the same as the solution under a majoritarian system, equations (4), except that now the optimal choices of α^* and β^* by the median voters will be different, as we now show.

B. The Choice of the Representatives

The median voter of group j_1 maximizes with respect to $\alpha^*_{j_1}$ and $\beta^*_{j_1}$ the utility function:[10]

$$E(V^P_{j1m}) = \sum_{r=2}^{3}[\alpha_m\beta_m\log(1-t^P(j_1,j_r))+ \tag{13}$$

[9] Because in equilibrium public good spending is divided equally within the district, individuals are indifferent to the region of origin of a representative: the only relevant characteristic is which social group the representative belongs to.

[10] Again, when this does not create any ambiguity we omit the region and the group subscripts.

$$\alpha_m(1-\beta_m)\log s^P_{j_1}(j_1,j_r)+(1-\alpha_m)\log g^P(j_1,j_r)]$$

where the values of t^P, $s^P_{j_2}$ and g^P are given by (12). The first order conditions are:

$$\sum_{r=2}^{3}\left[\frac{\alpha_m\beta_m}{(1-t^P(j_1,j_r))}\frac{\beta^*_{j_1}}{2}+\frac{\alpha_m(1-\beta_m)}{s^P_{j_1}(j_1,j_r)}\frac{1-\beta^*_{j_1}}{2}-\frac{1-\alpha_m}{g^P(j_1,j_r)}\right]=0 \tag{14}$$

and

$$\sum_{r=2}^{3}\left[\frac{\alpha_m\beta_m}{(1-t^P(j_1,j_r))}+\frac{\alpha_m(1-\beta_m)}{s^P_{j_1}(j_1,j_r)}\right]=0 \tag{15}$$

Imposing symmetry in the two groups, the optimal values of α and β of the representative preferred by the median voter in the proportional system are:

$$\beta^{*P}=\frac{\beta_m}{2-\beta_m};\qquad \alpha^{*P}=\frac{\alpha_m(2-\beta_m)}{1+\alpha_m(1-\beta_m)} \tag{16}$$

Hence, the median voter wants a person with a value of α higher than the median, and a value of β lower than the median. This pattern is exactly the opposite than under a majoritarian system. The reason is intuitive: in a proportional system, spending on public goods is uniform across regions, but each member of the government benefits from a different type of transfer. Hence, the median voter tries to bias the decision of the government towards his own transfer by electing an individual with a preference for high spending on transfers relative to public goods. In equilibrium, the result is just high spending on the two types of transfers that get funded. Using (16) in (12), one finally gets:

$$\begin{aligned} t^P &= \frac{1+\alpha_m(1-2\beta_m)}{1+\alpha_m(1-\beta_m)} \\ s^P &= \frac{2\alpha_m(1-\beta_m)}{1+\alpha_m(1-\beta_m)} \\ g^P &= \frac{1-\alpha_m}{1+\alpha_m(1-\beta_m)} \end{aligned} \tag{17}$$

C. Predictions

Comparing equations (8) and (17), it is easy to see that

$$\begin{aligned} s^P &> s^M \\ g^P &< g^M \\ t^P &\gtrless t^M \leftrightarrow \alpha_m \gtrless \frac{1}{2-\beta_m} \end{aligned} \tag{18}$$

Thus, the model delivers three predictions. First, suppose one compares the outcome across electoral systems, holding constant the median voter's preference parameters; then we have just shown that:

1. spending on transfers is higher in a proportional system
2. spending on purchases of goods and services is higher in a majoritarian system

Now consider two countries, with different values of α_m and β_m. In the first, transfers are larger than public good spending under both electoral systems: from (9) and (17), this implies $\alpha_m > 2/(3-\beta_m)$. In the second country, public good spending is larger under both electoral systems, implying $\alpha_m < 1/(3-2\beta_m)$. For $\beta_m < 1$, $2/(3-\beta_m) > 1/(2-\beta_m)$; hence, from (18) in the first country total spending is larger in a proportional system: $t^P > t^M$. Conversely, because $1/(3-2\beta_m) < 1/(2-\beta_m)$, again from (18) in the second country total spending is lower in a proportional system: $t^M > t^P$. Hence, we have the third prediction of the model:

3. Total government spending is higher in a proportional system if transfer spending is large relative to public good spending, regardless of the electoral system; conversely, total government spending is higher in a majoritarian system if transfer spending is low relative to public good spending, regardless of the electoral system.

Because total primary spending is the sum of transfers and public good spending, another way to state this last prediction, which will be useful in interpreting the empirical results, is the following

3′. The difference between the effect of proportionality on transfers and (the absolute value of) the effect on public goods is larger, the higher the share of transfers in total spending.

V. Operationalizing Voting Systems

To test these hypotheses, we need quantitative measures of the degree of proportionality of a system. But real life electoral systems are invariably more complicated than the stylized systems of the model; in particular, they often use two tiers to allocate seats, and legal thresholds to bar smaller parties from entering parliament. In this section, we build up a rigorous classification of electoral systems that incorporates these two features. This in turn will allow us to arrive at well defined quantitative measures of proportionality. For all this, some investment in notation and definitions is needed first.

A. The Electoral System

In two-tier systems, a certain portion of parliamentary seats are allocated in a second tier comprising fewer, larger districts; this second tier typically serves the function of increasing the degree of proportionality in less than fully proportional systems. We will use T1 and T2 as shortcuts for "first tier" and "second tier"; the subscripts i and k will denote a tier and a district,

respectively;[11] and D_i will denote the number of districts in tier i, where each T2 district includes several T1 districts.

Let S_{ikp} be the number of seats attributed to party p[12] *on the basis of votes in district k of tier i*; $S_{ik} \equiv \sum_p S_{ikp}$ denotes the number of seats attributed to parties on the basis of votes in district k of tier i, or its *district size*; S_i is the total number of seats attributed to parties on the basis of votes in tier i, or the *tier size*; $\overline{S}_i \equiv S_i/D_i$ is the *average district size* of tier i. In some electoral systems (see section V.B), S_{1k} can be an upper bound to the number of seats attributed in a T1 district: some seats could be left unfilled, transferred to T2, and attributed there; in these cases, the number of seats attributed in T2 depends on the number of seats effectively attributed in T1. We denote with an asterisk actual sizes: thus, S^*_{ik} denotes the *actual district size* of district k in tier i, and analogous definitions hold for S^*_i and $\overline{S}^*_i$; note that for T2 districts, $S_{2k} = S^*_{2k}$ always. i.e. they are always conditional on T1 results. Finally, $S_{tot} \equiv S^*_1 + S^*_2$ denotes the total number of seats in the assembly, with $S^*_2 = 0$ for one-tier systems.[13] We can now define formally the electoral system.

Definition(Electoral System): *An electoral system is described by:*

- S_1, S^*_1, S_{tot}, D_1 *and* D_2;

- *The Voting Method;*

- *The Legal Thresholds.*

We now define formally the Voting Method and the Legal Thresholds.

Definition (Voting Method): *A voting method describes how party votes are converted into seats in each district of a given electoral system.*

For our purposes, there are three basic voting methods:

1) *Majority/Plurality.* All the S_{ik} district seats are attributed to those parties that win an absolute majority of votes (Majority systems) or just more votes than other candidates/lists (Plurality systems). In our sample, Majority methods are represented by the Two-Round method (France) and the Alternative Vote method (Australia);[14] Plurality methods are represented by the

[11] Because we are running out of Latin alphabet letters, the subscripts i and k in this section have a different meaning from the same letters in the presentation of the model (sections 2 to 4).

[12] As we will see, in some systems seats are attributed to parties on the basis of votes in a tier, and to specific individuals on the basis of votes in another tier. We are interested in the distribution of seats by parties.

[13] As it is standard in the literature, whenever there are two chambers all of these magnitudes refer to the lower chamber.

[14] In the Australian system, voters rank candidates on the ballot. Any candidate with an absolute majority is elected. If no candidate reaches an absolute majority, the candidate with the lowest number of first preferences is eliminated, and his votes reassigned to all other candidates

First-Past-the-Post method (United Kingdom and many other countries).

2) *Highest Average*. The share of votes obtained by each party in each district is divided sequentially by a set of divisors: $1, 2, 3, ...$ in the case of the *d'Hondt* formula, and 1,3,5,.... in the case of the *St. Laguë* formula. Each of the S_{ik} highest quotients entitles the party that obtains them to a seat.[15]

3) *Largest Remainder*. In each district k of tier i, first a *quota* is calculated, defined as $1/S_{ik}$ in the *Hare* formula, $1/(S_{ik}+1)$ in the *Droop* formula, and $1/(S_{ik}+2)$ in the *Imperiali* formula. Then each party is allocated as many seats as full *quotas* it has obtained. The seats left unfilled after this allocation can be transferred to a higher tier, if it exists, or attributed in the same district to the parties or candidates with largest remainders.[16]

Definition (Legal Threshold of tier *i*, THR$_i$): *The legal threshold of tier i, THR_i, is the minimum share of national votes, set by the electoral law, that a party must obtain in order to be eligible for a seat in the tier.*[17]

Sometimes the electoral laws state requirements on the vote shares of a party in a district, rather than a tier. These local requirements can be translated into a share of national votes, and therefore into a legal threshold, using the procedure described in Appendix B.

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according to the ranking indicated on his ballots. The process is repeated until a candidate reaches an absolute majority.

[15]As an example, consider a 4-seat district with 3 parties (A, B, and C).There are 100 electors, and the votes obtained by each party are: $V_A = 50$, $V_B = 30$, $V_C = 20$. Under a d'Hondt formula, the quotients obtained by party A are: 50, 50/2, and 50/3; by party B, 30, 30/2, and 30/3; by party C, 20, 20/2, and 20/3. The three highest quotients are 50, 30, and 50/2. Hence, party A gets 2 seats, party B one seat, and party C gets no seats.

[16]Two methods, the Single Transferable Vote (used in Ireland) and the Single Non Transferable Vote (used in Japan until 1995) are difficult to fit in our classification. In one important respect (the calculation of upper quotas – see below) they behave like Largest Remainder methods; hence, we will classify them as such.

In the Irish STV method, voters rank candidates. Any candidate whose first preferences reach a full Droop quota is elected, and his votes above the quota are redistributed to the remaining candidates following the second preferences he has received. If no candidates reach a full quota, the candidate with the lowest number of first preferences is eliminated. The process continues until all S_{ik} seats are filled. In the Japanese SNTV method, voters express a single vote; the S_{ik} most voted candidates are elected.

[17]Thus, $THR_2 = .05$ would state that, in order to obtain at least one seat in T2, a party must win at least 5% of the national votes. If the same threshold also applies to T1, a party not meeting this threshold must relinquish any T1 seat that it might have obtained. Otherwise, the threshold is binding only for the allocation of T2 seats. Note that, if a legal threshold does not exist in tier i, this is equivalent to assuming $THR_i = 0$.

B. Two-Tier Systems

There are several possible classifications of two-tier systems. For our purposes, we will need to consider two dimensions, corresponding to the two questions: 1) How is S_2 determined? 2) What votes are used in T2?

1) How is S_2 determined?

In **Remainder Seats** systems (denoted by RS), S_2 is variable. T1 seats are attributed to parties using a Largest Remainder method; the remainder seats after this allocation are filled in T2. Hence, in principle all or no seats could be attributed in T1 ($S_1 = S_{tot}$); but typically only some are ($S_1^* \leq S_1$), and the remainder seats are filled in T2 ($S_2 = S_2^* = S_{tot} - S_1^*$).

In **Adjustment Seats** systems (denoted by AS), S_2 is fixed; hence, $S_1^* = S_1$ and $S_2 = S_2^* = S_{tot} - S_1$. Because AS systems must attribute a fixed number of seats in T2, and therefore in T1, they generally use a Highest Average method to attribute T1 seats (the exception in our sample being Ecuador, which uses the Hare formula in T1).

2) What votes are used in T2?

In **Remainder Votes** systems (RV), seats in T2 district k are attributed using the remainder votes not used in the allocation of seats in all the T1 districts included in k. These remainder votes are transferred to k, pooled[18] and used to attribute seats there, typically using a Highest Average method.

In **Superdistrict Votes** systems (SV), all votes cast in a T2 district are used, not just the remainder votes. In one case (**Parallel** SV systems, denoted by SV-P), T2 seats are attributed independently of T1 seats. The allocation of T1 seats is based on T1 votes, and the allocation of T2 seats is based on T2 votes (usually voters cast a separate ballot for each tier). In a second case (**Mixed** SV systems, denoted by SV-M), seats in each T2 district are attributed to parties after taking into account the seats already attributed to candidates in the T1 districts that make up the T2 district in question. Specifically, seats in T2 are attributed in order to achieve an overall distribution of seats to parties as close as possible to the distribution that would obtain if *all* seats were attributed based on the T2 votes, method and number of districts. Effectively, then, if there are enough seats in T2, the seats attributed to *candidates* in T1 serve only to determine the names of as many representatives, but the distribution of seats to *parties* is determined wholly in T2. Since we are interested in the distribution of seats to parties, for our purposes effectively the system works as if $S_2 = S_{tot}$: this is what we will use in our empirical application.[19]

[18]The exception is Norway since 1990, which attributes the 8 T2 seats to the lists with the highest quotas among all the quotas unused in the distribution of seats in T1.

[19]Obviously for the first tier in these systems to be *completely* irrelevant, a sufficient number of seats must be attributed in the second tier. In practice, this is the case for all SV-M systems in our sample.

The following table summarizes the two-tier systems in our sample, which covers the years 1960-95 for OECD countries and 1991-94 for Latin American countries.[20]

Table 1: Two-tier systems

	SV	RV
AS	Denmark, Germany, **Greece** Italy 94-95, Sweden 71-95, **Ecuador, Guatemala,** Mexico	Norway 90-95
RS	Belgium, Venezuela	Austria, Italy 60-93

In bold the parallel systems. The electoral systems of Belgium, Greece and Venezuela have peculiarities that require some interpretation. A detailed description of these systems is available upon request.

In all the above systems, it will be useful to distinguish between two types of tiers, according to the following

Definition (Primary Tier): *A primary tier is a tier whose districts have a fixed size, independent of the election results.*

Thus, all tiers in the systems considered above are primary, except T2 in RS systems, whose size depends on the results in T1.

Finally, to operationalize voting systems, we need assumptions about the distribution of parties among districts and of votes among parties in each tier:

Assumption (Uniform Party Distribution): *The same parties field candidates in all districts of all primary tiers.*

Assumption (Uniform Vote Distribution): *The distribution of votes among parties is the same in all primary districts.*

By these two assumptions, a party's district share of votes in a primary tier is equal to its national share. [21]

VI. Measures of Proportionality

In this section, we define rigorously a few variables aimed at capturing different aspects of the notion of proportionality; their common thread is that, roughly speaking, they try to formalize how easy it is for smaller parties to gain representation in Parliament. In operationalizing these measures of proportionality, we will ignore all those tiers that elect less than 5% of the total

[20]Thus, the sample does not include, for instance, the reform of the Japanese electoral system, which is currently of the AS/SV-P type, and several recent reforms in Latin America.

[21]A shortcoming of the two assumptions is that they do not deal well with regional parties. However, incorporating regional parties would require a detailed knowledge of actual results, election by election and district by district, which we do not have.

assembly size. In our sample, this excludes the second tier in the Norwegian AS/RV system in 1991-95, which elects 8 out of 165 representatives, and the fourth parallel tier in the Greek AS/SV system, which elects 12 out of 300 representatives.

A. Average Effective District Magnitude (EM)

Our first measure of proportionality is closest to the most widely used variable in the literature (see e.g. Taagepera and Shugart (1989) and Lijphart (1994)).[22] But in defining the average district magnitude, one has to take into account the existence of legal thresholds of various types and of a second tier. To do this, we start with a few definitions:

Definition (Upper Quota, Q_i): *The upper quota of district k in tier i, $Q_i(S_{ik})$, is the share of district votes that would guarantee a party its first seat in that district, if there were no legal threshold.*

In other words, the upper quota is the share of votes that, even under the most unfavorable distribution of votes among parties in the district, still guarantees a seat to the party that obtains it. Note that the upper quota depends only on the district size, not on the number of parties in the district. We provide formulas for the upper quota for each voting method in the Appendix.[23]

Definition (Upper Marginal Share of Votes of tier i, UMS_i): *The upper marginal share of votes of tier i, UMS_i, is the share of national votes that guarantees a seat to a party in the district of average size of that tier.*

If all national votes are used in a tier, as in all primary tiers, then by the Uniform Vote Distribution assumption $UMS_i = \max(Q_i(\overline{S}_i), THR_i)$. In T2 of RS systems, where only the remainder votes from T1 are used, UMS_2 is a slightly more complicated function of $Q_2(\overline{S}_2)$: we describe its computation later in this section.

Definition (Decisive Tier): *The decisive tier of an electoral system is the tier with the lower UMS_i.*

In other words, the decisive tier is the tier where the marginal seat in the average district– the seat obtained in the average district with the lowest national vote share – is allocated.

Definition (Upper Marginal Share of Votes of an electoral system, UMS): *The upper marginal share of votes of an electoral system, UMS, is the share of national votes that guarantees a seat in the district of average size of the decisive tier: $UMS = \min(UMS_1, UMS_2)$.*

[22]Taagepera and Shugart (1989) have calculated average effective district magnitudes for a number of OECD countries in the seventies and mid eighties. Our measure differs from theirs because it follows a precise definition, based on the rigorosuly defined notion of Upper Marginal Share of votes, and because it incorporates the different types of two-tier systems and legal thresholds.

[23]In a few cases (Hare and St Laguë when the number of parties is below the district magnitude) the formula for the upper quota depends on the number of parties. In these cases, we have collected data on the number of parties in each election.

We can now define our first measure of proportionality:

Definition (Average Effective District Magnitude, EM): *Consider the electoral system Δ, possibly with two tiers and a legal threshold; and consider the electoral system Γ, with one tier, no legal threshold, and the same voting method as the decisive tier of system Δ. The average effective district magnitude of system Δ, EM, is the average district size of Γ in which a party with the same UMS of Δ would be guaranteed a seat.*

Hence, EM is defined by $EM = \overline{S}^{\Gamma}$ and $\overline{S}^{\Gamma} = Q_{\tilde{i}}^{-1}(UMS)$, where $\tilde{i}$ is the decisive tier of Δ (all variables without a superscript refer to the electoral system Δ).[24] Thus, the problem of finding EM for system Δ is equivalent to finding the lower of UMS_1 and UMS_2; this automatically identifies also the decisive tier and UMS. We now illustrate how EM can be obtained in practice in the different electoral systems identified in section V.B.

1) One-tier systems: By the Uniform Vote Distribution assumption, UMS is equal to the share of district votes that guarantees one seat in the average district: $UMS = Q_1(\overline{S}_1)$. Hence, $EM = Q_1^{-1}(UMS)$,which gives back the average district size of the system $\overline{S}_1$.

2.A) Two-tier SV systems: The purpose of the second tier is to increase the proportionality of the system; hence, in all these systems $UMS_2 < UMS_1$ (in other words, T2 is the decisive tier). Since all these systems use all national votes in both tiers, the Uniform Vote Distribution assumption applies to both tiers. Hence $UMS_2 = \min(Q_2(\overline{S}_2), THR_2)$; and $EM = Q_2^{-1}(UMS_2)$.[25]

2.B) Two-tier RV systems: As in SV systems, it is always the case that in these systems $UMS = UMS_2$. The lowest share of national votes that still guarantees a seat to a party in the average district of T2 occurs when the party does not win any T1 seat, transfers all its votes as remainders to T2, and these votes are enough to guarantee a seat in the average district there. Thus, once again $UMS = UMS_2$. However, now the Uniform Vote Distribution assumption does not apply to T2 districts: only the remainder votes from T1 are used to allocate T2 seats, and small parties (for instance, all those that did not obtain any seat in T1) have a much larger share of remainder votes than of all national votes. We now show how UMS_2 and EM can be calculated in these cases.[26]

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[24]In several majority/plurality methods, the upper quota $Q_i(S_{ik})$ is fixed at .5 (see Appendix B). However, these are all cases of single-member districts; the upper quota can then be interpreted as a d'Hondt upper quota, equal to $1/(1 + S_{ik})$, with $S_{ik} = 1$. Hence, $Q_i(S_{ik})$ is still invertible in these cases.

[25]Although the formula is the same, recall that $S_2 = S_{tot}$ in AS/SV-M systems, while in AS/SV-P systems $S_2 < S_{tot}$.

[26]We show the calculation for the case when a Largest Remainder method is used in T1. In our sample, only Norway after 1990 uses a Highest Average method to attribute T1 seats. The 8 T2 seats are attributed to the T1 district lists with the 8 highest averages after the averages that earned a seat. Unlike in a Largest Remainder method, in a Highest Average method a seat can be attributed in T1 even to a party that gets less than the upper quota. Therefore, it is more difficult to

Seats are attributed in a T1 district only if the upper quota is met[27], hence on average each seat attributed in T1 uses a fraction of district votes equal to $Q_1(\overline{S}_1)$, (assuming, as it is always the case in practice, that this is larger than THR_1: see section V.B), and a fraction of national votes equal to $Q_1(\overline{S}_1)/D_1$.[28] A total of S_1^* seats are attributed in T1 this way,[29] thus leaving a fraction $1 - S_1^* Q_1(\overline{S}_1)/D_1$ of national votes to be used for the allocation of the remaining S_2 T2 seats.[30] Assuming that all T2 districts have the same size, and ignoring for the moment legal thresholds, to be guaranteed a seat in a T2 district a party needs a share $Q_2(\overline{S}_2)$ of all the average T2 district votes, hence the same fraction of all T2 votes, hence a fraction $Q_2(\overline{S}_2)(1 - S_1^* Q_1(\overline{S}_1)/D_1)$ of national votes. UMS_2 can then be computed as $UMS_2 = \max\,(Q_2(\overline{S}_2)(1 - S_1^* Q_1(\overline{S}_1)/D_1), THR_2)$. From this, we obtain $EM = Q_2^{-1}(UMS_2)$.

B. Average District Magnitude (AM)

A second measure of average effective district magnitude captures the notion of how large is the constituency where the "average" representative is formally elected. It is defined as follows:

Definition (Average District Magnitude, AM): *The average district magnitude of an electoral system is the weighted average of the average district sizes of the two tiers, with weights equal to the proportion of all representatives elected in the two tiers.*

Thus, this variable is measured simply by $AM = (\overline{S}_1 S_1^* + \overline{S}_2 S_2^*)/S_{tot}$.[31]

C. Average Standardized District Magnitude (SM)

A shortcoming of the two previous definitions of average district magnitude is that they do not "partial out" the electoral method used. Consider for simplicity two one-tier systems with no legal thresholds, and both with $EM = 4$; the first uses a St. Laguë formula, the second the Hare

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approximate the share of votes that go to T2 as remainders, and to calculate UMS_2. However, because the number of allocated in T2 seats is less than 5% of the assembly size, by the rule we set out above we do not consider T2 in this case. In any case, because T2 is so small, we know that UMS_2 must be very close to UMS_1. This leaves Austria and Italy 1960-93 to represent two-tier RV systems.

[27]Recall that, when a Largest Remainder method is used in T1 districts of RV systems, $Q_1(S_{1k})$ is the actual share of district votes used for each seat allocated in district k of T1.

[28]This is clearly an approximation, because we replace the average of $Q_1(S_{1k})$ with $Q_1(\overline{S}_1)$.

[29]We do not have information on S_1^* for each election; however, Taagepera and Shugart (1989) do provide information on the *average* value of S_1^*, where the average is taken across elections in a given country. In the empirical implementation of our variables, we use this average value as a proxy for the actual value of S_1^*.

[30]Throughout these calculations, obviously we assume that there are no abstentions or invalid ballots.

[31]For SV-M systems, S_1^* and S_2^* represent the number of *candidates* formally elected in T1 and T2, respectively. Thus, for the purpose of computing this variable $S_1^* > 0$ and $S_2^* < S_{tot}$, even if as we have seen in these systems the *party* shares of seats are formally decided all in T2.

formula with 3 parties. Using the formulas for the upper quotas in Appendix B.2, the UMS of the first system is .25, of the second .165. Thus, the same value of EM can hide differences in terms of what share of votes guarantees the election of a representative in the average district of the decisive tier. What one needs is therefore to convert the UMS of the system in the district size of a standard system, with a fixed electoral formula. We therefore introduce our third proportionality variable as follows:

Definition (Average Standardized District Magnitude, SM): *Consider the electoral system Δ, possibly with two tiers and a legal threshold; and consider the electoral system Γ, with one tier, no legal threshold, and the d' Hondt formula.*[32] *The average standardized district magnitude of system Δ, SM, is the average district size of system Γ in which a party with the same UMS of Δ would be guaranteed a seat.*

Hence, the SM of system Δ is defined by $SM = \overline{S}^{\Gamma}$ and $\overline{S}^{\Gamma} = 1/UMS - 1$. Note the difference from the definition of Average Effective District Magnitude, EM: here system Γ uses the Hare formula, there it uses the same method and formula used in the decisive tier of system Δ. If voters' preferences and votes are independent of the electoral system in use, SM might be a more appropriate measure of the ease of access to Parliament by smaller parties.

D. The Average Deviation From Proportionality (RAE)

All the variables described so far are *ex-ante* measures of proportionality, being based on institutional characteristics. We also use one *ex-post* measure, based on voting outcomes election by election. This variable was originally defined by Rae (1967) as follows:

Definition (Average Deviation from Proportionality, RAE): *The Average Deviation from Proportionality (RAE) is the average of the deviations (in absolute values) of the share of seats of each party from its share of electoral votes: $RAE \equiv \Sigma_{p=1}^{P}|s_p - v_p|$, where p indexes a party, s_p is the share of seats won by party p and v_p is the share of votes obtained by party p.*

Thus, broadly speaking this variable captures deviations of the shares of seats in Parliament from the share of votes obtained by parties in each election.[33]

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[32]We choose the d' Hondt formula because it is very common and it does not depend on the number of parties.

[33]This variable is not independent of the number of parties and their size: it tends to give a small degree of disproportionality in systems with many small parties. An alternative measure, proposed by Gallagher (1991), is defined as the square root of the sum of squares of the deviations between seat and vote percentages. Thus, it gives more weight to large deviations. In practice, it is highly correlated with RAE.

VII. CROSS-SECTIONAL REGRESSIONS

A. The Data

Our sample consists of 20 OECD and 20 Latin American countries, listed in the Appendix. Data for the OECD sample starts in 1960, with the exception of Greece, Portugal and Spain whose data start in the mid-seventies. The time span for Latin American data is more limited–we have information on electoral variables for the early nineties.[34] In our empirical investigation we first use the combined OECD and Latin American samples for cross-sectional estimates (based on averages of all variables over the four-year period 1991-4, or the closest available periods), and then we exploit the time-series dimension of the OECD sample to run panel regressions.

Table 2 displays the cross-sectional averages (where a cross-sectional observation is the 1991-4 average of the variable in a country) of each variable, their standard deviation, and their minima and maxima. The table also presents the same information separately for the OECD and the Latin American groups. To make the reading of the empirical results easier, we will define all electoral variables as direct measures of proportionality. To do so, in the case of RAE we take the negative of the variable as originally defined, although we keep the original name.

A few points are worth noticing, because they will play a role in interpreting our results. Latin American countries tend to have more proportional systems: all measures of district magnitudes and RAE are higher, on average, in Latin American than in OECD countries. Latin American countries also have much smaller governments: on average, primary expenditure is less than half than in OECD countries, 19.8% of GDP against 45.4%; indeed, the largest Latin American government is smaller than the smallest OECD government. The largest difference between the two groups of countries is in transfers[35]: on average, they represent 21.3% of GDP in OECD countries but only 5.5% in Latin American countries. In contrast, the shares of public goods[36] are much closer: 21.9% against 13.9%. Note that in Latin America public good spending

[34]To construct the four electoral system variables, we relied on several sources. For OECD countries, we used information in Lijphart (1994), Taagepera and Shugart (1989), updated and cross-checked based on national data and data from the Inter-Parliamentary Union. For Latin American countries, we also used data from the Inter-Parliamentary Union, Georgetown University's Political Database of the Americas and primary sources – mostly constitutions and electoral laws in place at the times we take our cross-sectional observations.

[35]Transfers are defined as the sum of social security payments and other transfers to families, plus subsidies to firms. For most Latin American countries we do not have enough information to separate social transfers to families from subsidies to firms.

[36]Public goods are defined as the sum of current and capital spending on goods and services, i.e. the sum of government consumption and of capital spending. Note that the so called "pork-barrel" expenditure, like building a bridge or hiring civil servants in a certain locality to please one own's constituency, falls mostly under one of the two components of our definition of public goods, government consumption and government investment. Our results are not sensitive to a definition of public goods that leaves out government investment. Given our definition of public goods,

is much larger than transfers, but the two items are virtually equal in OECD countries; indeed, if one subtracts military spending from public good spending[37], transfer spending becomes considerably larger than public good spending in OECD countries.

B. Basic Specification

Our basic cross-section specification is:

$$G_i = c + c_{OECD} + \alpha X_i + \beta POP65_i + \gamma LGDPPC_i + \varepsilon_i \quad (19)$$

where i indexes a country.

G is the average share (multiplied by 100) in GDP of either total primary expenditure EXP, transfers TRAN, or public goods PGOOD. X is one of the four electoral system variables that we have introduced before; the first three, LEM, LAM, and LSM, are the logs of EM, AM, and SM respectively: the assumption is that increasing the average district magnitude by 1 representative has a very different effect on government spending when the initial district magnitude is 1 than when it is 50. Hence, we test the notion that the semielasticities of government spending shares in GDP to these two electoral variables are constant, rather than their derivatives. The fourth electoral system variable is RAE. POP65, the share of population over 65, is a potentially important determinant of the size of transfer expenditure; and LGDPPC, the PPP adjusted per capita income of the country, in logs of thousands of dollars, captures possible Wagner Law-type effects. In addition to the regression constant, c, we also include an OECD dummy variable, c_{OECD}, to allow for the large difference in the average government spending / GDP ratio between OECD and Latin American countries.

Our hypotheses imply that an increase in the value of any of the electoral variables should be associated with a higher share of transfers in GDP – a positive value of α when G = TRAN – and with a lower share of public goods in GDP – a negative value of α when G = PGOOD (see Results 1 and 2 in section IV.C). In addition, the effect on total spending depends on the initial share of transfers in total primary spending, and more fundamentally on the underlying preferences of the median voter. We have documented above the vastly different shares of transfers in GDP and in government spending between Latina American and OECD countries. If we interpret these differences as reflecting, at least in part, different patterns of distribution of preferences over fiscal policy between these two groups of countries, then when G = EXP we should expect a positive value of α in OECD countries, which have a large share of transfers in primary spending, and a negative value of α in Latin American countries, all of which have an extremely low share of transfers (Result 3 in section IV.C). Equivalently, we should expect a

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the residual term in total primary expenditure is represented by property income paid (net of interest payments), which is also largely not subject to political control at each moment in time. In regressions on the sample of OECD countries only, the residual term also includes subsidies to firms.

[37]The size of military spending is to a large extent dictated by international commitments, and its geographic targeting is largely constrained by strategic considerations.

larger difference between the absolute values of the effect of electoral variables on transfers and on public goods in OECD countries than in Latin American countries (Result 3' in section IV.C).

C. Basic Results

In columns 1 to 4 of Table 3 the dependent variable is the total primary spending / GDP ratio, EXP. The estimated coefficients of the four electoral variables are positive, but none is significant at conventional levels. This result is consistent with our theoretical model, where a more proportional system can have an ambiguous impact on total primary government spending, depending on the relative strength of its effects on transfer spending and on public good spending. In fact, we will see shortly that this result is the combination of two very different patterns in Latin American and in OECD countries.

Our model does predict unambiguously that more proportional systems should be associated with higher spending on transfers. Columns 5 to 8 display the same regressions as columns 1 to 4, but with the share of transfers in GDP as the dependent variable. Now all the estimated coefficients of the electoral variables are significant at the 5% level. The magnitude of these coefficients is also economically significant; for instance, averaging the coefficients of the three average district magnitude variables (columns 5 to 7), doubling the average district magnitude increases the share of transfers in GDP by about 1.4 percentage points. Perhaps the most meaningful way to compare the various regressions in Table 3 is to consider the change in the dependent variable associated with a change in the electoral variable equal to its range. This is reported in the third to last row of Table 3. The range in the transfer/GDP ratio varies between about 6.9 (in the LEM and LSM regressions of columns 5 and 7) and 9.8 percentage points of GDP (in the RAE regression of column 8). Besides electoral variables, the only other significant variable in the regressions is POP65, which has the expected positive coefficient. Still, the explanatory power of these regressions is quite large, with adjusted R^2s always at or above .8.

By comparing the coefficients of the electoral variables in each total spending regressions with the same coefficient in the corresponding transfer regression, it is clear that one should expect a negative but small coefficient of the electoral variable in the public good regressions. This is in fact what we find: in all public good regressions (columns 9 to 12), the electoral variables have negative coefficients – consistent with our model – but they never reach statistical significance.

However, Table 3 hides a substantial difference between the two subsamples. Table 4 displays the same regressions as Table 3, but on the subsample of OECD countries only. In the primary spending regressions of columns 1 to 4, the coefficients of the electoral variables are three to five times larger in the OECD subsample than in the whole sample, and although the sample size has fallen from 40 to 20, they are now significant at the 10% level (except for RAE in column 4). Even stronger results hold for the transfer regressions in columns 5 to 8: now the coefficients of the electoral variables are typically twice as big as in the corresponding columns of Table 3, and all significant at least at the 2% level. The effect of electoral variables on transfers explains nearly all of their effect on total spending: as a result we find small and statistically insignificant negative effects on public good spending (columns 9 to 12).

Qualitatively, the results for Latin America, displayed in Table 5, are almost the mirror image of those for OECD countries, although they are statistically less strong (we do not display results with RAE, because in the Latin American sample we have only 15 observations on this variable). The effect of electoral variables on total spending is now negative, although not statistically significant (columns 1 to 3). This is the result of almost no effect on transfers (columns 4 to 6) and a large negative effect on public good spending (columns 7 to 9), although again with rather high p-values, between .15 and .20.

All the point estimates in Tables 3 to 5 are consistent with the results set out in section IV.C. Consistent with Results 1 and 2, we find that more proportional systems always have higher transfers and lower public good spending, *ceteris paribus*. Consistent with Result 3, more proportional systems are associated with higher total primary spending, ceteris paribus, in OECD countries, which have high transfer spending, and with lower primary spending in Latin American countries, which have very low transfer spending regardless of the type of electoral system. And consistent with Result 3', the difference between the effects of proportionality on transfers and on public good is much larger in OECD countries.

These results complement those of a related literature that has studied the difference in Latin American and OECD fiscal policy. As documented in Gavin and Perotti (1997), in Latin America most of the fiscal policy response to cyclical variations in the economy and to external shocks occurs on public good spending, in OECD countries on transfer spending. This paper shows that the (cross-country) response of fiscal policy to electoral institutions also follows the same pattern: it affects mostly public good spending in Latin America, and mostly transfer spending in OECD countries.

It is still true that the results are statistically weaker in Latin America. We have two candidate explanations for this difference – besides the obvious one that our theory fits Latin America less well than OECD countries. First, measurement error: both the budget variables and the electoral variables are measured less precisely in Latin American countries. Second, Latin America and its fiscal policy are subject to much more frequent and larger shocks than OECD countries (see e.g. Gavin et al. (1995)); hence, it is likely that the role of electoral systems in shaping fiscal outcomes will be harder to detect in Latin America.

D. Robustness

Because of the small sample size, our benchmark specification is necessarily very parsimonious. Several variables that we have omitted could conceivably be correlated both with the electoral systems and with fiscal outcomes. In Table 6, we display the estimated coefficients of the electoral variables when we add these omitted variables, one at a time, in the specification estimated so far; we also display the estimated coefficient of the added variable. To conserve space, we focus on the most relevant dependent variables in the two groups of countries: transfer spending in OECD countries, and spending on public goods in Latin American countries. Always to conserve space,we present results for LSM only: results with the other variables are similar.

Conventional wisdom has it that proportional systems tend to be associated with a larger number of parties in Parliament and therefore with larger coalition governments. In turn, empirically larger coalitions tend to be associated with more expenditure, particularly on transfers (see Perotti and Kontopoulos (1999)). Hence, the natural question arises: how much of our results so far capture this association between electoral systems on one hand and the number of parties on the other? To answer this question, in columns 1 and 5 of Table 6 we display the results from adding the log of the average effective number of parliamentary parties, LENPP, to the list of independent variables. In OECD countries the estimated coefficient of LENPP is positive, albeit insignificant; more importantly, the coefficient of LSM remains significant at the 5% level. We conclude that the electoral system has an effect on fiscal outcomes independent of its effects on the degree of party fractionalization both in elections and in Parliamentary representation. In Latin America, the estimated coefficient of LSM practically does not change.[38]

Two variables that have frequently been used, together or separately, as regressors in cross-section equations explaining fiscal outcomes are openness and ethno-linguistic fractionalization. The same two variables have also been used in the smaller existing empirical literature on electoral systems and fiscal outcomes. [39] When we include them in our regressions (columns 2 and 3 and columns 6 and 7 of Table 6), their coefficients are always entirely insignificant; the coefficients of the electoral variables are largely unaffected.

Another potentially relevant omitted variable is ideology. One could worry that the countries with larger district magnitudes tend to be Nordic countries, with a Social-Democratic tradition, or Southern European countries, that have had leftist governments for long periods of time. Thus, in column 4 we add an ideology variable (not available for Latin American countries), IDEOL, which takes values ranging from 1 in more rightist governments to 5 in the more leftist ones (see Appendix C for a more detailed description). Its coefficient has a t-statistics very close to 0, while the estimated coefficient of the electoral variable virtually do not change.

Particularly in small samples, one has to worry about the robustness of the results to possible outliers. In the OECD group, no country has, individually, a significant effect on the results: when we exclude one country at a time, the p-value on the estimated coefficient of the electoral variables in the transfer regression never falls below .05. In principle, two countries could have a non trivial influence on the results: the Netherlands, with a very large average district magnitude (its proportional system consists of only one district electing 150 representatives) and

[38]In their study of the effects of electoral institutions on fiscal performance in Latin America, Stein, Talvi and Grisanti (1999) find that the only 'political' variable correlated with the size of total spending (inclusive of interest payments) is the effective number of parties.

[39]See for instance Persson and Tabellini (1999a). The relationship between openness and fiscal outcomes has been studied recently by Rodrik (1998) and by Alesina and Wacziarg (1998) and (1999), among others, but we are not aware of plausible a priori reasons why openness should also be correlated with the electoral system. Alesina, Baqir and Easterly (1999) find that in ethnically fragmented US cities the provision of public goods is lower, while Ordeshook and Shvestova (1994) present cross-country evidence on the impact of ethnic fractionalization on the effective number of parties under different electoral systems.

France, the only non-Anglo-Saxon country with a majority system, but at the same time with a very high share of transfers in GDP, close to 30%. Indeed, when we re-estimate all our regressions dropping one country at a time, we typically find that the exclusion of France causes the estimated coefficients of electoral variables and their t- statistics to increase dramatically; the exclusion of the Netherlands causes them to fall somewhat, although they remain always significant at the 5% level. When we exclude both countries, point estimates and t-statistics rise considerably relative to the benchmark regressions of Table 4. In Latin America, the initial results are statistically less strong to begin with; in any case, a similar exercise confirms that no individual country is responsible for these weaker results.

One could also worry that the 1991-4 period might not be well representative – for instance because it was a period of widespread fiscal consolidations in many countries in both subsamples. We do not have a choice for Latin American countries; but for OECD countries we have annual data over the whole1960-95 period. When we re-estimate the regressions of Table 4 using cross-sectional data based on 1960-95 averages, we do find even stronger results, with usually larger and more significant coefficients in the total spending and transfer regressions.

VIII. Time-series evidence: interactive effects

In the OECD sample we can exploit the time dimension of the fiscal data to investigate the following question: do electoral institutions affect the response of fiscal variables to shocks? The spirit of the model suggests that the increase in government spending in response to a given shock should be higher in a more proportional system.[40] Except for RAE, the electoral measures we use in the previous regressions display limited or no time variation in the OECD sample;[41] hence, it does not make sense to run pure fixed effects panel regressions, because the fixed effects and the electoral variables would be highly collinear. We use two different methodologies, designed to estimate the responses to common shocks and to country-specific shocks, respectively.

A. Common Shocks

To study the response to common shocks, we borrow the methodology of Blanchard and Wolfers (1999): we estimate regressions of the type:

$$G_{it} = c_i + d_t(1 + \beta X_i) + \gamma POP65_{it} + \delta GDP_{it} + \varepsilon_{it} \qquad (20)$$

where i indexes the country and t the period. c_i is a country-specific intercept, d_t is a time dummy, and the other variables have been defined previously. Thus, in this specification the time dummies

[40]Strictly speaking, this question is outside the model. However, it could easily be incorporated in a version of the model where the current policy acts as the status-quo.

[41]There is more time series variation in the Latin American sample, due to the frequent changes in electoral laws enegeneered by new administrations. However, it is extremely difficult to reconstruct precisely electoral laws further back than the early nineties, and in many countries meaningful democratic elections began only in the mid- or late eighties.

capture the common shocks, and their effects depend on the value of the electoral variable. This dependence is captured by the coefficient β.

Without a much more generous dynamic specification (which would however be difficult to estimate given the shortness of the time-series) it would not be reasonable to interpret this regression as capturing the effects of electoral institutions on year-to-year changes in fiscal policy: hence, all our variables are averages over a five-year period, and the time index t refers to 5-year periods, beginning in 1960 or the earliest available year.

Table 7 reports estimates of equation 20 (by non-linear least squares) on the sample of 20 OECD countries, with the spending/GDP ratio (columns 1 to 4) and the transfer/GDP ratio (columns 5 to 8) as the dependent variables. In the case of RAE, which does have meaningful time series variation, the regression includes also the variable by itself. The table displays the following information[42]. Row 1 displays the effects of the "pure" time effects, i.e. the increase in the spending/GDP ratio that would have been experienced by a country with the average value of the electoral variable: thus, the pure time effect is equal to the difference between the estimated time effects in 1990-5 (the last one) and 1960-4. The next row reports the estimate of β with its t-statistic. The rows labelled "Min" and "Max" answer the following question: suppose a common shock causes the spending/GDP ratio to increase by 1 percentage point in the country with average values of the electoral variable: by how much does the spending/GDP ratio increase in the countries with the lowest and highest values of the electoral variable? The answer is given by $1+\beta X_{min}$ and $1+\beta X_{max}$, respectively. The row labeled "Range" displays the difference between the two.

Table 7 provides considerable support for the notion that more proportional systems respond to common shocks by increasing primary spending and especially transfers more than other systems. In the primary spending regressions, all the estimates of β are positive, and significant in the case of LAM (at the 5% level) and RAE (at the 10% level). According to the point estimates, the range of variation in the spending/GDP ratio in response to a shock that causes the same ratio to increase by 1 percentage points *ceteris paribus* in the "average" country, oscillates between about .36 and .52 percentage points of GDP.

In the transfers regressions (columns 5 to 8) the coefficients of the electoral variables are very close to those in the spending/GDP regressions, and the t-statistics are much higher – the p-values are all below .001. The implied range of variation in the transfer / GDP ratio in response to the "average" shock is even larger, from .5 to .65 percentage points of GDP. Note also that the "pure" time effect is similar across all columns, between 14.0 and 14.9 percentage points in the spending regressions, and between 12.4 and 13.2 percentage points in the transfers regressions.

[42]We also borrow much of this method of presenting the results from Blanchard and Wolfers (1999).

B. Country-Specific Shocks

We now allow electoral institutions to interact with country-specific shocks. To do so, we need a macroeconomic shock whose effects on spending are a priori clear. Most people would agree that an increase in unemployment will cause most types of government spending to increase relative to GDP, both because of the working of automatic stabilizers and because of the discretionary response by the government. Thus, we estimate regressions of the type:

$$G_{it} = c_i + d_t + \alpha U_{it} + \beta U_{it} X_i + \gamma POP65_{it} + \delta GDP_{it} + \varepsilon_{it} \quad (21)$$

U_{it} is the unemployment rate in country i in period t. Thus, β captures the interaction of a shock to unemployment with the electoral system: if a country with a more proportional system responds to a shock to unemployment by increasing spending or transfers more, β is positive. As before, because RAE displays meaningful time series variation, we also include the variable by itself, in addition to the its interaction with U. The rows labeled "Min" and "Max" display the *coeteris paribus* response to a 1 percentage point increase in unemployment in the countries with the lowest and highest value of the electoral variable; these values are computed as $\alpha + \beta X_{min}$ and $\alpha + \beta X_{max}$, respectively.

Table 8 displays the results. The estimated coefficient of U is indeed always positive and significant: over a five year horizon, in a majority system (where LAM, LEM and LSM are all 0) an increase in unemployment by 1 percentage point is associated with an increase in the total primary spending/GDP ratio by between .42 and .48 percentage points, and an increase in the transfers/GDP ratio by between .27 and .31 percentage points.

The estimates of the interactive term coefficient, β, are always positive, but they are significant (and always at the 5% level) only when transfers/GDP is the dependent variable (columns 5 to 8). The implied economic significance is also considerable: from the row labeled "range," a one percentage point shock to unemployment causes the transfers/GDP ratio to increase by between .53 and .77 percentage points more in the most proportional electoral system than in the least proportional one.

Both types of panel regressions are very robust to outliers. We re-estimated all regressions in Tables 7 and 8 dropping one country at a time, and both France and the Netherlands at the same time. The estimates of β in Tables 7 or 8 change only minimally (often only after the third decimal point), and so do their p-values.

IX. Conclusions

We now discuss the relationship between our contribution and the existing literature, in terms of both theory and empirics. One strand of literature extends the common-pool approach to fiscal policy determination to include the effects of electoral systems.[43] Hallerberg (1998) argues

[43]On the "common pool problem" arising when the financing of expenditure on local public

that the incentive for a personal vote is stronger in plurality systems, where candidates have a direct link with a local constituency. However, as argued by Hallerberg and Von Hagen (1998), certain types of fiscal institutions, such as the presence of a strong finance minister and a closed rule on the budget, provide constraints that limit the common pool problem arising in plurality systems.

Other recent contributions are outside the common-pool framework. Their theoretical mechanisms are also very different from that of our model. In Persson and Tabellini (1999a) two candidates make binding promises on the provision of a "universal" public good and on transfers, which are both district- (and group-) specific. The driving force is uncertainty by the policymakers over the distribution of voters' preferences, and therefore over the identity of the median voter. In a majoritarian system the candidates compete for "swing" districts, rather than focusing on the "safe" districts. They do so by directing redistribution towards a narrower constituency, identified in their model with the "middle class." The result is more spending on the more targetable instrument in majoritarian systems, and a lower provision of the universal public good. By focusing on voters on a limited number of districts, politicians in a majoritarian system fail to internalize the overall distortions induced by taxation decisions, thus leading to a larger government. In Lizzeri and Persico (2000) two candidates make binding promises on the level of spending on two types of government expenditure, a universal public good and transfers which can be targeted geographically or by groups. Even when the public good is more valuable to individuals, in a majoritarian system, where the spoils of office go to the winner, on average one could have lower provision of the universal public good.

The prediction of Persson and Tabellini (1999a) is that majoritarian systems are associated with higher spending on transfers (the more targetable expenditure in their model), the opposite than our implications. One could obviously swap the labels of the two types of expenditures in their model, but it would still yield the prediction that total government spending is larger in majoritarian governments, which for countries with high transfer spending like OECD countries would be the opposite than in our model. It is also difficult to reinterpret their universal public good as our transfers, because in our model the latter do not benefit everyone, but only specific groups.[44]

On a cross-section of 50 countries, Persson and Tabellini (1999a) find some evidence that expenditure on a universal public good – defined as expenditure on order and safety, health, transportation and education – as a fraction of GDP is higher in proportional systems, and that total government expenditure is higher in majoritarian systems; Persson and Tabellini (2000b)

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goods is not fully internalized by legislators see the seminal contribution of Weingast, Shepsle and Johansen (1981) and the dynamic versions of the problem in Tornell and Velasco (1992) and Chari and Cole (1995).

[44]It is more difficult to evaluate the empirical implications of Lizzeri and Persico (1999). Spending on transfers is the same in the two electoral systems, while spending on the public good can be higher or lower in the majoritarian system depending on the value of the public good to the individuals.

find similar results in a panel of 60 countries.[45] The first finding contrasts with our theoretical predictions and empirical findings: expenditure on order and safety, health, transportation and education is essentially local in nature (it reflects mostly purchases of goods and services) and is therefore targetable geographically; hence, according to the logic of our model, it should be lower in a proportional system. Regarding the effects on total spending, in our framework it depends on the underlying voters' preferences and, empirically, it changes sign when we move from countries with high spending on transfers to countries with low level of transfer spending. There could be several reasons for these differences: our definition of public goods is larger than expenditure on order and safety, health, transportation and education; our data refer to the general government, rather than just the central government; and our sample is slightly different. Because theoretical arguments on the effects of electoral institutions on the size and composition of spending can easily go both ways, explaining and possibly reconciling these differences in the empirical results seems an important topic for future research.

[45]In an interesting study at a more disaggregated level, Baqir (1999) finds that in a cross-section of US cities larger district councils are associated with larger city governments, and that spending is higher when councils are elected "at large" than when they are elected by city district.

Table 2. Summary Statistics

	All Mean	All SD	All Min	All Max	OECD Mean	OECD SD	OECD Min	OECD Max	LA Mean	LA SD	LA Min	LA Max
EM	22.9	39.6	1	181.8	19.6	32.9	1	148.3	26.3	45.9	1	181.8
AM	16.1	30.7	1	150	15	32.3	1	150	17.3	29.9	1	120
SM	23.6	39.7	1	180.8	20.1	33	1	148.3	27.2	46	1	180.8
LEM	2.1	1.4	0	5.2	2	1.5	0	5	2.2	1.4	0	5.2
LAM	1.9	1.3	0	5	1.8	1.3	0	5	2	1.3	0	4.8
LSM	2.2	1.5	0	5.2	2.1	1.5	0	5	2.3	1.5	0	5.2
RAE	3	4.4	0.3	26.1	2.4	1.9	0.3	6.8	3.7	6.5	0.3	26.1
EXP	32.6	15.1	10.3	66.6	45.4	9.4	32.7	66.6	19.8	5.5	10.3	29.8
TRAN	13.4	9.5	1.4	31.6	21.3	6.3	11.5	31.6	5.5	3.6	1.4	14.6
PGOOD	18.1	5.6	7.1	29.9	21.9	4.2	16	29.9	14.4	4.1	7.1	23.5
GDPPC	8400	5500	1200	18100	13200	2800	6800	18100	3500	1800	1200	7200
LGDPPC	1.8	0.8	0.2	2.9	2.6	0.2	1.9	2.9	1.1	0.5	0.2	2
POP65	9.7	5.2	2.9	19.5	14.4	2	11.3	19.5	5	2.2	2.9	11.8
ENPP	3.5	1.7	1.3	8.4	3.7	1.6	1.9	8.4	3.3	1.7	1.3	8.4
LENPP	1.2	0.4	0.3	2.1	1.2	0.4	0.7	2.1	1.1	0.5	0.3	2.1
ETHNIC	20.1	19.8	1	75	22.1	22.1	1	75	18.1	17.5	1.1	59.9
OPEN	30.5	17.3	7.4	96.1	30.1	14.1	8.7	62.9	30.9	20.4	7.4	96.1

Cross-sectional averages, standard deviations, minimum and maximum values for all the variables for the full sample, the OECD sample and the Latin American sample. See the Appendix for variables' mnemonics. Each cross-sectional observation is the 1991-94 (or closest available period) average of the variable for the country. Number of observations: 40 for the whole sample (35 for RAE); 20 for the OECD sample; 20 for the Latin American sample (15 for RAE).

Table 3. Electoral Systems and Fiscal Outcomes, Full Sample

Dep. Var.	(1) EXP	(2) EXP	(3) EXP	(4) EXP	(5) TRAN	(6) TRAN	(7) TRAN	(8) TRAN	(9) PGOOD	(10) PGOOD	(11) PGOOD	(12) PGOOD
LEM	0.67				1.32				-0.54			
	(0.80)				(3.03)**				(1.15)			
LAM		1.05				1.70				-0.60		
		(1.10)				(3.49)**				(1.12)		
LSM			0.74				1.32				-0.48	
			(0.89)				(3.06)**				(1.03)	
RAE				0.32				0.38				-0.02
				(1.05)				(2.21)**				(0.13)
POP65	1.15	1.13	1.14	1.30	1.27	1.25	1.27	1.42	-0.12	-0.12	-0.12	-0.10
	(1.86)*	(1.86)*	(1.87)*	(1.95)*	(3.95)**	(4.04)**	(3.96)**	(3.81)**	(0.34)	(0.34)	(0.35)	(0.27)
LGDPPC	0.78	1.16	0.83	0.54	1.63	2.19	1.69	1.45	-1.45	-1.64	-1.46	-1.72
	(0.25)	(0.37)	(0.26)	(0.16)	(0.99)	(1.37)	(1.04)	(0.78)	(0.83)	(0.92)	(0.83)	(0.93)
OECD	13.84	13.49	13.82	11.55	1.81	1.20	1.75	-0.21	10.60	10.83	10.64	10.65
	(2.14)**	(2.10)**	(2.14)**	(1.57)	(0.54)	(0.37)	(0.52)	(0.05)	(2.92)**	(2.98)**	(2.92)**	(2.60)**
Constant	6.34	2.75	5.74	10.86	-16.88	-21.79	-17.46	-11.75	27.83	29.32	27.83	28.87
	(0.26)	(0.11)	(0.23)	(0.42)	(1.32)	(1.73)*	(1.36)	(0.81)	(2.02)	(2.09)*	(2.01)	(2.00)*
Range	3.47	5.25	3.84	8.30	6.89	8.51	6.86	9.76	2.80	3.02	2.49	0.55
$\bar{R}^2$	40	40	40	35	40	40	40	35	40	40	40	35
Observ	0.75	0.76	0.75	0.73	0.83	0.84	0.83	0.80	0.44	0.44	0.43	0.38

Dependent variables: EXP: share of total primary spending in GDP (columns (1)-(4)); TRAN: share of transfers in GDP (columns (5)-(8)); PGOOD: share of spending on public goods in GDP (columns (9)-(12)), averages 1991-1994 or closes available period. See the Data Appendix for the definition of all variables. Estimation by ordinary least squares (t-statistics in parentheses). * (**) significant at the 10 percent (5 percent) level. "Range": range of variation of dependent variable, associated with range of variation of electoral variable, holding constant all other variables.

Table 4. Electoral Systems and Fiscal Outcomes, OECD Countries

Dep. Var.	(1) EXP	(2) EXP	(3) EXP	(4) EXP	(5) TRAN	(6) TRAN	(7) TRAN	(8) TRAN	(9) PGOOD	(10) PGOOD	(11) PGOOD	(12) PGOOD
LEM	2.52				2.64				-0.33			
	(1.84)*				(3.63)**				(0.44)			
LAM		3.05				3.03				-0.34		
		(2.10)*				(4.03)**				(0.41)		
LSM			2.56				2.63				-0.28	
			(1.89)*				(3.64)**				(0.37)	
RAE				1.41				1.62				-0.64
				(1.29)				(2.56)**				(1.14)
POP65	1.19	1.37	1.15	1.43	0.97	1.19	0.95	1.17	0.26	0.22	0.25	0.40
	(1.20)	(1.49)	(1.17)	(1.40)	(1.84)*	(2.50)**	(1.80)*	(1.99)*	(0.47)	(0.43)	(0.45)	(0.75)
LGDPPC	16.44	17.15	16.39	15.76	7.15	7.73	7.05	6.59	4.51	4.48	4.57	4.09
	(2.22)**	(2.36)**	(2.23)**	(2.03)	(1.82)*	(2.05)*	(1.80)*	(1.48)	(1.09)	(1.08)	(1.11)	(1.03)
OECD	-132.44	-142.10	-131.54	-120.92	-65.69	-74.42	-64.42	-54.04	-23.90	-23.17	-24.34	-24.04
	(1.85)*	(2.02)*	(1.85)*	(1.62)	(1.73)	(2.04)*	(1.70)	(1.26)	(0.60)	(0.58)	(0.61)	(0.63)
Range	12.58	15.28	12.80	9.11	13.19	15.18	13.13	10.45	1.66	1.69	1.41	4.13
Observ	20	20	20	20	20	20	20	20	20	20	20	20
$\overline{R}^2$	0.31	0.34	0.31	0.24	0.57	0.61	0.57	0.44	-.08	-.08	-.08	-.01

Dependent variables: EXP: share of total primary spending in GDP (columns (1)-(4)); TRAN: share of transfers in GDP (columns (5)-(8)); PGOOD: share of spending on public goods in GDP (columns (9)-(12)), averages 1991-1994 or closest available period. See the Data Appendix for the definition of all variables. Estimation by ordinary least squares (t-statistics in parentheses). * (**) significant at the 10 percent (5 percent) level. "Range": range of variation of dependent variable, associated with range of variation of electoral variable, holding constant all other variables.

Table 5. Electoral Systems and Fiscal Outcomes, Latin American Countries

	EXP	(2) EXP	(3) EXP	(4) TRAN	(5) TRAN	(6) TRAN	(7) PGOOD	(8) PGOOD	(9) PGOOD
LEM	-1.17			0.13			-1.03		
	(1.22)			(0.26)			(1.50)		
LAM		-0.91			0.36			-0.99	
		(0.86)			(0.67)			(1.31)	
LSM			-1.08			0.14			-0.96
			(1.13)			(0.28)			(1.40)
POP65	0.46	0.69	0.49	0.95	0.98	0.95	-0.54	-0.38	-0.52
	(0.62)	(0.96)	(0.65)	(2.44)**	(2.69)**	(2.44)**	(1.01)	(0.75)	(0.97)
LGDPPC	-0.64	-1.45	-0.77	1.43	1.50	1.44	-1.72	-2.42	-1.83
	(0.22)	(0.51)	(0.27)	(0.95)	(1.04)	(0.96)	(0.84)	(1.20)	(0.89)
Constant	25.23	29.84	26.00	-11.07	-12.12	-11.13	33.22	37.64	33.87
	(1.21)	(1.40)	(1.24)	(1.01)	(1.12)	(1.02)	(2.23)**	(2.49)**	(2.26)**
Range	6.08	4.38	5.61	0.69	1.72	0.71	5.35	4.72	4.99
Observ	20	20	20	20	20	20	20	20	20
$\bar{R}^2$	0.01	-.04	0.00	0.38	0.40	0.38	0.11	0.09	0.10

Dependent variables: EXP: share of total primary spending in GDP (columns (1)-(3)); TRAN: share of transfers in GDP (columns (4)-(6)); PGOOD: share of spending on public goods in GDP (columns (7)-(9)), averages 1991-1994 or closest available period. See the Data Appendix for the definition of all variables. Estimation by ordinary least squares (t-statistics in parentheses). * (**) significant at the 10 percent (5 percent) level. "Range": range of variation of dependent variable, associated with range of variation of electoral variable, holding constant all other variables.

Table 6. Electoral Systems and Fiscal Outcomes: Robustness Checks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	TRAN	TRAN	TRAN	TRAN	PGOOD	PGOOD	PGOOD
	OECD	OECD	OECD	OECD	LATAM	LATAM	LATAM
LSM	1.99	2.30	2.90	2.64	-0.85	-1.18	-0.84
	(2.39)*	(2.99)**	(3.49)**	(3.61)**	(1.11)	(1.79)*	(1.23)
POP65	0.63	0.89	0.90	0.90	-0.51	-0.83	-0.57
	(1.12)	(1.70)*	(1.66)	(1.66)	(0.92)	(1.54)	(1.08)
LGDPPC	4.72	7.37	6.12	7.27	-1.75	-0.93	-2.27
	(1.14)	(1.90)*	(1.46)	(1.82)*	(0.82)	(0.46)	(1.10)
LENPP	4.85				-0.83		
	(1.40)				(0.38)		
OPEN		0.09				-0.08	
		(1.17)				(1.71)	
ETHNIC			0.04				-0.07
			(0.70)				(1.22)
IDEOL				0.55			
				(0.69)			
Constant	-42.44	-68.61	-56.31	-67.29	33.83	30.99	38.59
	(1.06)	(1.82)*	(1.40)	(1.74)	(2.19)**	(2.17)**	(2.53)**
Range	10.3	11.47	14.51	13.22	4.41	6.11	4.36
$\bar{R}^2$	20	20	20	20	20	20	20
Observ	0.59	0.58	0.56	0.56	0.05	0.20	0.13

Dependent variable: TRAN: share of transfers in GDP (columns (1)- (4)); PGOOD: share of spending on public goods in GDP (columns (5)-(7)), averages 1991-1994. See the Data Appendix for the definition of all variables. Estimation by ordinary least squares (t-statistics in parentheses). * (**) significant at the 10 percent (5 percent) level. "Range": range of variation of dependent variable, associated with range of variation of electoral variable, holding constant all other variables.

Table 7. Common Shocks and Electoral Systems
Panel Regressions, OECD Countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep.Var.	EXP	EXP	EXP	EXP	TRAN	TRAN	TRAN	TRAN
Time	13.98	14.91	14.02	14.29	12.75	13.19	12.78	12.40
LEM*d_t	0.07 (1.56)				0.10 (4.27)**			
LAM*d_t		.0.10 (2.08)**				0.13 (4.93)**		
LSM*d_t			0.07 (1.61)				0.11 (4.35)**	
RAE*d_t				0.05 (1.84)*				0.06 (3.56)**
RAE				-2.95 (-1.43)				-2.93 (-2.79)**
POP65	1.03 (2.46)**	0.95 (2.22)**	1.01 (2.43)**	0.95 (2.28)**	0.22 (1.12)	0.21 (1.08)	0.21 (1.06)	0.25 (1.23)
GDPPC	-3.65 (-1.05)	-4.09 (-1.17)	-3.62 (-1.04)	-3.84 (-1.08)	-4.49 (-2.69)**	-4.79 (-2.94)**	-4.46 (-2.68)	-4.43 (-2.53)**
Min	0.86	0.82	0.86	0.68	0.80	0.78	0.80	0.64
Max	1.22	1.34	1.22	1.12	1.32	1.43	1.32	1.14
Range	0.36	0.52	0.36	0.44	0.52	0.65	0.52	0.50
R^2	0.92	0.92	0.92	0.91	0.96	0.96	0.96	0.96
Observ.	112	112	112	112	112	112	112	112

Dependent variable: EXP: share of total primary spending in GDP (columns 1 to 4); TRAN: share of transfers in GDP (columns 5 to 8); 5-year averages from 1960 (or earliest available year) to 1995. See the Data Appendix for the definition of all variables. d_t: time dummies. Estimation by non-linear least squares (t-statistics in parentheses). * (**) indicates statistical significance at the 10 percent (5 percent) level. "Min"("Max"): effect on the dependent variable in the country with lowest (highest) value of the electoral variable of a shock causing a 1 percentage point increase in the dependent variable in the country with average value of the electoral variable. "Range": "Max" - "Min".

Table 8. Country-Specific Shocks and Electoral Systems
Panel Regressions, OECD Countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Var.	EXP	EXP	EXP	EXP	TRAN	TRAN	TRAN	TRAN
LEM*UNR	0.09 (1.23)				0.12 (2.78)**			
LAM*UNR		0.14 (1.60)				0.15 (3.15)**		
LSM*UNR			0.09 (1.25)				0.11 (2.80)**	
RAE				-0.14 (-0.30)				-0.39 (-1.53)
RAE*UNR				0.05 (1.01)				0.06 (2.09)**
UNR	0.48 (2.39)**	0.42 (2.04)**	0.48 (2.38)**	0.8 (4.44)**	0.31 (2.74)**	0.27 (2.38)**	0.30 (2.74)**	0.68 (6.80)**
POP65	1.68 (4.35)**	1.68 (4.38)**	1.68 (4.35)**	1.77 (4.58)**	1.04 (4.91)**	1.05 (5.00)**	1.04 (4.91)**	1.15 (5.31)**
LGDPPC	4.44 (1.83)*	4.59 (1.90)*	4.46 (1.84)*	3.94 (1.62)	2.61 (1.96)*	2.69 (2.04)**	2.62 (1.97)**	2.17 (1.60)
Range $\bar{R}^2$ Observ	0.46 0.90 112	0.72 0.90 112	0.47 0.90 112	0.46 0.90 112	0.58 0.94 112	0.77 0.94 112	0.57 0.94 112	0.53 0.94 112

Dependent variable: share of total primary spending in GDP (columns 1 to 4) and share of transfers in GDP (columns 5 to 8); 5-year averages from 1960 (or earliest available year) to 1995. See the Data Appendix for the definition of all variables. Estimation by non-linear least squares (t-statistics in parentheses). * (**) indicates statistical significance at the 10 percent (5 percent) level. "Min"("Max"): effect on the dependent variable in the country with lowest (highest) value of the electoral variable of a 1 percentage point increase in the unemployment rate. "Range": "Max" - "Min".

DECISIVE VOTER

We show that the median voter is indeed the decisive voter in each electoral system. With a bidimensional issue space, one way of doing this is to show that the median voter is always the decisive voter, regardless of the sequencing of votes on α and β.

Consider the majoritarian system first, and suppose initially that the sequencing on votes is first on α and then on β. Consider the problem solved by individual i of group B in district k_1 (for brevity, we will omit the subscript B to indicate the group when this does not create any ambiguity). Starting from the second stage, let $\alpha^*_{k_1}$ denote the value of α that has prevailed by majority voting in the first stage. The problem of individual i in district k_1 is to find the optimal value of β for a representative who already has a value of α equal to $\alpha^*_{k_1}$. Denote this optimal value of β from the perspective of individual i by $\beta^*_{ik_1}$. This is found by maximizing with respect to $\beta^*_{k_1}$ expression (5) (with the index "i" replacing the median voter index "m"), subject to t^M, s^M_B and g^M_1 being given by (suitable modifications of expressions (4)), and taking as given $\alpha^*_{k_1}$, $\alpha^*_{k_2}$, $\alpha^*_{k_3}$, $\beta^*_{k_2}$, and $\beta^*_{k_3}$. It is easy to see that one obtains $\beta^*_{ik_1} = \beta_{ik_1}$. Thus, in the second stage an individual with median value of β prevails in each district.

In the first stage, the optimal value of α for a representative from the point of view of individual i in district k_1, $\alpha^*_{ik_1}$, is found by maximizing the same expression above with respect to α_{ik_1}, with $\beta^*_{k_1} = \beta_m$. Again, it is easy to see that one obtains $\alpha^*_{ik_1} = \alpha_{ik_1}/(2 - \alpha_{ik_1})$. Hence, the individual with median value of α is decisive in the first stage.

A similar reasoning applies when voting first on β, then on α, and in the proportional system.

LOCAL REQUIREMENTS

A first type of local requirement sets a minimum share of votes that a party must obtain in a given district in order to participate in the allocation of seats in that district; under the Uniform Vote Distribution assumption, this is equivalent to a legal threshold of the same size applying to that tier. A second type of local requirement defines a fraction h of an upper quota that a party must win in at least one district in T1 in order to have access to the allocation of seats in T2. To translate this requirement into a legal threshold, note that the binding constraint is meeting the requirement in the largest district of T1. Hence, the legal threshold in T2 is $THR_2 = hQ_1(S_{1\max})$. We have assembled information on the maximum district size in T1, and we use it in constructing THR_2 whenever the local requirement is of this type.

A. Upper Quotas

We now provide the formulas for the upper quota in the different voting methods and formulas. In all cases, we will refer to "party A" as the party whose share is equal to the upper quota. We will assume that there are P parties in each district.

Majority/Plurality methods.

FPTP: clearly $Q_i(S_{ik}) = .5$

Alternative Vote: $Q_i(S_{ik}) = .5$

Two-Round: $Q_i(S_{ik}) = .5$

Largest Remainder methods.

In LR methods in which "remainders" are transferred to an upper tier, the formulas for the upper quotas are clearly the same as the quotas themselves: any party needs to reach the full quota to be assured of a seat. The exception is the LR Imperiali method, where the number of quotas can exceed the number of seats. Hence:

Hare: $Q_i(S_{ik}) = 1/S_{ik}$

Droop: $Q_i(S_{ik}) = 1/(1 + S_{ik})$[46]

Imperiali: $Q_i(S_{ik}) = 1/(1 + S_{ik})$

[46]In the Japanese SNTV method, the share that guarantees a candidate election without resorting to any second-round allocation of votes is defined by law as the Droop quota, hence $Q_i(S_{ik}) = 1/(1 + S_{ik})$. For the purpose of calculating upper quotas, we consider the Irish STV method as equivalent to a Droop formula. In fact, the Irish system establishes that the Droop quota guarantees election for a candidate. We assume this is also the quota for a party. Hence, $Q_i(S_{ik}) = 1/(1 + S_{ik})$.

In LR methods in which remainder seats are attributed within the same electoral tier, the formulas for the Droop and Imperiali quotas are unchanged. For the Hare quota, instead, they depend on the relation between the number of seats in the district and the number of parties P competing for the seats (see Lijphart and Gibberd (1977) and Gallagher (1992)). If $S_{ik} < P$, the upper quota is $1/(1 + S_{ik})$, as for the other methods. If $S_{ik} \geq P$, the upper quota is $(P - 1)/PS_{ik}$ for the Hare formula.

Highest Average methods:

d'Hondt: The least favorable distribution of votes for party A is when another party (say party P) gets all the remaining votes. Party A still gets one seat if party P gets a vote share V_P which is just short of $V_A S_{ik}$. Thus, when the vote share of the two parties are divided by $1, 2, ...S_{ik} - 1$, party P gets a seat each time. The last quotient, V_P/S_{ik}, is (infinitesimally) smaller than V_A, hence party A gets the last representatives. Hence, $Q_i(S_{ik})$ is defined by the conditions

$$V_A + V_P = 1; \qquad V_A = V_P/S_{ik}; \qquad Q_i(S_{ik}) = V_A \tag{A-1}$$

which gives $Q_i(S_{ik}) = 1/(1 + S_{ik})$. This formula is valid irrespective of the relation between number of parties and number of seats.

Modified St. Laguë. We present the conditions for the Modified St. Laguë formula, since this is always used instead of the pure St. Laguë formula. Under Modified St. Laguë, the party shares are divided by 1.4, 3,5,... instead than by 1,3,5,... In this case we need to distinguish between the case in which the number of parties is larger than the number of seats ($S_{ik} < P$) and the opposite case. In the former case, the worst distribution of votes for party A obtains when S_{ik} other parties get a share of votes which is the same as the share of party A. This implies that the vote share to ensure election is implicitly given by $V_A/1.4 = (1 - V_A)/1.4S_{ik}$, which in turn implies $Q_i(S_{ik}) = 1/(1 + S_{ik})$. If instead the number of parties is "intermediate" ($S_{ik} \geq P \geq S_{ik}/2 + 1$), then $Q_i(S_{ik}) = 1.4/(1.6S_{ik} - 0.2P + 1.6)$ (Gallagher (1992)). Finally, if the number of parties is "small" ($P < (S_{ik}/2 + 1)$) then $Q_i(S_{ik}) = 1.4/(2S_{ik} - P + 2.4)$ (Lijphart and Gibberd (1977)).

LIST OF COUNTRIES AND VARIABLES

A. List of Countries

OECD: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States. **Latin America**: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay, Venezuela.

B. Fiscal Variables

OECD countries:

All fiscal variables are from the OECD *Economic Outlook* Database, and refer to the general government.

TRAN: Transfers to households. Defined as SSPG+TRPG using the mnemonics of the *Economic Outlook* Database. SSPG: Social security benefits to households; TRPG: Other transfers to households.

PGOOD: Public goods, defined as the sum of government consumption and government investment, net of depreciation: CGW + CGNW + CAPEXP. CGW: Government consumption, wages; CGNW: Government consumption, excluding wages; CAPEXP: government investment, net of depreciation, plus net capital transfers paid.

EXP: Total primary government expenditure, defined as TRAN + PGOOD + residual item, where residual item $\equiv$ TSUB + YPEPG - GNINTP. TSUB: Subsidies to firms; YPEPG: Property income paid by government; GNINTP: Net interest payments by government

Latin American countries:

For Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Panama, Paraguay, Peru, Uruguay, Venezuela: Gavin and Perotti (1997), based on IMF data, World Bank data, and national data.

For Dominican Republic, El Salvador, Guatemala, Honduras, Jamaica, Nicaragua, Trinidad and Tobago: IMF data.

All definitions are consistent, and follow the IMF *Government Financial Statistics* classifications, which in turn is, for large aggregates, virtually identical to the OECD *Economic Outlook* classification.

C. Other Variables

LENPP Logarithm of the effective number of Parliamentary parties. ENPP is defined as $\sum_p \frac{1}{s_p^2}$, where s_p is the share of seats of party p. Source: for OECD countries Lijphart (1994) and unpublished data from Lijphart extended to the early 1990s using national sources; for Latin American countries Inter-Parliamentary Union (various years), Political database of the Americas (http://www.georgetown.edu/pdba/english.html), and national sources.

ETHNIC Index of ethno-linguistic fractionalization for 1960. It measures the probability that two randomly selected people from a given country will not belong to the same ethnolinguistic group. Source: Atlas Narodov Mira (1964) as reported in Easterly and Levine (1997).

IDEOL Ideological configuration of government. The variable takes values from 1 (dominant right-wing party) to 5 (dominant left-wing party). Source: Woldendorp et al. (1993) and updates from Perotti and Kontopoulos (1999) (available only for OECD countries).

LGDPPC Log of real GDP per capita in thousands of 1985 international dollars. Source: Summers and Heston (1991) and Penn World Tables 5.6 update; updated for the years after 1992 using World Bank data.

OPEN Ratio of exports of goods and services plus imports of goods and services over two times GDP. Source: World Bank, World Development Indicators and Penn World Tables 5.6 update.

POP65 Ratio of population above 65 to total population. Source: World Bank, World Development Indicators.

U Unemployment rate. Source: OECD *Economic Outlook* Database.

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