Electoral Systems, Legislative Fragmentation and Public Spending:
A Comparative Analysis of Brazilian States

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Abstract:

A panel data analysis is performed using a pool of Brazilian states to evaluate how the size and composition of public spending may be affected by the rules defining electoral systems through their effects on legislative fragmentation. Framed on recent political economy models that examine the fiscal outcomes of electoral systems, results indicate that the more disproportional the electoral system and the smaller the fragmentation of state assemblies, more is allocated towards public goods and less is allocated towards transfers. Evidence in favor of the common-pool hypothesis at the state level was not compelling. Under some specifications, large and more fragmented state legislatures were found to be associated with smaller state governments.

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I. Introduction

Comparative political scientists have long attempted to evaluate the effects of electoral systems on features of the political process. Majoritarian systems have often been associated with greater accountability to geographic constituencies, lower representation of minority positions, small number of parties and one-party long-tenured governments. Proportional representation (PR) systems, on the other hand, have been related to greater accountability to socioeconomic groups, larger representation of minority interests, larger number of parties, multi-party and short-tenured governments (Lijphart 1994).

Borrowing from such insights, political economists have started to construct hypothesis on how electoral rules may affect fiscal outcomes. Much of the initial literature has looked at the effects of government fragmentation on the size and balance of public budgets stemming from multi-party coalitions usually observed under PR systems. (Roubini and Sachs 1989, Grilli et al 1991, Stein, Talvi and Grisanti 1999). Their predictions, however, were derived from political behavior based on electoral strategies usually associated with majoritarian systems.

Having realized this, recent efforts have been directed towards designing structural models that incorporate electoral strategies more compatible with PR systems (Persson and Tabellini 1999a, 2000a, Milesi-Ferretti, Perotti and Rostagno 2002, Lizerri and Persico 2001). Accounting for such strategies led to new testable results relating the degree of proportionality in electoral systems to the size and composition of public spending.

Thus, based on this new theoretical framework in general and in the model developed by Milesi-Ferretti, Perotti and Rostagno (2002), in particular, this paper will focus on an evaluation of how the size and composition of public spending may be affected by changes in the electoral rules. It will attempt to answer the following question: can differences in the degree of *proportionality* in the electoral system among political units explain differences in the size and composition of their governments' spending?

It is also my intention to go beyond the estimation of simple reduced forms commonly pursued in this literature. Instead, I will utilize an econometric model based on the structure laid down in Milesi-Ferretti, Perotti and Rostagno (2002) and I will attempt to evaluate whether the effects of electoral institutions on public spending are transmitted through their long recognized impact on legislative fragmentation.

The econometric model will be tested using a sample of Brazilian states. The validity of the sample for the purpose of this exercise can be justified on the basis of Brazil's long-standing and malapportioned PR system, the size and decentralized nature of its federal regime and the availability of good and uniform data.

Brazil's long-standing PR system, presents considerable variation in (electoral) district magnitude among Brazilian states. The system is malapportioned implying that

differences in district magnitude cannot be reduced to simple differences in state population. It is a large federation (twenty-six states and one federal district) where state goverments' autonomy and resources to implement public investment, social security and welfare programs have been recently amplified due to decentralization. Separation of powers at the subnational level has been accentuated in the last decade, increasing the involvement of state legislatures in fiscal policy making.

This analysis will complement recent work on the fiscal effects of electoral systems conducted by Persson and Tabellini (1999a ,2001), Scartascini and Crain (2001) and Milesi-Ferretti, Perotti and Rostagno (2002) for cross-section of countries, Gilligan and Matsusaka (1995, 2001) for US states and Baqir (2001) for US cities.

Although a previous analysis of the political determinants of fiscal policy among Brazilian states has already been conducted by Blanco (2001), my paper will complement his by trying to verify if the effects of some of the political variables are rooted in electoral rules. It will also expand his analysis by not only looking at the size of primary spending, but at its composition.

Finally, by incorporating electoral institutions in the analysis, my study may offer new insights in two important areas on the research of Brazilian politics: how Brazilian electoral rules shape legislator's budgetary activities (Ames 1987, 1995) and how political institutions have affected the interaction between executive and legislative powers in the process of state fiscal policymaking (Abrucio 1998, Santos 2001).

The rest of this paper is organized as follows. The next section reviews the political economy literature on the fiscal effects of electoral institutions. Section III summarizes and contrasts the theoretical predictions presented in the previous section by translating them into testable hypotheses. The appropriateness of using a sample of Brazilian states along with the description of the Brazilian electoral system is discussed in Section IV. Section V describes and summarizes the dataset. Section VI sets up the econometric model and proceeds to evaluate the testable hypotheses presented in section IV. Finally, a summary of the main results and some proposed extensions are presented in section VII. All tables used in the analysis are included in the Appendix.

II. Literature Review

A large and growing literature in the disciplines of economics and political science has designed analytical models to study the effects of political institutions on the size and fiscal performance of governments.[1] Most of the literature has been motivated by Weingast et al's *common-pool hypothesis* (Weingast, Shepsle and Johnsen 1981). Based on Buchanan and Tullock's (1962) ideas on the role played by distributive politics in the determination of budget outcomes, their seminal model emphasized the potential role played by electoral rules, legislative procedures and fiscal arrangements in the size and efficiency of governments. Their so-called *law of 1/n* stated that publicly provided goods

[1] A good survey of the literature can be found in Persson and Tabellini (1999b, 2000)

are overprovided and that public expenditures should increase as the number of legislators increases.

Three institutional features were crucial to this result: (i) a fiscal arrangement where publicly provided goods are funded by a *common-pool of revenues* raised through distortionary taxes imposed uniformly on all jurisdictions, (ii) a majoritarian electoral system where legislators are elected in single member districts serving geographically based constituencies, (iii) a legislative norm *of reciprocity or universalism,* whereby all legislators would form a unique coalition; voting on each other's projects.[2]

The combination of the norm of universalism with the existence of a fiscal common-pool allows legislators to charge their voters only 1/nth of the real value of every additional dollar in public projects delivered to their districts, where n is the total size of the legislature. Therefore, by internalizing all benefits but only part of the costs of their pet projects, each legislator presents an incentive to increase their public demands relative to a situation where their citizens would have to pay for the entire cost of their local projects. As the size of the legislature expands, so will total government expenditures given the norm of universalism.

Several models have attempted to generalize the common-pool hypothesis (CPH) by relaxing some of their institutional and structural hypothesis. Inman and Fitts (1990) extended Weingast et al (1981) to incorporate the role of political parties in a two-party legislature. They developed the notion of "constrained universalism", whereby public spending increases not with the overall size of the legislature but with the number of legislators in the majority party coalition. The relationship, however, is non-linear as increases in the total tax bill shared by party members imposes cuts in the size of individual projects proposed by majority party members preventing the majority coalition from further growth. Party discipline plays a role in attenuating the overspending effects resulting from more fragmented coalitions.

Chari, Jones and Marimon (1997) and Halleberg and Von Hagen (1999) verified the CPH in environments where the budget is decided partially or entirely by the legislature. Both analyses have introduced the figure of the Treasury minister or the President, whose constituency is the whole country, as opposed to legislators or spending ministers, whose constituencies are inherently local. The effect of government fragmentation on the size of government will be conditional on how concentrated the budget process is in the hands of the Treasury minister (President).[3] More hierarchical budget procedures increase the power of Treasury minister, while more collegial procedures assign a more egalitarian standing among different public officials.

2 The norm of universalism is originated by the uncertainty behind the formation of minimum winning coalitions (MWC). Legislators would prefer the certainty of a smaller share coming out of a public budget equally divided with the whole legislature than the lottery of obtaining a higher share only in the event he succeeds in being part of a MWC.

[3] Government fragmentation is usually associated with the size of the legislatures in parliamentary democracies and with the number and heterogeneity of spending ministers in presidential systems

All CPH models described above present two central predictions (i) the more decentralized and fragmented the budget procedures and (ii) the greater the number of districts (in a majoritarian system), the larger the government will be.[4]

A large number of empirical analyses have tested both CPH predictions for the institutional environment it best fits, US legislatures. The role played by centralized budget procedures in containing public spending has been supported by Bohn and Inman (1996), Poterba (1994) Holtz-Eakin (1988). In addition, Gilligan and Matsusaka (1995, 2001) found a positive and significant correlation between the size of upper legislative chambers and state government spending. Using a cross-section of state municipalities Baqir (2001) arrived at a robust positive association between city council seats and local government spending, a link that is broken for cities whose executives present veto powers. Finally, a less direct prediction stemming from the CPH approach has been that political institutions commonly associated with decentralized and fragmented fiscal policy-making procedures should also promote larger and more inefficient governments.

The initial conjecture that proportional (majoritarian) representation systems should be associated with larger (smaller) government spending and public deficits is an illustration of the second type of prediction. This conjecture has been drawn simply by combining the strong empirical regularity between the degree of proportionality in a given electoral system and the degree of legislative fragmentation, invoked in the comparative politics literature as Duverger's Hypothesis and Law, with the positive relationship between legislative fragmentation and government spending/surplus predicted by CPH.[5]

While at first sight this proposition seems intuitively compelling, its logic is fundamentally flawed, given that theoretical predictions in the CPH were derived by assuming electoral strategies inherently connected to majoritarian electoral rules. This was apparently reflected in the mixed support received by this conjecture in cross-national samples. Roubini and Sachs (1989), Grilli, Masciandaro and Tabellini (1991), Stein, Talvi and Grisanti (1999) have found evidence of a positive correlation between proportional systems/minority governments and fiscal deficits. On the other hand, Edin and Ohlsson (1991) and Alesina and Perotti (1995) found more proportional systems to present smaller fiscal deficits.

[4] Halleberg and Von Hagen (1999) have also looked at the common-pool problem in a two period model obtaining a positive association between goverment fragmentation and the size of public deficits. The same result was also obtained in Cole (1993) and Velasco (1999) in more general dynamic extensions.

[5] Duverger's Hypothesis states that proportional representation systems favor multi-partism. It has been systematically tested and identified as a positive correlation between the number of legislative representatives elected from each electoral district (district magnitude) and the degree of legislative fragmentation proxied by number of effective parties in any given legislature (Laakso and Taagepera 1979, Powell 1982, Ordeshook and Shvetsova 1984, Taagepera and Shugart 1989, Amorim Neto and Cox 1997). Duverger's Law, on the other hand simply states that plurality or majoritarian rules favors the two-party system.

In response to this problem, a recent wave of analytical models has been developed to reevaluate the size and composition of government spending in alternative electoral systems (Persson and Tabellini 1999, Scartascini and Crain 2000, Lizerri and Persico 2001, Milesi-Ferretti, Perotti and Rostagno 2002).

Scartascini and Crain (2001), for example, provide an heuristical modification of Inman and Fitt's notion of "constrained universalism" in order to incorporate the existence of multiple parties in proportional representation systems. They argue that in multiparty/PR systems party leaders prefer to include projects favored by opposition parties rather than face the uncertainty of forming minimum size winning coalitions. This behavior leads to the adoption of a norm of universalism analogous to the one emerging in the CPH, but only involving legislators from parties with enough bargaining power. *Public spending is expected to increase in more proportional systems only to the extent that the number of effective parties, their proxy for the number of influential legislative parties, increases*. They also have found a robust positive correlation between the number of effective parties and total spending for a panel of OECD countries between 1970 and 1990 and for a larger panel between 1980 and 1996.

Persson and Tabellini (1999a), Lizerri and Persico (2001), Milesi-Ferretti, Perotti and Rostagno (2002) went further with their analytical models by allowing a richer variety of fiscal instruments whose *targetability* properties are exploited by political candidates in their electoral strategies and by individuals on their voting decisions. For instance, while welfare transfers and retirement pensions affects particular socioeconomic groups in the population (the poor and the old, respectively), public investment expenditures and intergovernmental transfers are more likely to affect all individuals living in one or more geographic constituencies independently of their socioeconomic characteristics. Differences in the targetability nature of public spending also provide a rationale for the allocation of government expenditures among different budget categories leading to predictions with respect to the impact of electoral systems on the composition of public spending.

Despite the similarity in their research agendas and the common *targetability assumption*, their analysis have been framed on different models of electoral competition and different fiscal instruments. They have also differed on their formalization of proportional systems. These differences resulted in alternative reduced forms that relate electoral systems to the size and composition of public spending.

Persson and Tabellini (1999a) have set up a probabilistic voting model where two candidates/parties compete in a nationwide election. Candidates make binding promises on the provision of a "universal" public good and on transfers that can be targeted to three different socioeconomic groups. Differences in the distribution of ideological preferences among groups are the driving forces of the model. Parties adopt the strategy to direct most of the announced transfers to the ideologically polarized group, identified in their model as the middle class, not wasting too much of them in groups who are either strongly biased against or towards their competitor. Electoral systems differ from each other by the way votes are aggregated to obtain a winner. Under a majoritarian system,

the winner is required to obtain a simple majority of votes in an absolute majority of districts. Under a PR, candidates will have to win by an absolute majority of votes in the unique district containing the whole nation. By changing the geographic locus of the electoral competition, electoral rules led political candidates to adopt different strategies. In PR systems, this strategy consists of targeting the middle class in the population at large in order to attract swing voters. In majoritarian systems this requires targeting the middle class only in the districts where they are more numerous (swing districts). Even tough the benefit of redistribution, measured in terms of marginal votes gained from the middle class, is the same under both electoral systems; the costs are smaller in the majoritarian system as parties do not internalize the votes lost in non- marginal districts.[6] The result is more spending on transfers and a lower provision of the universal public good in the majoritarian system. By focusing on voters in a limited number of districts, politicians under a majoritarian system fail to internalize the overall distortions induced by taxation, thus leading to a larger government. *They preditct that is that majoritarian systems will be associated with higher spending on transfers and larger total spending relative to proportional representation systems.*

Lizzeri and Persico (2001) expand Myerson's (1993) model of redistributive politics under alternative electoral systems by allowing a pure public good in addition to transfers. The benefits from the public good are higher on average but they cannot be targeted to groups of voters as easily as transfers. Political candidates are selected on the basis of announced fiscal policies to which they commit if elected. Electoral systems now differ by the way vote shares are translated into influence in policy-making. Majoritarian systems are associated to a winner-take-all voting rule where fiscal policy making is assigned to the party with the highest share of votes. Under a PR, fiscal policy is chosen in a cooperative game with weights corresponding to each party vote share. This feature mimics the bargaining process implicit in coalition governments common in PR systems. Hence, while in a PR, candidates need to win by a large margin, in a majoritarian system the margin is irrelevant. Winning the election is all that matters in this case. Despite such differences in incentives the size and composition of public spending is set to depend on individual preferences between the non-targetable and the targetable budget component but not on electoral rules. *Their final prediction is that spending on transfers, which equals total spending, is the same in both electoral systems.*

Milesi-Ferretti, Perotti and Rostagno (2002) model, hereafter defined as MFPR, is built on an extension of the logic of strategic delegation to legislatures developed in Besley and Coate (1999). Differences in electoral systems are modeled by changes in the nature of target constituencies. In proportional systems, the availability of more than one seat per district allows voters to select legislative candidates whose fiscal policy preferences are more in tune with the socioeconomic group to which she belongs. At the same time multiseat districts also allow political candidates to redefine their electoral strategies by proposing fiscal packages designed to conquer the vote of specific socioeconomic groups. In majoritarian systems, each district elects one candidate. Under this system

[6] In proportional systems, winning the election requires obtaining an absolute majority of votes over the entire population. In a majoritarian system, winning the election requires obtaining an absolute majority of votes in an absolute majority of districts.

constituencies are narrowed down to one determined geographic location leading them to focus on geographically targetable expenditures.

In contrast to the previous models, in MFPR, voters select their candidates based on expected policy outcomes not on promises. Policy outcomes are determined by a minimum winning coalition of legislators, regardless of the electoral rule. Forward-looking voters will internalize the subsequent legislative game before voting. Rational candidates will take such deliberations into account when selecting their electoral strategy and subsequent behavior. There is no universal public good. Instead two types of targeted publicly provided goods exist: the first is targeted towards social groups (transfer) and the second is targeted toward geographical groups (local public good). In Majoritarian systems, the median voter will come from the same socioeconomic group and will choose legislators with identical preferences for transfers. Therefore, no bargaining over the preferred level of transfers occurs, instead there will be bargaining over the level of public goods. Foreseeing this, the median voter in each district will choose a legislator with a higher preference from the public good relative to transfers than hers. In PR systems, a representative for each group will be elected. As a result, there will be bargaining over the level of transfers. On the other hand, no bargaining over the level of local public goods occurs, as they are assumed to be uniformly provided across regions. Foreseeing this outcome, the median voter in each group will decide to elect somebody with a higher preference for transfer relative to public good than his. *Their final prediction is that spending with transfers (public goods) will be higher under PR (majoritarian) systems.* Switching from a majoritarian to a proportional system may increase or decrease total spending in a given political unit depending on the median voter preferences of transfers relative to public goods. *The authors show that if individual preferences are such that transfer spending is smaller (larger) than public good spending regardless of the electoral system, a switch from a majoritarian to a proportional system will result in a decrease (increase) in total spending*.

Persson and Tabellini (1999a) using cross-section of countries have found a marginally significant association between majoritarian systems and larger governments. This result, however has not proven robust to different samples. On a different empirical analysis the same authors (Persson and Tabellini 2001) obtained a statistically significant association between government size only for OECD countries.[7] Persson and Tabellini (1999) have also found some evidence that expenditure on their "universal public good" – defined as expenditure on order and safety, health, transportation and education- as a fraction of GDP is higher in proportional systems. This is the opposite of what is expected in the Milessi-Ferretti et al (2001) model: expenditure on order and safety, health, transportation and education is essentially local or at least regional in general and is, therefore, targetable geographically; hence, it should be lower in a proportional system.

Milesi-Ferreti et al (2002) also performed an econometric analysis of their theoretical results. Using a sample of OECD and Latin American countries, they found evidence

[7] They have justified this empirical finding as a validation of Milesi- Ferretti et al (2002) findings given that transfer spending is systematically higher than public good spending among OECD countries irrespectively of their electoral systems. Note, however, that the same result would also be compatible with

supporting their three theoretical predictions. Transfers were found to be positively associated with more proportional systems for the whole sample. Public good expenditures were found to be negatively associated with more proportional systems also for the whole sample. Lastly, more proportional systems are positively associated with higher total primary spending in OECD countries, where transfers have been historically a sizeable component in government budgets. On the other hand, more proportional systems have been associated with lower primary spending in Latin American countries, where public spending with transfers have been consistently smaller than public good spending.

III. Testable Results.

Two different hypotheses regarding the effect of electoral systems on public spending can be extracted from the theory reviewed above:

H.1)CPH Approach

Total spending increases with the proportionality of the electoral system as legislative fragmentation measured by the number of effective parties in the legislature increases. Individual preferences for the composition of spending plays no specific role.

H.2.) MFPR Approach

A) An increase in the degree of proportionality will facilitate the election of more than one legislator from the same geographical location, increasing the bargaining conflict over transfers more than proportionally than the conflict over public goods. Foreseeing that individuals from different socioeconomic groups will refine their voting and will elect legislators with stronger (weaker) preferences for transfers (public goods) than theirs. The final result will be an increase in transfers and a decrease in public goods as the electoral system becomes more proportional.

B) Given A, if individuals value transfers over public goods, regardless of the electoral system, the increase in proportionality and legislative fragmentation will increase transfers by a larger absolute value than it will decrease public goods. The final result will be an increase in total primary spending. Individual preferences for transfers relative to public goods is revealed whenever transfer spending is larger than public good spending for different political units with different electoral systems.

Both hypotheses can be summarized in the following way:

Let the primary budget (total spending minus debt payments) be decomposed between expenditures targeting socioeconomic groups, hereafter defined as transfers, and expenditures targeting specific regions, hereafter defined as local public goods, or simply, public goods.

$$b = w + g \qquad (1)$$

where b is primary spending, w is transfers and g is public goods.

Let p be the degree of proportionality of the electoral system and let c be the number of socioeconomic groups being part of the government coalition in the legislature. Duvergers' Hypothesis can be simply written as:

$c = C(p)$ where $dC/dp > 0$ (2)

Let w, g and, hence, b be a function of c:

$w = W(c)$ (3)
$g = G(c)$ (4)
$b = B(W(c) + G(c))$ (5)

Plugging (2) into (3), (4) and (5) and given that $dF/dp = dF/dC * dC/dp$ where F=W, G, B and $f^* = f \circ c$, we arrive at the following reduced forms:

$w = W(C(p)) = W^*(p)$ (6)
$g = G(G(p)) = G^*(p)$ (7)
$b = B(W^*(p), G^*(p)) = B^*(p)$ (8)

Translated to the functional forms (1) to (8), H.1 would imply: dB/dc and $dB^*/dp > 0$.
No a priori hypothesis are made with respect to dW/dc, dW^*/dp, dG/dc, dG^*/dc.

On the other hand, under MFPR approach, *H.2.A* imposes the following restrictions on functional forms (1) to (8): $dW/dc>0$, $dW^*/dp>0$, $dG/dc<0$, $dG^*/dp<0$. The functional translation of *H.2.B* would be: $dB/dx >(<)0$ if $w/g>(<)1$ where x=c and p.

While the CPH and MFPR approach are not necessarily mutually exclusive, their reduced form effects of proportionality with respect to the size of government spending are expected to deliver exactly opposite results in samples where government spending is biased towards public goods ($w/g<1$). This result is independent of the degree of the electoral systems' proportionality. In such samples negative values for $dW/dp – dG/dp$ and, hence, for dB/dp may not only result in rejection of the CPH approach but also provide some preliminary support for the MFPR/targetability approach. Therefore, estimation of equation (8) will be essential in this assessment. Additional support for the MFPR approach may arise from reduced forms (6) and (7) whose effects are summarized in H.2.

Legislative fragmentation plays an important role in translating electoral rules into fiscal outcomes in both approaches. Its relevancy can be evaluated by estimating the effects of electoral rules on the size and composition of spending using the structural specification in equations (2) to (5) and contrasting it with the estimates of reduced forms (6) and (7). If legislative fragmentation is a relevant channel, one should expect its qualitative impact on the size and composition of public spending to be identical to the qualitative impact of the degree of proportionality on the same fiscal outcomes.

The role of proportionality, targetability and legislative fragmentation in influencing fiscal outcomes will be evaluated in Section V for a sample of Brazilian states. The appropriateness of using this sample and a through description of the dataset is presented in the next two sections.

IV. The case for a Brazilian study case.

Empirical political economists interested in testing the impact of institutions on policy outcomes have often relied on cross-country samples. While policy outcomes and institutions may vary widely across such samples, so do a variety of other factors that are very difficult to be measured and are usually left out of reduced form equations. Consistency of regressions estimates is compromised when these ommitted variables turn out to be correlated with the proxies used to measure institutional changes.

Brazil's democratic and decentralized regime coupled with its long-standing federal and electoral systems can potentially tackle the requirement of sample variance.[8] The process of political and fiscal decentralization, which culminated in 1988 with the promulgation of a new federal constitution, increased the access of state governments to tax revenues and instruments previously assigned to the central government. The unclear assignment of mandates among different government levels emerging from the new Constitution was another factor that enhanced state governments discretion to allocate their budgets. Political and fiscal autonomy at the subnational level was further augmented by allowing state governments to design legislation in areas such as the administration and provision of social insurance and pensions to public employees, which were regulated by federal legislation in the past. This autonomy is reflected in wide differences in the size and composition of state budgets, which the next section will demonstrate.

The nature of the Brazilian electoral system is another factor in favor of variance as it combines a long-standing and nationally uniform voting formula with regional and temporal variations in district magnitude. Brazil's open list PR dates back to 1945. Federal and state deputies along with city council members are selected through a combination of a Hare quota, which determines the initial allocation of seats among parties, with a d'Hondt voting formula used to assign seat remainders. This procedure dates back to 1950 (Jobim and Porto 1996). The geographical delimitation of electoral districts in Brazil for the purpose of electing state legislators coincides with states' jurisdictional boundaries. For that reason, district magnitude in elections for state assemblies varies across states being equal to the number of seats in the state legislature.

Endogeneity of electoral rules does not seem to be a fundamental issue in the Brazilian case. Rules regarding district magnitude are written in the federal constitution and provisioned to be periodically modified by federal legislation. The size of state legislatures is defined as a function of the size of its state legislative delegation in the national assembly, which on its turn, is set to be a function of the state population. Both

[8] The qualifiers "democratic" and "decentralized" are used to emphasize to emphasize that federative regimes are not always characterized by democratic and decentralized governance structures.

functions, however, are peculiar enough to prevent any proportional relationship between seats and state populations.[9] The fact that state differences in district magnitudes are set by federal law is a point in favor of their exogeneity for the purpose of this analysis. Choosing the district magnitude of any given state is out of the jurisdiction of their state legislators and, for that matter, unlikely to be influenced by yearly decisions regarding state budgets. Moreover, the fact that their principles are set in the federal constitution make it harder for state representatives in congress to change it on behalf of their respective states as a response to budget or fiscal matters.

Another point in favor the exogeneity of district magnitude has to do with the disproportionality between state populations and the size of their legislative delegations. Also referred to by political scientists as *malapportionment* has been a persistent feature of the Brazilian proportional representation system. (Nicolau 1991). Malapportionment has persisted even after 1994, the last time when legislation altering district magnitudes for state and national assemblies was updated .

Last but not least, the case of a Brazilian study case could also be made on the accumulation of good quality and uniform public finance and electoral data at the state level, which given its dimension (twenty-six states and one federal district) and the sucession of elections over the last fifteen years represents a good opportunity to perform a longitudinal statistical analysis.

V. Data

A. Description

Reduced and structural form specifications will be described and estimated in the next section. They will consist of regressions involving the size and composition of Brazilian state government spending, measures of the proportionality of the electoral system, measures of government fragmentation and a set of socioeconomic variables commonly used as controls in the public finance literature.

All data required in the analysis was collected from a sample of all twenty-six Brazilian states plus Brazil's Federal District. For general reference, Brazilian state names along with their population and per capita income are listed in Table 1 in the Appendix.

Since 1986, public finance data of Brazilian state governments' balance sheets has been compiled without considerable methodological changes by the Brazilian Central Government Treasure Secretary (STN) being published in a statistical annuary

[9] The size of the state legislatures is set to be three times the size of the state delegation in the national assembly if such delegation is smaller or equal than 12. For state delegations larger than 12, the size of state legislatures would be 36 plus the difference between the state congressional delegation and 12. The size of state congressional delegation, on the other hand, is set in the Constitution to be proportional to the population and provisioned to change by federal law before each election. The size of state congressional delegations is constitutionally constrained to be larger than 8 and smaller than 70.

denominated Financas do Brasil (FINBRA). FINBRA/STN dataset has been the dataset most commonly used by applied researchers studying Brazil's subnational goverments. An alternative source spanning 1991 to 1997 has been recently made available by the Central Government Census Bureau (IBGE) in a publication titled Regionalizacao das Transacoes do Setor Publico (RTSP). In spite of its shorter horizon, RTSP/IBGE presents a methodological advantage over FINBRA/STN because it follows the United Nations System of National Accounts in the coverage (general government) and classification of their cross-national public finance statistics .[10]

RTSP/IBGE was chosen, as it will allow for the calculation of measures of the size and composition of public finances compatible with those used in cross-country public finance analysis and identical to those used in MFPR empirical analysis. Another important reason for choosing RTSP/IBGE is that this database also includes the amount spent in each Brazilian states by the federal government and by all municipal governments within their boundaries, another potential control for determining state government decisions in a federal country.[11]

Taking that into account, the size of Brazilian state governments has been measured by its primary spending (total spending minus public debt payments) as a share of state government gross state product (GSP). The composition of state spending was obtained by decomposing state government primary spending into two categories matching MFPR targetability criteria: Transfers and Public Goods. Transfers are defined as the sum of social security and welfare payments and other household transfers. Public Goods includes all primary budget items targeting regions being defined by the sum of current and capital spending on goods and services plus current and capital transfers to municipalities. As is the case with MFPR empirical analysis, some items of the primary budget cannot be classified either as transfers or public goods. Thus item such as subsidies to firms, financial transactions were included in a third category defined as Residual.

Data on state government political structure was collected from Nicolau (1998) and from the Laboratory of Experimental Studies at the University Research Institute of the state of Rio de Janeiro (LEEX-IUPERJ). Both sources contain raw data on election results for the state executive and for the state legislative assembly with a four-year interval corresponding to the duration of state elective mandates. They also contain data on the number of seats in each state legislative assembly used as a measure of state district magnitude. Data was collected from both sources for elections 1990 and 1994.

Five different proxies for the degree of proportionality of each Brazilian state are used in this analysis: absolute district magnitude, Rae's and Gallagher's indexes of

[10] Following UN/SNA, budgets shall include all economic transactions of the state governments direct administration, *public* foundations and autarchies along with non-profit private organizations which are controlled and financed by any of the government units previously mentioned. This notion is referred to as general government and excludes all economic transactions carried on by financial and non-financial public corporations (Government Finance Statistics Manual 2001).

[11] A variable that deserves special attention in Brazil given the issue of unclear assignment of mandates between government levels brought in the previous section.

disproportionality (Rae 1967,Gallagher 1991), deviations from the perfect proportionality profile (Devprop), and empirical threshold (Thr).

State legislative assemblies are unicameral and their representatives are elected at large in one district corresponding to the whole state jurisdiction. Under this condition, absolute district magnitude is reduced to the number of legislative assemblies in each state (seats), which has been directly collected from the data sources described above. The remaining four proxies are calculated by contrasting the percentage of votes received by a party with the percentage of seats in the legislative assembly it conquered.[12]

Let states be indexed by i, parties by j and election years by τ. Let s be the percentage of seats and v the percentage of votes. Rae's (Rae) and Gallagher's (Lsq) indexes of disproportionality are direct functions of the differences between s and v for each state in any given election. Their formulas are presented below.

$$\text{Rae}(i, \tau) = \frac{1}{n}\sum_{j}\left|s_j(i,\tau) - v_j(i,\tau)\right| \qquad (9)$$

$$\text{Lsq}(i, \tau) = \frac{1}{2}\sum_{j}(s_j(i,\tau) - v_j(i,\tau))^{1/2} \qquad (10)$$

Devprop and Thr were obtained after regressing seat on vote shares for all parties competing in each state i and in any given election τ .[13] The non-stochastic part of the regression of s on v is then given by:

$$s_j(i, \tau) = \rho_{i\tau} + \pi_{i\tau}\, v_j(i, \tau) \qquad (11)$$

A perfect proportionality profile can be defined as one in which the percentage of seats allocated to a given party in the legislative assembly equals the percentage of votes received by the same party (s=v). Under these circumstances ρ=0 and π =1 and deviations from perfect proportionality may occur as ρ deviates from zero and π from 1. Devprop can be defined in (12) as the absolute value of π'-1. Where π' is the regression estimate of π from (11) when ρ equals zero.

$$\text{Devprop}(i, \tau) = \left|\pi'(i,\tau) - 1\right| \qquad (12)$$

Deviations from perfect proportionality may also occur due to the existence of electoral thresholds and, the minimum percentage of votes required to obtain minimum representation in the legislative assembly. In Brazil, state differences in electoral thresholds are not the product of differences in states' legislation, but rather an outcome of the imposition of the Hare quota as a requirement for parties to participate in the distribution of seat remainders. Brazil's Hare quota is computed by dividing the number of valid votes casted to any given party in a given state by the number of seats in the state

[12] See Taagepera and Shugart (1989) for a description of their properties

[13] Brazil's fragmented party system will allow us to have acess to at least eight observations in each electoral year and in each state.

legislative assembly (district magnitude). The role of the electoral quota as a typical threshold is limited by another peculiarity in the Brazilian electoral legislation, which allows votes to be transferred not only among parties but also among party coalitions for the purpose of reaching the quota. This mechanism is particularly helpful for small parties. They can free ride on votes cast to larger parties with whom they decide to coalesce in order to overcome an electoral quota that would have been insurmountable had the coalition mechanism not been allowed in the first place. [14] For that reason, instead of computing electoral quotas, I decided to estimate an empirical electoral quota or threshold based on the regression estimates in (11).

This empirical electoral threshold corresponds to $-\rho/\pi$, the point where s equals zero in (11). Thr corresponds to $-\rho'/\pi'$ where ρ' and π' are the regression estimates of ρ and π from (11) when ρ is different to zero.

$$\text{Thr}(i, \tau) = -\left[\frac{\rho'(i,\tau)}{\pi'(i,\tau)}\right] \qquad (13)$$

Government fragmentation has been proxied by two measures of legislative fragmentation: the effective number of assembly (Enps) and elective parties (Enpv)- (Laakso and Taagapera 1979)- and Rae's measure of legislative fractionalization (Raefrac)- (Rae 1971).

$$\text{Enps}(i, \tau) = \frac{1}{\sum_j s_j^2(i,\tau)} \qquad (14)$$

$$\text{Enpv}(i, \tau) = \frac{1}{\sum_j v_j^2(i,\tau)} \qquad (15)$$

$$\text{Raefrac}(i, \tau) = 1 - \sum_j s_j^2(i,\tau) \qquad (16)$$

Regressions of the size and composition of Brazilian state government spending have been controlled for an identical set of regressors commonly used in the public finance literature and account for: economies of scale in the provision of public goods and services (population density), Wagner's law (state per capita product), social and ethnic heterogeneity (gini and racial fractionalization indexes), the existence of a common-pool of resources at the federal level (intergovernmental transfers/state tax revenue), and ideological preferences of state governor (ideology).[15,16] Three additional variables were

[14] Coalitions are very important for proportional representation elections in Brazil. In 1962 nearly 50 percent of federal deputies were elected through coalitions. With the surge of new parties created after 1985, coalitions again appeared in the 1986, 1990, and 1994 elections. These coalitions accounted for nearly 90 percent of those elected.

[15] Mueller (1989, 1997) surveys this literature.

used in order to control for state need towards individually targeted expenditures : dependency, unemployment and poverty rate.[17]

With the exception of ideology computed from Nicolau (1998) and the proxy for the federal common-pool calculated from IBGE/RTSP, the set of state socioeconomic controls was computed from two primary sources: the IBGE regional accounts dataset and its national household survey (PNAD).

Population density, racial fractionalization and dependency rates were computed from demographic data extracted from *Sintese dos Indicadores Sociais* (SIS/IBGE), an IBGE cd-rom with several demographic and social indicators aggregated at the state level from PNAD micro data. Unemployment, poverty and income inequality measures (Gini) were also aggregated at the state level from PNAD micro data by a project on the labor market effects of macroeconomic instability developed by IPEA, a think tank in applied economics subordinated to the Ministry of Planning. State gross output was collected from IPEA, which calculated it, based on IBGE regional accounts.

There were no PNADs in 1991 and 1994. Values for all PNAD based socioeconomic controls are missing in those years. Thus, my estimates for the PNAD based socioeconomic controls in 1991 and 1994 were set equal to the simple average between the previous and following year (1990 and 1992 for 1991 and 1993 and 1995 for 1994) in order to work with a balanced panel.

B. Preliminary Analysis

Table 2 presents a synthesis of the size and composition of the Brazilian public sector in each Brazilian state by government level. In particular it contrasts state governments to federal and municipal governments combined.

In Brazil, like in any Latin American country, most public spending by all three tiers of governments has been allocated towards the provision of public goods. This pattern has been observed in every single Brazilian state independently of its socioeconomic status.

Government transfers to households have been traditionally, but not exclusively, a federal government function, which explains the largest proportion of this item in expenditures not administered by state governments. Expenditures with transfers corresponded on average to almost 40 percent of total primary spending by federal and municipal governments and to slightly more than 10 percent of state government budgets. However, a large cross-sectional variability exists. For example, state governments in Rio Grande do Sul have been consistently allocating almost a quarter of primary spending to

[16] Ideology of state governor was coded as –1 if state governor's party was from the left, 0 from the center and 1 from the right. Left-wing parties: PDT, PSB, PT. Center parties: PSC, PTB, PMDB,PSDB. Right-wing parties: PDS, PFL, PTR, PRN, PPR, PRT.

[17] State dependency rate is defined as the proportion of the old population (population above 65 relative to the size of the labor force measured by the population between 14 and 64).

transfers while in the states of Roraima and Sergipe, state government spending in transfers was virtually zero.

On average, the size of Brazilian state governments in any given state looks respectable as it matches the size of all the municipal governments within that state and the total spending allocated by the federal government to that state combined. This result, however, hides a strong longitudinal variability. State government primary spending can range from as low as 7 percent and as high 70 percent of GSP.

On average more than 90 percent of state government primary budgets are allocated to two Transfers or Public Goods. This seems to indicate that, at least at the state level, primary budget items that were not captured in the classification (residual expenditures) could be neglected without major problems.

Differences between the periods before and after 1994 accounted for most of the observed changes in fiscal variables observed within each state. This is not surprising given that 1994 was also the year when the *Real* Plan was implemented causing an abrupt disinflationary process and increasing pressure on public finances through the elimination of seignorage. Interestingly enough, disinflation seemed to present less of an effect on size than on the composition of government spending. The amount spent on transfers by all government levels seemed to increase at a faster rate than government expenditures with the provision and administration of public goods. This can be easily seen at the bottom of Table 2**.** The amount state governments spent on transfers increased to more than 17 percent of spending on public goods after 1994 from a previous level of less than 13 percent. The amount spent on transfers relative to public goods in each state by the federal government and their respective municipal governments also increased from 65 to 76 percent.

The point to be made here is that state government spending presented enough sample variability and, most importantly, cross-sectional variability (between standard errors are consistently higher than within standard errors) to justify a longitudinal analysis of the factors behind its determination.

Longitudinal variability is also observed in all measures of proportionality and legislative fragmentation that were computed, as well as in the remaining set of controls proposed above. Table 3 illustrates this variability with some basic summary statistics.

Apart from the number of seats in state legislatures, most of the sample variation comes from differences among states. In fact, all remaining proxies for proportionality in the electoral system presented considerable cross-sectional and time-series variation over the sample.[18] The same is true for the measures of legislative fragmentation used in the

[18] All temporal variance in the size of state legislature was due to changes in three states: Amapa, Roraima and Sao Paulo in 1994, the two least and the highest populated states, respectively. The number of seats in the state legislature decreased from 24 to 17 in the first two and increased from 84 to 94 in the third. This change occurred as a result of modifications in the electoral law decreasing the minimum number of seats in state legislatures to 17 and increasing the maximum to 94.

analysis. The number of effective parties in the legislative assembly (Enps) bottoms out at 2.9 for the state of Paraiba during its 1994 legislature and peaks at 9.1 for the Federal District also for its 1994 legislature.

As expected all proportionality and legislative fragmentation measures are correlated among themselves. State absolute district magnitude, the only variable that increases as the electoral system becomes more proportional, presents a negative correlation with all the remaining proportionality variables. Very high pairwise correlations are only observed between Rae and Lsq and between Devprop and Thrs. The existence of low pairwise correlation among other possible pairs will allow for alternation between such variables in order to check the robustness of our results. On the other hand, since the proxies of legislative fragmentation are highly correlated the robustness of the effects of electoral variables on legislative fragmentation could also be checked. Table 4 summarizes the results.

VI. Econometric Analysis

Assuming a linear specification for equations (2) to (8), this section will evaluate H.1, H.2.A and H.2.B. The existence of cross-sectional and temporal variance in all variables detected in the previous section led us to a reliance on panel data econometric models in order to pursue this exercise. Such models will also allow for better accounting of any potential omitted variables whose effects are not captured by any of the socioeconomic and political explanatory variables described above.

Subsection A investigates whether changes in the degree of proportionality among Brazilian states had an impact on the size and composition of their general administrations. It will pay particular attention to whether MFPR empirical results obtained for Latin American countries can be replicated for Brazilian states.

Subsection B goes beyond the reduced forms and attempts to verify the relevancy of legislative fragmentation as a channel through which electoral rules are transmitted to fiscal policy.

A. Reduced Form Estimation

The general model specification used to estimate the effects of electoral institutions on the size and composition of state government spending is presented in equation (17). This equation summarizes the reduced form results obtained in section III (equations (6)-(8)).

$$f_{it} = \gamma p_{i\tau} + \Phi X_{it} + \eta_{it} \qquad (17)$$

f is a scalar representing each of the alternative dependent fiscal variables: primary spending (b), transfers(s) and public goods (g), X is a vector of socioeconomic and

political controls and p, defined before, is a scalar representing different proxies for the degree of proportionality of the electoral system .

Fiscal variables and socioeconomic controls are assumed to vary across states indexed by i as well as in every fiscal year indexed by t. Proxies for the degree of proportionality of the electoral system and any remaining political controls also vary across states but only every four years after the inauguration of a new state legislature indexed by τ.[19]

Total primary spending, transfers and public goods were measured as a share of gross state product (GSP). Transfers and public goods were also measured as shares of total primary spending. Their ratio was also used as an additional measure of the composition of Brazilian states' budgets.

Each of the fiscal variables were regressed on different specifications including one of the four measures of proportionality of the electoral system (p) described in the previous section: absolute district magnitude (seats), the empirical threshold (Thr), the magnitude of deviations from the perfect proportionality coefficient (Devprop) and Rae's index of disproportionality (Rae). Apart from seats, increases in all the proportionality proxies result in a loss of the degree of proportionality of the electoral system in a given state. In order to make increases in p to be interpreted unambiguously as increases in the proportionality of electoral systems and thus easy to interpret, for the purpose of the regression analysis, Rae, Lsq, Devprop and Thr have all been multiplied by –1. In order to avoid spurious scale effects due to the presence of outliers, while at the same time allowing for the possibility of non-linear effects, *seats* is presented in logs.

Any remaining omitted variable is captured by η_{it} and assumed to present the stochastic structure in (18). This structure allows for the presence of state (α_i) and time (δ_t) effects along with the usual white-noise random component.

$$\eta_{it} = \alpha_i + \delta_t + \mu_{it} \qquad (18)$$

Given this general specification, qualifying the effects of electoral institutions on public spending is reduced to estimating the parameter γ.

Support for the Targetability approach should come in the form of a positive (negative) γ in regressions of transfers (public goods) on each of the proportionality measures.

As presented in the previous section, government spending in the form of transfers has always been smaller than public good spending for all government levels in all Brazilian states, regardless of their district magnitude. This last point can be interpreted as an indication that Brazilian citizens have an underlying preference for public goods over transfers, then a negative γ should be expected after regressing total primary spending on all proxies of proportionality.

[19] Let t^l be every year where a new state legislature is being inaugurated. A relationship between t and τ can be defined as follows: $\tau=t$ if $t= t^l$, $\tau=t-k$ if $t= t^l+k$ for k=1,...,4

The appropriate econometric estimate for γ will depend on the particular stochastic structure imposed on (18): ordinary least squares (OLS) if both state and time effects are omitted (E (α_i)= E (δ_t)=0, V (α_i)= V (δ_t)=0, V (η_{it})= μ_{it}), least-square dummy variables (LSDV) if either state or time effects are included and both are assumed to be deterministic (E (α_i), E ($\delta_t \neq 0$, V (α_i)= V (δ_t)=0, V (η_{it})= μ_{it}), generalized least squares (GLS) if either state or time effects are included and both are assumed to be random variables (E(α_i), E(δ_t)>=0, V(α_i), V(δ_t)>0 and V(η_{it})= V(α_i) +V(δ_t) + V(μ_{it})). (Hsiao 1986). [20]

Following standard criteria in the panel data literature, a F-test for the joint significance of state and the time effects will be used when comparing pooled OLS and the fixed effect models (both one-way and two-way error models). By allowing the inclusion of potential omitted variables, LSDV should deliver better estimates than OLS whenever such effects are significantly different than zero. The same rationale should apply when comparing one-way (time or state dummies) with two-way (time and state dummies) LSDV estimates. OLS and GLS will be compared by testing the null that state or time random effects do not exist (V (α_i)=0 and/or V (δ_t)=0). This test can be implemented using the Breusch-Pagan Lagrange multiplier.[21]

Finally, a Hausman specification test is implemented to compare between LSDV and GLS estimators. The choice involves a trade-off between consistency and efficiency of their respective estimators. Since LSDV is a least square estimators inherit, it inherits consistency quality. On the other hand, since they are calculated by looking at average differences within each state over time, they tend to be less efficient than GLS estimators, given that the later also incorporates variance between states.

However, a caveat with GLS estimators is that they are consistent only if the random effects are uncorrelated with all the other explanatory variables. A Hausman specification test can evaluate whether this assumption is satisfied. It is implemented by testing for the equality between the LSDV and GLS estimates. If the coefficients differ significantly, either the model is misspecified or the assumption that the random effects are uncorrelated with the regressors (C ([X_{it},$q_{i\tau}$], α_i), C ([X_{it},$q_{i\tau}$], δ_t) $\neq 0$).[22]

The inclusion of state and time dummies could not be rejected as revealed in significant F statistics obtained irrespectively of the proportionality measure used. This initial support for the LSDV model was not compelling as highly significant Bruesch and Pagan LM statistics rejected the null of inexistent random effects in all different specifications. Evidence in favor of the GLS random effect model was obtained with the implementation of Hausman specification tests. Very small statistics for these tests could not reject the

[20] E (.) stands for expected value, while V (.) stands for variance. Note that GLS assumes a constant variance across panels.
[21] Time effects were assumed fixed throughout the analysis.
[22] C(.) stands for covariance. Other assumptions with respect to the stochastic structure of the GLS model are the existence of contemporaneously correlated errors across panels (C (η_{it}, η_{jt}) = V (δ_t)) and the inexistence of autocorrelation within and across panels (C (η_{it}, η_{jt-k}) = 0 if k>0 and even if i=j).

equality between LSDV and GLS estimates when model specification has been alternated over different proportionality proxies.[23]

Table 5 summarizes the results. Reduced form estimates seem to support the MFPR targetability approach. Support for MFPR predictions regarding the composition of public spending varies depending on the budget item, on whether budget items are measured as a share of GSP or as a share of total primary spending and, finally, on the proxy for proportionality of the electoral system used. Support for the theory comes especially from specifications where transfers is the dependent fiscal variable and increases as fiscal composition is measured as a share of primary spending. All election variables with the exception of the size of state legislatures presented the expected effect on transfers statistically significant at least at a 10 percent level (columns (5) to (8)). All election variables including the size of state legislatures seem to affect transfers under an even smaller 5 percent significance level when measured as a share of primary spending (columns (13)-(16) in Table 5 cont.). The effects of electoral system proportionality on the composition of government expenditure is also strongly corroborated by regression estimates in the model where the ratio of transfers to public good expenditures is the dependent fiscal variable (columns (21)-(24) in Table 5 -cont).

The effect of proportionality on the size of state government budget is less clear. It shows up in column (1) in the form of a negative and statistically significant coefficient for changes in the size of state legislature. Even tough the statistical significance occurs at a 10percent level, the economic significance of the estimated coefficient is considerable. A 1percent increase in the size of state legislature is capable of reducing primary spending by almost 5percent. This result cannot be taken at face value, since it is not corroborated by the remaining proportionality proxies.

Rae's index of disproportionality was the most supportive among the election variables. It presented the expected signal under a satisfactory confidence interval for specifications with the exception of the ones having primary spending and public goods as a share of state GSP. A 10percent increase in this index increases the participation of transfers in state GSP and primary spending by 3 percent and 13 percent, respectively.

The set of socioeconomic controls generated some interesting associations. Contrary to expectations from Wagner's law, both state governments' primary budget and the amount spent in public goods were predicted to decline as the state development level proxied by its per capita income increases. Population density presented no effects on size, and exhibited a a positive association with transfers and a negative association with public goods. This result may be capturing the existence of economies of scale in the provision of public goods and its inexistence in the concession of transfers to individual.

Heterogeneity seemed to matter. Race fractionalization affects in a positive and statistically significant way the size of state government budgets as well as the provision

[23] The only exception was Transfers as a share of GSP where the Hausman test rejected the GLS model. Estimated coefficients were basically identical to GLS. Among the proportionality only Rae's index persisted being significant.

of public goods. This result is in line with Alesina, Baqir and Easterly (1999) who show a positive relationship between racial heterogeneity and the provision of public goods. The expected positive effect of income inequality, proxied by a Gini coefficient, on the size of government is just weakly vindicated in the results through a marginally positive association with the size of primary spending and its share allocated towards the provision of public goods (columns (1) and (9)).

Political ideology plays no role in determining the size of state governments. On the other hand transfers appear to increase the more left wing oriented the state governor's party. This result may be the outcome of stronger political support of state employee's unions, where the bulk of state government transfers are directed, towards left-wing parties.

The size and composition of state government budgets do not seem to respond to state differences in welfare need. States with high dependency and poverty rates are also those in which the size of state governments measured, by its participation in state GSP is smaller. By comparing regression estimate values, it seems that a slight pro-transfer bias as budgets shrink in proportion to state GSP may exist. No clear pattern could be detected with respect to the effects of poverty rate on the composition of public spending, as the regression estimates are not significant under most specifications. The same can be said with respect to unemployment rate both in terms of its effects on the size and composition of state government spending. Nevertheless, the large negative effect of the dependency ratio is intriguing and deserves future examination.

Finally, there is strong evidence in favor of a common-pool problem at the federal level. A 10 percent increase in federal transfers relative to tax revenues raised locally, increases primary spending by nearly a quarter for all specifications. Transfers and public goods also increase with a bias towards the former revealed in column (24) by a positive and statistically significant regression estimate for intergovernmental transfers.

The GLS estimates obtained above may not be robust to the existence of heteroskedasticity and correlation across panels as well as autocorrelation within panels.

Three possible paths may be taken to account for this problem. The first would be to reestimate the random effect model using a more general GLS estimator that would take into account heteroskedasticity and autocorrelation. This path is usually not taken, as it would require a large number of ad-hoc assumptions in order to identify all variance components. A second path would be to avoid making such assumptions by estimating the variance-covariance components from the data with the help of a feasible generalized least squares procedure (FGLS). However, given the dimensions of our sample where the number of periods (seven) is much smaller than the number of states(twenty-seven), FGLS estimates shall present downward biased standard deviations and thus upward biased t-statistics (Beck and Katz 1995). This will lead to a third path, which will be the one taken in the analysis. It consists of combining OLS estimates with Beck and Katz's panel data corrected standard errors (PCSE) in order to assess the robustness of the previous results. In order to account for autocorrelation within panels, OLS estimates are

obtained after dependent variables are corrected for first-order serially correlated residuals (AR (1)) using Prais-Winsten transformed regression estimator.

Table 6 reports the results**.** Model specifications are replicated and reported in the same column order as in the previous table. The number of seats in state legislature continues to be the only election variable presenting a statistically significant association with the size of state government budgets. The OLS regression coefficient value is fairly close to what was obtained before. PCSE estimates seem to reveal a more robust association as the significance of this variable coefficient has increased to 5 percent. MFPR predictions with respect to the composition of government spending continue to be dependent on the model specification. Estimates for transfers (measured as a share of GSP, primary spending or public goods) continue to match the theory. Support comes specifically from two electoral variables under tighter significance levels: deviations from the perfect proportionality profile (Devprop) and Rae's index of disproportionality (Raeprop). The latter's OLS regression estimate values were very similar to previous GLS estimates. Qualitative effects of the socioeconomic controls followed the same pattern as in the GLS model.

B. Structural Forms.

Legislative fragmentation plays an important role in translating electoral rules into fiscal outcomes in the CPH and in MFPR approaches. Its relevancy as a transmission channel for the effects of electoral rules has been questioned in PR systems marked by strong executive powers. In such systems, legislative assemblies act as mere rectifiers of the budget with most of the negotiations taking place within members of the executive cabinet.

Kontpoulos and Perotti (1999), for instance, find executive fragmentation, proxied by the number of spending ministers to be a better predictor of government size than legislative fragmentation in periods following macroeconomic shocks.

For the particular context of Brazilian state governments, Abrucio (1998) has illustrated in a series of study cases for the period between 1991-94 the dominant role of state governors and the relative weakness of state legislative assemblies as the locus of fiscal policy bargaining. Santos (2001) updates Abrucio's analysis for the period 1995-98, expanding the universe of states investigated. Executive dominance has been found to be limited to a small number of cases with most state legislative assemblies having developed institutional arrangements granting them a large degree of autonomy over the passage of legislation.

If legislative fragmentation is a relevant channel, one should expect its qualitative impact on the size and composition of public spending to be similar to the qualitative impact of the degree of proportionality on the same fiscal outcomes.

A better understanding of the mechanism through which electoral systems may affect public spending is pursued in this subsection with an econometric analysis of MFPR structural form. A linear and stochastic version of equations (2)-(5) is presented below:

$$f_{it} = \theta c_{i\tau} + \Psi X_{it} + \nu_{it} \quad (12)$$
$$c_{i\tau} = \beta p_{i\tau} + \Pi Z_{it} + \omega it \quad (13)$$

f, p and X were defined above. c, as defined in section III, is a scalar corresponding to a proxy for the degree of legislative fragmentation. Z is a vector of exogenous variables with two or more components, which do not necessarily coincide with X. [24] ν and ω are omitted variables with the following structure.[25]

$$\nu_{it} = \alpha_i + \varepsilon_{it} \quad (14)$$
$$\omega_{it} = \acute{\alpha}_i + \acute{\varepsilon}_{it} \quad (15)$$

where ε and έ are built as random white noises.

Equations (12) and (13) define a system that is triangular, implying that the joint determination of the endogenous variables f and c is recursive.

Since there are no right hand side endogenous variables in (13), its estimation will follow the same procedure presented in the last section for the reduced form of the model. Its specification will be expanded to include proxies of the number of social cleavages in each state, reckoned in the comparative politics literature as the main non-institutional determinant of legislative fragmentation in multiparty systems. Race or ethnic fractionalization, which has been the most commonly used proxy (Powell 1982, Ordeshook and Shvetsova 1994), does not apply very well for the Brazilian case, where social differences are often politicized in the income, location and occupation spectrum. Thus I decided to keep race fractionalization while adding the Gini coefficient and the degree of urbanization to account for income and occupational cleavages at the state level. Each of these variables was included in an additive way to (13). Recent work has revealed the statistical significance of interacting electoral with sociological variables (Amorim Neto 1997, Benoit 2002). I will, however, avoid this specification, yet keep it in mind for future extensions.

As in the previous section, a random state effect model with time-dummies was estimated by GLS after Hausman specification tests failed to reject it.[26] A F-test rejected the joint significance of the time-dummies. Hausman and F- statistics are reported in the last two rows of the first half of Table 7 .

[24] This assumption is required for the number of right hand side endogenous variables in equation (11), which is 1 (c) to be smaller than the number of instruments, thereby complying with the order identification restriction.
[25] Time-effects will be assumed fixed in each structural equation being included as dummies in X and Z.
[26] The size of state legislature could only be rejected for confidence levels smaller than 5percent. A LSDV with state effects has delivered the same positive association between state legislature seats and its fragmentation, reinforced with higher estimates (4 for the effective number of assembly parties proxying for fragmentation and 0.08 when Rae's fractionalization index is the proxy).

Increases in legislative fragmentation were found to be consistently associated with increases in the degree of proportionality of the electoral system in different Brazilian states and over different periods. This result was robust to different proxies of legislative fragmentation such as the effective number of assembly parties and Rae's legislative fractionalization index and, with the exception of Rae's disproportionality index, was statistically significant for all proportionality variables. The stochastic structure of the omitted variables played no role in the results. Random state effects and Prais-Winsten regression regression results were very similar both from a qualitative and from a quantitative perspective.

On the other hand, an appropriate estimation of (12) will depend on the design of the variance-covariance matrix between omitted variables in each structural equation (Σ_{fg}), which on its turn, will depend on the omitted variables' stochastic properties as defined in (13) and (14).

As long as Σ_{fg} is diagonal, $C(c_{i\tau},vit)= C(\alpha_i,\acute{\alpha}_i) = 0$, each equation can be estimated separately with any loss in consistency and efficiency by (i) OLS if $E(\alpha_i)=V(\alpha_i)=0$, by (ii) LSDV if $V(\alpha_i)=0$ and (iii) by GLS if $V(\alpha_i) \neq 0$. If Σ_{fg} is not diagonal, least squares estimates (OLS or LSDV) cease to be consistent as $C(c_{i\tau}, vit) \neq 0$. Instrumental variable techniques can be used to estimate the system in a consistent and efficient manner in this case.

Starting from the assumption that Σ_{fg} was diagonal, Hausman and Breusch-Pagan specification tests were performed for all different specifications in order to contrast the GLS and LSDV estimation methods. Results were mixed. If on the one hand, Breusch-Pagan tests have rejected the non-randomness of state effects ($V(\alpha_i)=0$) for all different specifications thus indicating a signa in favor of the random-effect estimator, yet on the other, Hausman specification tests have rejected the null that random state effects are uncorrelated with the remaining repressors for some specifications. In conjunction, both tests seem to indicate the existence of random-effects and the inappropriateness of the GLS estimator in dealing with it. Hausman tests in particular seem to point out for the potential endogeneity stemming from the legislative fragmentation variable. The existence of endogeneity should not be fully deduced from Hausman results. Differently from Breusch-Pagan results, they did not apply to all specifications. Moreover, one has to keep in mind that the Hausman test is built under the assumption that the correct set of regressors in included in the model.

In light of the results and with the objective of obtaining consistent and efficient estimates, two different paths were taken. The first was to accept exogeneity and to rely on OLS consistency, while trying to improve efficiency using Beck and Katz's panel corrected standard errors. The second was to embrace the existence of endogeneity and assume (backed by theoretical arguments) that they are coming from proxies for legislative fragmentation. Under this path, consistency bias due to the endogeneity of legislative fragmentation will be corrected using proxies of electoral proportionality as instruments in order to filter out the assumed correlation between state effects influencing

legislative fragmentation and state effects influencing fiscal policy at the state level. Efficiency will be pursued using Baltagi's error corrected two-stage least-squares (EC2SLS) estimator (Baltagi 1995). Table 8 contrasts the results.

In both set of results, legislative fragmentation proxied by the effective number of parties in the state assembly presented a negative and statistically significant effect on the size of state governments.[27] This result was stronger under Prais-Winsten corrected OLS estimates than under Baltagi's EC2SLS, where the negative effect was obtained at a 10 percent significance level and only when the size of state legislature in logs (seats) was taken as the proportionality instrument.[28] Nevertheless, regression estimates presented very similar values under both estimates. Each additional effective party in a Brazilian state legislature is supposed to decrease state government spending as share of state output by 1 percent.

By looking only at the OLS estimates, this result, as predicted in MFPR, seems to be the outcome of a shift in the elected candidate's preferences from individual to geographically targetable expenditures under more proportional systems of representation. This shift in preferences leads to a decrease in the observed value of public goods provided almost identical to the observed decrease in primary spending. At the same time it seems to induce an increase in transfers both as a share of GSP and as share of total primary spending. While identical qualitative results and similar quantitative results are observed for spending with public goods under EC2SLS, the same cannot be said about the amount spent on transfers, now either statistically significant as a share of primary spending or with the wrong signal as a share of total GSP.

Preliminary results seem to bring support to legislative fragmentation as a relevant channel through which electoral systems affect fiscal outcomes. Moreover, the negative association between legislative fragmentation and government size seems to provide additional evidence in favor of the targetability approach advocated by MFPR.

VII. Conclusions

Recent scholarship on the role played by electoral systems in the determination of fiscal outcomes has moved beyond the common-pool hypothesis by studying how fiscal policy is determined under proportional representation systems where the connection between voters and politicians ceases to be strictly geographic. In such studies, an increase in the proportionality of the electoral system facilitates the election of candidates with high preferences for transfers over pork, thereby increasing transfers and decreasing spending on pork. If individual preferences are inherently pork-biased, any increase in transfers will have to come at the cost of a proportionally higher decrease in public goods resulting in smaller overall spending. Legislative fragmentation continues to be an important channel in the transmission of electoral rules over fiscal outcomes.

[27] Rae's legislative fractionalization index was not reported as the qualitiative results were basically the same to those obtained using the effective number of parties under OLS and EC2SLS.
[28] I have used each proportionality proxy separately as an instrument. Those reported were the only instruments for which statistically significant results were obtained.

This paper has attempted to test such predictions using a pool of Brazilian states. The validity of the sample for this exercise can be justified on the basis of Brazil's long-standing and malapportioned PR system, the size and decentralized nature of its federative regime and the availability of good quality and uniform data.

Public spending in the form of transfers has always been smaller than public good spending for all government levels in all different Brazilian states, regardless of their district magnitude. If this last point is taken as an indication that Brazilian citizens have an underlying preference for pork over transfers, then we should expect that Brazilian states with more proportional representation systems should present smaller governments.

Preliminary support for this result is obtained when panel data regression estimates reveal that, contrary to what should be expected by the common-pool hypothesis, large and more fragmented state legislatures were found to be associated with smaller state governments. Evidence that transfer (public good) spending increases (decreases) with the degree of proportionality of the Brazilian system was also found. The qualitative effect of legislative fragmentation proxies on the size and composition of state spending is virtually identical to those obtained for proportionality proxies. This final result is an indication that fragmentation represented a potential channel through which changes in the Brazilian electoral system are translated into changes in fiscal outcomes. This last result is particularly interesting for the Brazilian case where subnational fiscal policy making has always been thought to be the monopoly of state governors irrespective of the position of their parties in the state assembly.

Immediate extensions should look more carefully at the sensitivity of the results to alternative specifications to the set of socioeconomic and political controls. The observed low time variability of the size of state legislative assemblies may compromise the consistency of the GLS estimates as they become highly collinear with the state effects. Given the revealed joint statistical significance of the time-dummies, future extensions should try to correct that using Blanchard and Wolfers (2000) common-shock econometric model.

Recent contributions to the fiscal federalist literature taking a more explicit account of the political environment in the process of subnational fiscal policy-making (Besley and Coate 1999, Bardhan and Mookerjee 2000a and b,Besley and Burguess 2002) have been reevaluating some of the trade-offs posed by the early fiscal federalist literature (Musgrave 1959, Oates 1972). A general message from this literature is that welfare gains from decentralization of expenditure functions will depend to a great extent on the relative accountability of local and central governments to individual interests. Thus, future work should contrast the effects of electoral rules on the composition of state government spending with those on the composition of federal government in each state. Lack of clear spending mandates for federal and state governments should allow that. This type of analysis can potentially reveal how electoral strategies may affect different government levels in their expenditure allocation thereby shedding some light in the current design of the Brazilian fiscal federalist system.

Appendix:

Table 1: Basic Facts on Brazilian States

State	code	Per capita Income	Population
Acre	AC	3,443	501
Alagoas	AL	2,621	2,676
Amapa	AP	3,827	401
Amazonas	AM	4,680	2,495
Bahia	BA	3,869	12,660
Ceara	CE	2,379	6,955
Distrito Federal	DF	14,426	1,872
Espirito Santo	ES	4,931	2,872
Goias	GO	4,133	4,629
Maranhao	MA	1,749	5,312
Mato Grosso	MT	5,227	2,297
Mato Grosso do Sul	MS	5,111	1,964
Minas Gerais	MG	5,351	16,943
Para	PA	3,402	5,635
Paraiba	PB	2,081	3,337
Parana	PR	6,019	9,133
Pernambuco	PE	2,945	7,522
Piaui	PI	1,675	2,712
Rio de Janeiro	RJ	8,627	13,640
Rio Grande do Norte	RN	3,322	2,610
Rio Grande do Sul	RS	7,034	9,765
Rondonia	RO	6,718	1,266
Roraima	RR	4,092	264
Santa Catarina	SC	6,170	4,978
Sao Paulo	SP	9,297	34,811
Sergipe	SE	3,615	1,662
Tocantins	TO	1,361	1,074

Note: Per capita Income in 1997 measured in R$ 1999.
Population in thousands of residents

Table 2: Size and Composition of Brazilian Public Sector – Summary statistics

		State Government						Federal and Municipal Government					
Variable		Mean	Std. Dev.	Min	Max	Mean 91-93	Mean 94-97	Mean	Std. Dev.	Min	Max	Mean 91-93	Mean 94-97
1)%GSP													
Prim Spending	overall	20.43	13.16	6.98	71.91	20.02	20.74	23.46	10.73	9.04	66.48	24.54	22.64
	between		13.00						8.90	11.58	39.69		
	within		3.07						6.21	2.46	53.75		
Transfers	overall	1.94	1.08	0.02	5.94	1.63	2.17	8.16	4.63	0.08	19.55	7.01	9.03
	between		0.93						4.38	0.87	17.02		
	within		0.58						1.69	0.57	11.89		
Public Goods	overall	16.91	12.43	5.27	68.30	17.08	16.78	12.22	4.52	5.65	27.59	11.45	12.80
	between		12.32						4.16	6.79	21.32		
	within		2.75						1.91	1.90	18.49		
2)% Prim. Spending													
Transfer (A)	overall	11.65	5.95	0.03	26.20	10.29	12.68	36.76	16.20	0.34	62.74	30.99	41.08
	between		5.58						14.61	5.22	57.62		
	within		2.30						7.48	14.19	53.33		
Public Goods (B)	overall	80.00	8.62	49.01	95.57	82.31	78.26	55.77	14.34	24.95	98.50	51.75	58.79
	between		7.17						10.07	41.21	77.84		
	within		4.94						10.38	18.38	77.89		
(A)/(B)	overall	15.33	8.84	0.04	40.70	12.98	17.09	71.20	35.39	0.63	150.46	65.56	75.42
(%)	between		8.20						33.67	7.36	122.38		
	within		3.62						12.51	21.75	109.55		
(A)+(B)	overall	91.65	6.01	63.66	99.48	92.60	90.94	92.53	18.76	36.30	126.47	82.74	99.87
	between		4.10						10.86	66.50	113.54		
	within		4.46						15.42	44.64	126.86		

Note: Federal and municipal spending omits the Federal District due to the fact that it serves as the recipient of all non-regionalized federal spending.

Table 3: Proportionality Measures and Socioeconomic Controls: Summary Statistics

Variable		Mean	Std. Dev.	Min	Max
State Legislature Seats	overall	38.68	18.48	17	94
(seats)	between		18.73		
	within		1.34		
Empirical Threshold	overall	0.10	0.056	0.004	0.237
(Thr)	between		0.039		
	within		0.041		
Prop. Slope -1	overall	0.33	0.186	-0.095	0.826
(Dprop)	between		0.126		
	within		0.138		
Rae's Disproportionality. Index	overall	26.74	9.80	9.90	55.10
	between		8.59		
	within		4.96		
Rae's Fractionaliztion Index	overall	0.81	0.06	0.66	0.89
	between		0.05		
	within		0.03		
Effective Number Parties	overall	5.73	1.53	2.90	9.10
(enps)	between		1.34		
	within		0.78		
State per capita product	overall	4,635	2,906	1,245	16,779
(R$/individual)	between		2,943		
	within		240		
Population Density	overall	52.61	77.06	0.97	321.58
(Individual/SqKm)	between		78.24		
	within		3.45		
Race Fractionalization Index	overall	0.45	0.10	0.14	0.58
	between		0.10		
	within		0.03		
Pop65+/Pop14-64	overall	0.08	0.024	0.024	0.148
(%)	between		0.023		
	within		0.007		
Unemployment Rate (%)	overall	7.02	2.432	2.705	16.033
	between		1.931		
	within		1.519		
Gini Coefficient	overall	0.58	0.044	0.295	0.655
	between		0.032		
	within		0.030		
% of Pop. below poverty line	overall	43.22	17.004	13.381	77.500
	between		16.556		
	within		4.88		
Ideology of Governor's Party	overall	0.22	0.72	-1	1
	between		0.54		
	within		0.49		
Intgv Transfers/Tax Revenues	overall	1.72	2.58	0.06	14.71
	between		2.50		
	within		0.80		

Table 4: Correlation between Political Variables

	Seats	Rae	Lsq	Devprop	Thrs	Enps	Enpv	Raefrac
Seats	1.00							
Rae	-0.58	1.00						
Lsq	-0.61	0.89	1.00					
Devprop	-0.27	0.54	0.67	1.00				
Thrs	-0.29	0.49	0.57	0.93	1.00			
Enps	0.35	0.07	-0.22	-0.25	-0.21	1.00		
Enpv	0.18	0.37	0.10	0.09	0.09	0.93	1.00	
Raefrac	0.34	0.02	-0.27	-0.34	-0.32	0.95	0.86	1.00

Table 5 : Effects of Proportionality on Public Spending –GLS model

	Primary Spending as share of GSP				Transfers as share of GSP				Pub. Goods as share of GSP			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Log (State Legislature Seats)	-4.69				-0.15				-2.75			
	-1.75*				-0.47				-1.11			
Empirical Threshold (-Thr)		-0.35				0.46				-1.25		
		-0.23				1.65*				-0.93		
Prop. Slope -1(-Dprop)			0.14				1.68				-2.97	
			0.03				1.87*				-0.69	
Rae's Prop. Index (-Rae)				0.07				0.03				0.04
				1.6				4.8**				-1.16
Log (State Per Capita Income)	-10.14	-10.52	-10.58	-9.88	-0.39	-0.45	-0.44	-0.17	-8.00	-8.10	-8.17	-7.78
	-3.81*	-3.93**	-3.96**	-3.68**	-1.03	-1.2	-1.17	-0.47	-3.28**	-3.33**	-3.37**	-3.17**
Log (Population Density)	0.05	-0.50	-0.51	-0.73	0.49	0.47	0.46	0.42	-0.62	-0.93	-0.92	-1.11
	0.06	-0.56	-0.57	-0.81	4.52**	4.52**	4.44**	4.08**	-0.7	-1.11	-1.11	-1.32
Ideology of Governor's Party	0.16	0.16	0.14	0.13	-0.17	-0.18	-0.18	-0.17	-0.42	-0.38	-0.40	-0.44
	0.35	0.33	0.29	0.28	-1.91*	-2.13**	-2.13**	-2.11**	-1.02	-0.92	-0.96	-1.06
Pop65+/Pop14-64	-124.25	-129.38	-129.68	-125.92	-12.13	-13.45	-13.00	-13.49	-128.35	-129.91	-131.18	-128.06
	-3.9**	-4.04**	-4.05**	-3.96**	-2.22*	-2.57**	-2.5**	-2.71*	-4.55**	-4.61**	-4.65**	-4.54**
Unemployment Rate	-0.06	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.26	-0.22	-0.22	-0.24
	-0.4	-0.07	-0.1	-0.14	-0.55	-0.65	-0.61	-0.62	-1.82*	-1.54	-1.59	-1.68*
% of pop. below poverty line	-0.18	-0.18	-0.18	-0.18	0.00	0.00	0.00	0.01	-0.10	-0.09	-0.09	-0.09
	-2.62**	-2.45**	-2.5**	-2.5**	0.28	0.25	0.26	0.77	-1.57	-1.36	-1.42	-1.52
Gini Coefficient	15.08	12.62	13.01	13.08	1.84	2.10	2.08	1.51	13.36	10.91	11.36	12.25
	1.65*	1.37	1.41	1.44	1.12	1.28	1.27	0.99	1.66*	1.35	1.41	1.53
Race Fractionaliztion Index	21.48	22.33	22.43	24.41	0.24	0.46	0.46	1.30	16.19	16.28	16.41	17.94
	2.87**	2.96**	2.98**	3.22**	0.22	0.43	0.43	1.26	2.4**	2.41**	2.43**	2.63*
Intgv Transfers/Tax Revenues	2.48	2.42	2.41	2.38	0.24	0.23	0.23	0.24	2.31	2.29	2.29	2.25
	10.02**	9.72**	9.67**	9.75**	6.1**	5.99**	5.92**	6.45**	10.41**	10.41**	10.37**	10.32**
No of Observations	189	189	189	189	189	189	189	189	189	189	189	189
Overall R-squared	0.75	0.75	0.75	0.73	0.42	0.42	0.42	0.45	0.74	0.74	0.74	0.73
cont.	Transfers as share of Prim. Spending				Pub. Good as share of Prim Spending				Transfer/Pub.Good			
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Log (State Legislature Seats)	3.72				-2.88				5.67			
	2.13**				-1.1				2.21**			
Empirical Threshold (Thr)		2.26				-4.56				4.72		
		2.15**				-1.81*				2.96**		
Prop. Slope -1 (Dprop)			7.38				-13.10				13.59	
			2.19**				-1.6				2.64**	
Rae's Prop. Index (Rae)				0.13				-0.17				0.23
				4.59**				-2.57**				5.38**
Log (State Per Capita Income)	0.55	0.60	0.66	2.05	1.00	1.28	1.04	-0.22	-0.15	-0.26	-0.07	2.28
	0.31	0.34	0.37	1.19	0.32	0.4	0.32	-0.07	-0.06	-0.1	-0.03	0.89
Log (Population Density)	2.10	2.48	2.45	2.18	-2.03	-2.22	-2.16	-2.02	3.16	3.70	3.66	3.22
	3.43**	4.27**	4.22**	3.8**	-2.35**	-2.57**	-2.5**	-2.33**	3.55**	4.39**	4.33**	3.87**
Ideology of Governor's Party	-0.98	-1.05	-1.04	-0.97	-1.22	-1.15	-1.18	-1.31	-0.76	-0.91	-0.86	-0.73
	-3.02**	-3.21**	-3.18**	-3.15**	-1.57	-1.48	-1.51	-1.71	-1.52	-1.84*	-1.73*	-1.58
Pop65+/Pop14-64	-4.30	-0.75	1.62	6.10	-75.19	-81.59	-87.17	-80.73	-7.17	-1.76	3.27	9.25
	-0.2	-0.03	0.07	0.29	-1.58	-1.79	-1.92*	-1.78*	-0.22	-0.05	0.1	0.3
Unemployment Rate	-0.01	-0.07	-0.07	-0.06	-0.13	-0.05	-0.07	-0.07	-0.11	-0.23	-0.21	-0.19
	-0.08	-0.67	-0.6	-0.57	-0.5	-0.19	-0.26	-0.3	-0.68	-1.38	-1.24	-1.25
% of pop. below poverty line	0.05	0.03	0.03	0.05	0.18	0.21	0.20	0.17	0.00	-0.04	-0.03	0.00
	1.01	0.60	0.62	1.02	1.83*	2.06**	2.03**	1.75*	-0.03	-0.54	-0.46	-0.04
Gini Coefficient	-1.798	1.914	1.671	-0.154	-11.123	-15.027	-14.337	-11.303	0.600	7.294	6.384	2.987
	-0.29	0.3	0.27	-0.03	-0.75	-1.02	-0.97	-0.78	0.06	0.77	0.67	0.34
Race Fractionaliztion Index	-2.24	-2.25	-2.36	0.84	2.62	1.82	2.27	-1.17	-3.89	-3.51	-3.94	1.66
	-0.44	-0.45	-0.47	0.17	0.3	0.21	0.26	-0.13	-0.52	-0.47	-0.52	0.23
Intgv Transfers/Tax Revenues	0.47	0.47	0.46	0.49	0.25	0.33	0.34	0.27	0.63	0.60	0.60	0.66
	2.8**	2.81**	2.77**	3.09**	0.75	1.02	1.03	0.81	2.49**	2.38**	2.36*	2.77**
No of Observations	189	189	189	189	189	189	189	189	189	189	189	189
Overall R-squared	0.51	0.49	0.49	0.48	0.46	0.45	0.51	.451	0.52	0.51	0.50	0.54

Notes: t-statistics are reported below coefficient estimates. *denotes significance at 10 percent level, ** at 5 percent.

Table 6: Effects of Proportionality on Government Spending
OLS with PCSE

	Prim. Spending as a share of GSP				Transfers as a share of GSP				Pub Goods as a share of GSP			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Log (State Legislature Seats)	-5.13				-0.47				-3.41			
	-2.81**				-1.58				-2.17**			
Empirical Threshold (Thr)		-2.84				-0.01				-1.82		
		-1.2				-0.04				1.13		
Prop. Slope -1(Dprop)			-4.75				2.09				-5.46	
			-0.88				2.24**				-1.24	
Rae's Prop. Index (Rae)				-0.09				0.03				-0.06
				-1.58				4.12**				-1.23
Log (State Per Capita Income)	-12.51	-12.77	-13.04	-14.36	-0.60	-0.67	-0.68	-0.52	-9.98	-10.24	-10.17	-11.28
	-4.09**	-4.23**	-4.29**	-5.01**	-1.54	-1.72*	-1.74*	-1.37	-3.4**	-3.61**	-3.56**	-4.02**
Log (Population Density)	0.57	0.19	0.20	0.49	0.39	0.36	0.35	0.34	-0.05	-0.28	-0.33	-0.12
	1.01	0.29	0.3	0.8	3.73**	3.62**	3.49**	3.6**	-0.09	-0.47	-0.55	-0.21
Ideology of Governor's Party	0.73	0.53	0.43	0.55	-0.26	-0.28	-0.29	-0.25	0.23	0.14	0.05	0.15
	0.94	0.76	0.61	0.75	-2.96**	-3.21**	-3.19**	-2.9**	0.31	0.21	0.07	0.21
Pop65+/Pop14-64	-100.33	-128.60	-130.56	-126.92	0.85	-1.67	-2.13	-4.51	-121.34	-138.38	-137.99	-135.09
	-2.03**	-3.03**	-3.08**	-2.98**	0.15	-0.32	-0.41	-0.86	-2.53**	-3.31**	-3.3**	-3.12**
Unemployment Rate	-0.12	-0.09	-0.08	-0.06	0.01	0.02	0.02	0.02	-0.24	-0.22	-0.22	-0.21
	-0.47	-0.36	-0.32	-0.22	0.42	0.5	0.47	0.58	-1.16	-1.05	-1.05	-0.99
% of pop. below poverty line	-0.30	-0.28	-0.28	-0.32	-0.02	-0.02	-0.01	-0.01	-0.19	-0.18	-0.17	-0.21
	-4.34**	-3.84**	-3.82**	-4.63**	-1.34	-1.24	-1.12	-0.85	-2.73*	-2.56**	-2.49**	-2.98**
Gini Coefficient	1.62	1.30	1.93	4.08	1.07	1.07	1.04	0.63	0.14	-0.17	0.08	1.06
	0.09	0.07	0.11	0.22	0.51	0.5	0.49	0.31	0.01	-0.01	0.01	0.07
Race Fractionaliztion Index	17.37	20.00	20.33	16.48	0.67	0.89	1.05	1.57	17.03	18.40	19.02	16.29
	3.2**	3.16**	3.28**	2.86**	0.7	0.96	1.13	1.73*	3.02**	3.06**	3.12**	2.86**
Intgv Transfers/Tax Revenues	2.63	2.72	2.72	2.82	0.15	0.16	0.16	0.18	2.46	2.54	2.52	2.57
	6.09**	5.9**	5.91**	6.85**	2.19**	2.43**	2.29**	2.61**	7.57**	7.64**	7.46**	8.29**
Constant	148.77	132.88	135.34	145.19	6.90	5.91	6.16	5.42	119.05	109.35	108.51	117.78
	5.21**	4.47**	4.51**	4.95**	2.08**	1.81*	1.9*	1.74*	4.3**	3.84**	3.78**	4.09**
No of Observations	189	189	189	189	189	189	189	189	189	189	189	189
R-squared	0.72	0.69	0.69	0.72	0.21	0.20	0.22	0.25	0.72	0.72	0.71	0.73
cont.	Transfers as a share of Prim. Spend.				Pub Goods as a share of Prim. Spend.				Transfers/Pub.Goods			
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Log (State Legislature Size)	25.44				-1.26				1.88			
	1.17				-0.93				1.0			
Empirical Threshold (Thr)		2.23				-1.18				3.14		
		1.87*				-0.32				1.6*		
Prop. Slope -1			13.45				-13.18				19.47	
			3.09**				-1.29				2.78**	
Rae's Prop. Index				0.16				-0.10				-0.05
				4.66**				-1.6*				4.44**
Log (State Per Capita Income)	0.41	0.47	0.63	1.38	-1.24	-1.27	-1.51	-2.11	0.24	0.31	0.55	1.57
	0.32	0.36	0.5	1.05	-0.6	-0.61	-0.72	-1.1	0.13	0.16	0.3	0.83
Log (Population Density)	1.45	1.53	1.48	1.50	-1.08	-1.15	-1.08	-1.10	2.07	2.15	2.08	2.13
	4.44**	4.62**	4.48**	5.09**	-1.54	-1.53	-1.45	-1.55	4.2**	4.35**	4.2**	4.69**
Ideology of Governor's Party	-1.75	-1.80	-1.76	-1.55	0.95	0.82	0.88	0.90	-2.33	-2.41	-2.37	-2.04
	-5.02**	-5.71**	-5.28**	-4.85**	1.01	0.85	0.97	1	-4.07**	-4.39**	-4.37**	-3.78**
Pop65+/Pop14-64	53.91	60.70	59.47	46.65	-134.88	-143.89	-140.76	-129.92	89.91	98.32	96.00	75.89
	2.87**	3.5**	3.5**	2.76**	-3.37**	-4.44**	-4.52**	-3.79**	3.17**	3.69**	3.68**	2.92**
Unemployment Rate	0.08	0.07	0.06	0.08	-0.32	-0.28	-0.28	-0.31	0.05	0.04	0.03	0.05
	0.68	0.59	0.53	0.8	-1.06	-0.93	-0.91	-1.07	0.28	0.22	0.16	0.31
% of pop. below poverty line	-0.04	-0.04	-0.03	-0.01	0.15	0.16	0.14	0.12	-0.12	-0.13	-0.11	-0.08
	-1.13	-1.18	-0.95	-0.43	1.75*	1.77*	1.56	1.47	-2.2**	-2.17**	-1.98**	-1.66*
Gini Coefficient	4.09	4.73	4.54	2.21	-15.00	-14.09	-13.87	-12.62	11.92	12.66	12.17	8.96
	0.66	0.76	0.74	0.37	-1.38	-1.31	-1.27	-1.2	1.39	1.43	1.42	1.12
Race Fractionaliztion Index	-5.55	-5.74	-5.48	-3.03	6.07	6.15	5.47	4.29	-9.61	-9.63	-9.14	-5.82
	-1.53	-1.69*	-1.65	-0.92	1.34	1.29	1.18	0.89	-2**	-2.16**	-2.06**	-1.25
Intgv Transfers/Tax Revenues	0.05	-0.01	-0.02	0.10	0.48	0.55	0.57	0.49	-0.04	-0.11	-0.14	0.02
	0.23	-0.03	-0.12	0.48	2.22**	2.82**	2.92**	2.57**	-0.18	-0.5	-0.6	0.1
Constant	-4.24	0.92	0.10	-3.37	109.14	104.19	105.65	109.47	-3.48	2.69	1.53	-2.85
	-0.38	0.08	0.01	-0.3	6.47**	6.01**	6.08**	6.83**	-0.22	0.17	0.1	-0.18
No of Observations	189	189	189	189	189	189	189	189	189	189	189	189
R-squared	0.72	0.69	0.69	0.72	0.21	0.20	0.22	0.25	0.72	0.72	0.71	0.73

Notes: t-statistics are reported below coefficient estimates. *denotes significance at 10 percent level, ** at 5 percent. Omitted variables are assumed to present panel heteroskedasticity, to be contemporaneously correlated and to present first order autocorrelation (AR1).

Table 7: Effects of Proportionality on Legislative Fragmentation

	GLS									
	Effective Number of Parties					Rae's Fractionalization Index				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Log (State Legislature Size)	1.01					0.04				
	2.15**					1.97**				
Empirical Threshold (-Thr)		1.30					0.07			
		2.9**					4.48**			
Prop. Slope -1(-Dprop)			5.18					0.25		
			3.63**					5.34**		
Rae's Prop. Index (-Rae)				0.00					0.00	
				0.27					0.69	
Galagher's Prop Index (-Lsq)					0.15					0.01
					3.08**					4.76**
Gini Coefficient	-0.17	1.04	1.24	0.56	0.43	0.03	0.07	0.08	0.06	0.04
	-0.08	0.48	0.58	0.27	0.2	0.37	0.99	1.15	0.75	0.6
Urbanization Rate	5.51	5.38	5.31	6.22	5.48	0.15	0.15	0.15	0.18	0.16
	3.41**	2.95**	2.87**	3.63**	2.96**	2.13**	2.25**	2.15**	2.4**	2.3**
Race Fractionaliztion Index	0.86	0.68	0.58	-0.10	0.87	-0.02	-0.01	-0.02	-0.04	-0.01
	0.48	0.36	0.31	-0.05	0.46	-0.24	-0.21	-0.32	-0.51	-0.08
constant	-2.11	1.35	0.20	0.88	2.21	0.57	0.69	0.69	0.68	0.73
	-0.99	0.81	0.9	0.55	1.3	6.89	11.6	11.73	10.74	11.93
No of Observations	189	189	189	189	189	189	189	189	189	189
Overall R-squared	0.23	0.20	0.20	0.16	0.20	0.16	0.17	0.17	0.09	0.15
F time dummies=0(Prob>chi2)	0.90	0.71	0.97	0.93	1.00	0.99	0.81	0.49	0.70	0.79
Hausman (Prob>chi2)	0.05	0.16	0.28	0.47	0.17	0.04	0.15	1.00	1.00	0.48
	Prais-Winsten with PCSE									
	Effective Number of Parties					Rae's Fractionalization Index				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Log (State Legislature Size)	1.01					0.04				
	3.42**					9.68**				
Empirical Threshold (-Thr)		0.99					0.06			
		3.45**					5.38**			
Prop. Slope -1(-Dprop)			5.40					0.26		
			4.79**					5.5**		
Rae's Prop. Index (-Rae)				0.00					0.00	
				0.00					0.92	
Galagher's Prop Index (-Lsq)					0.16					0.01
					3.34**					3.99**
Gini Coefficient	-0.75	-0.24	-0.09	-0.19	-0.21	-0.02	-0.01	-0.01	-0.01	-0.01
	-0.59	-0.19	-0.08	-0.15	-0.18	-0.54	-0.21	-0.13	-0.27	-0.24
Urbanization Rate	4.29	4.91	4.47	5.12	4.19	0.13	0.15	0.13	0.15	0.12
	2.22**	2.48**	2.42**	2.59**	2**	3.63**	3.24**	3.76**	3.84**	2.56**
Race Fractionaliztion Index	1.84	1.46	1.56	1.13	1.80	0.04	0.04	0.05	0.04	0.05
	1.34	1.16	1.36	0.85	1.5	0.92	0.97	1.36	0.85	1.31
constant	-1.34	2.01	2.43	1.66	3.05	0.59	0.71	0.73	0.70	0.75
	-1.79*	1.37	1.79*	2.09**	1.9**	18.26**	17.66**	22.35**	18.57**	17.65**
No of Observations	189	189	189	189	189	189	189	189	189	189
R-squared	0.58	0.57	0.59	0.54	0.59	0.96	0.96	0.96	0.96	0.96
Rho (AR1)	0.85	0.86	0.87	0.88	0.85	0.88	0.88	0.87	0.87	0.85

Notes: Omitted variables are assumed to present panel heteroskedasticity, to be contemporaneously correlated and to present first order autocorrelation (AR1).
t-statistics are reported below coefficient estimates. *denotes significance at 10percent level, ** at 5percent.

Table 8: Effects of Legislative Fragmentation on Government Spending

	Prais-Winsten with PCSE									
	Primary Spending share of GSP		Transfers share of GSP		Public Goods share of GSP		Transfers share of Prim. Spending		Public Good share of Prim. Spending	
Effective Number of Assembly Parties	-0.99		-0.01		-0.87		0.53		-0.89	
(Enps)	-2.35**		0.09		-2.37**		3.01**		-2.44**	
Effective Number of Elective Parties		-0.73		-0.06		-0.59		0.07		-0.35
(Enpv)		-2.09**		-1.59		-1.89*		0.51		-0.84
Log (State Per Capita Income)	-11.96	-11.90	-0.67	-0.58	-9.29	-9.57	0.06	0.55	-0.32	-0.64
	-3.87**	-3.8**	-1.66*	-1.43	-3.19**	-3.25**	0.04	0.42	-0.15	-0.28
Log (Population Density)	0.32	0.29	0.36	0.37	-0.21	-0.19	1.49	1.54	-1.05	-1.13
	0.45	0.41	3.65**	3.92**	-0.34	-0.3	3.88**	4.51**	-1.39	-1.47
Ideology of Governor's Party	0.57	0.54	-0.28	-0.26	0.18	0.20	-1.78	-1.70	0.86	0.75
	0.72	0.71	-2.95**	-2.9**	0.24	0.27	-5.33**	-5.15**	1.01	0.84
Pop65+/Pop14-64	-135.43	-141.19	-1.75	-2.59	-143.13	-147.69	63.64	63.50	-148.01	-150.27
	-3.22**	-3.37**	-0.34	-0.49	-3.45**	-3.58**	3.59**	3.57**	-4.8**	-4.73**
Unemployment Rate	-0.09	-0.10	0.02	0.02	-0.22	-0.22	0.07	0.07	-0.29	-0.28
	-0.34	-0.37	0.5	0.49	-1.07	-1.07	0.6	0.59	-0.92	-0.89
% of pop. below poverty line	-0.29	-0.28	-0.02	-0.02	-0.19	-0.18	-0.03	-0.04	0.15	0.17
	-3.97**	-3.84**	-1.25	-1.24	-2.67**	-2.65**	-1.02	-1.23	1.78*	1.91*
Gini Coefficient	2.27	2.02	1.13	1.21	0.68	0.46	3.37	4.24	-14.20	-13.87
	0.13	0.12	0.52	0.56	0.05	0.03	0.56	0.7	-1.37	-1.3
Race Fractionaliztion Index	24.03	24.35	0.89	1.15	21.99	21.50	-7.70	-6.67	10.02	8.57
	3.98**	3.95**	0.96	1.24	3.76**	3.72**	-2.04**	-1.85**	2.02**	1.58
Intgv Transfers/Tax Revenues	2.73	2.73	0.16	0.17	2.53	2.57	0.00	0.01	0.56	0.56
	6.21**	6.24**	2.43**	2.52**	7.85**	8.1**	0	0.03	2.72**	2.72**
Intercept	131.14	129.93	5.87	5.39	105.53	107.34	1.65	-0.62	100.44	100.55
	4.34**	4.29**	1.77*	1.61*	3.65**	3.7**	0.15	-0.06	5.7**	5.58**
No of Observations	189	189	189	189	189	189	189	189	189	189
Adj R-squared	0.70	0.70	0.20	0.21	0.72	0.72	0.43	0.43	0.80	0.81
Rho (AR(1))	0.63	0.63	0.69	0.68	0.70	0.68	0.71	0.69	0.42	0.43
	Baltagi's EC2SLS									
	Primary Spending share of GSP		Transfers share of GSP		Public Goods share of GSP		Transfers share of Prim. Spending		Public Good share of Prim. Spending	
Effective Number of Assembly Parties	-1.18		-0.44		-0.76		-0.32		-1.60	
Instrumented with lseats	-1.63*		-4.11**		-1.09		-0.66		-2.1**	
Effective Number of Assembly Parties		-1.21		-0.25		-0.07		0.09		-1.61
Instrumented with Thr		-1.36		-1.96*		-0.28		0.15		-1.62**
Log (State Per Capita Income)	-14.54	-8.75	0.37	-0.05	-13.53	-8.19	2.63	0.82	-1.05	1.70
	-6.23**	-2.85**	1.06	-0.12	-6.03**	-3.37**	1.71*	0.42	-0.43	0.52
Log (Population Density)	1.59	-0.22	0.42	0.53	1.05	-0.93	1.08	2.48	-0.72	-1.63
	3.26**	-0.23	5.71**	4.7**	2.24**	-1.14	3.36**	4.24**	-1.41	-2.06**
Ideology of Governor's Party	1.55	0.60	-0.10	-0.08	1.26	-0.40	-1.66	-1.00	1.14	-0.44
	2.13**	1.01	-0.94	-0.78	1.79*	-0.93	-3.49**	-2.54**	1.49	-0.51
Pop65+/Pop14-64	-173.11	-141.89	-11.99	-14.70	-162.65	-131.88	77.56	3.49	-152.86	-116.23
	-5.68**	-4.13**	-2.64**	-2.62**	-5.54**	-4.64**	3.86**	0.15	-4.78**	-2.63**
Unemployment Rate	-0.01	-0.08	-0.05	-0.03	-0.14	-0.23	-0.10	-0.04	-0.51	-0.23
	-0.06	-0.49	-1.39	-0.91	-0.62	-1.65**	-0.63	-0.38	-2.08**	-0.86
% of pop. below poverty line	-0.34	-0.19	-0.01	0.00	-0.29	-0.10	-0.03	0.04	0.08	0.15
	-5**	-2.58**	-0.58	0.1	-4.43**	-1.57**	-0.77	0.85	1.11	1.56
Gini Coefficient	-9.21	17.07	7.93	2.36	-15.36	12.48	24.57	-0.14	-25.31	-10.64
	-0.58	1.72*	3.36**	1.34	-1.01	1.54	2.41**	-0.02	-1.52	-0.69
Race Fractionaliztion Index	18.36	20.52	1.16	0.58	15.81	16.45	-8.46	-3.28	14.62	8.87
	3.09**	2.58**	1.32	0.53	2.76**	2.44**	-2.17**	-0.65	2.35**	1.06
Intgv Transfers/Tax Revenues	3.28	2.57	0.23	0.26	2.95	2.28	0.01	0.50	0.39	0.41
	15.95**	9.11**	7.5**	6.14**	14.91**	10.35**	0.06	2.72**	1.82*	1.31
Intercept	161.25	95.53	-4.17	1.01	152.18	84.77	-25.99	84.77	118.69	86.00
	8.64**	3.97**	-1.5	0.29	8.46**	4.22**	-2.12**	4.22**	6.06**	3.22**
No of Observations	189	189	189	189	189	189	189	189	189	189
Overall R-squared	0.81	0.77	0.41	0.44	0.80	0.74	0.60	0.47	0.51	0.48

Notes: t-statistics are reported below coefficient estimates. *denotes significance at 10percent level, ** at 5percent.

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