Overrepresentation and Legislative Coalitions in Multi-Member Electoral Districts: The Impact of Malapportionment on Fiscal Transfers in Brazil

José Antonio Cheibub
Texas A&M University

Samira Kauchakje
Pontifícia Universidade Católica do Paraná

*** INCOMPLETE AND EARLY VERSION ***
*** PLEASE DO NOT CITE WITHOUT THE AUTHOR’S PERMISSION ***

Prepared for presentation at the 9th Latin American Congress of Political Science July 26-29, 2017, Montevideo. We thank Caren Caroline Deda for excellent research assistance. We thank Brian Crisp, Eric Magar, Shane Martin, Bjørn Erik Rasch and Gisela Sin for comments on even earlier drafts.
1. INTRODUCTION

There is strong evidence from many single-country and a few cross-national studies, that disproportionality in political representation results in disproportional distribution of resources: subnational units that are over-represented tend to receive a disproportionate share of the resources transferred from the center (Rodden 2002; Arretche & Rodden 2004; Lee 2004; Ansolabehere et al. 2002; Gibson et al. 2004; Pitlik et al. 2006). The explanation for this regularity hinges on the relative ‘price’ of including legislators from overrepresented districts in winning legislative coalitions. For any given amount of resources to be distributed in the process of coalition building, legislators from overrepresented districts, where fewer people live, can get more in per capita terms than legislators from underrepresented districts, where more people live. The aggregate cost of a coalition is lower the higher the number of legislators from overrepresented districts: these legislators can be attracted to the coalition by distributive offers that cost less in the aggregate, even if each legislator is offered more than what they would have been offered on the basis of strict proportionality (see Baron & Ferejohn 1989).

These explanations assume legislators elected in single-member districts, where there is a one-to-one correspondence between the district’s attributes or ‘interests’ and the district’s representative. Such correspondence, however, does not exist when legislators are elected in multi-member districts with proportional representation, particularly when voters can vote for candidates and not (only) parties. We claim that when a district returns multiple legislators, we can no longer assume a one-to-one correspondence between the district’s aggregate attributes and the representation of these attributes. Legislators from the same district seek votes from different constituencies and, in this sense, do not all represent the same interests. Their ‘prices’ are not uniform and therefore the gain in having them in the winning coalition is relatively small. Moreover, the ability of legislators to claim credit for the benefits they acquire by virtue of their participation in winning legislative coalitions is at the least severely challenged. Thus, the effect of malapportionment on the distribution of resources is mitigated by the combination of multimember electoral districts and relatively weak political parties.
In this paper we test this hypothesis by comparing the impact of malapportionment on legislative behavior in the Brazilian Chamber of Deputies, which is elected in large magnitude districts through open list PR, and the Senate, which is elected in physically identical districts as the ones for the CD, but on the basis of plurality in contests that alternate between one and two seats. We show that the effect of malapportionment on legislative behavior is weakened in the CD in comparison to the Senate. We interpret this as support for the idea that multi-member districts mitigate the effect of malapportionment.

To our knowledge, this is the first paper to consider how the electoral system modifies incentives and opportunities for coalition making in legislative chambers. To the extent that this is true, we need to consider two implications of our findings. First, malapportionment in itself is not sufficient to distort the distribution of fiscal resources in favor of overrepresented districts. In combination with the electoral rules, it is possible to design a system of representation that, on the one hand, protects certain minorities by inflating their legislative representation (Santos 1987), but which does not necessarily make representatives of these minorities pivotal actors in legislative coalitions. Second, electoral rules must figure as a variable in any empirical model that seeks to assess how malapportionment impacts legislative politics and the distribution of fiscal resources. This is particularly true for bicameral systems since the rules for composing each chamber may amplify or mitigate the importance of representation distortions in affecting legislative votes and distributional outcomes.

2. MALAPPORTIONMENT AND LEGISLATIVE BEHAVIOR

The correlation between disproportional representation and disproportional fiscal transfers is solid. In a study using data from Argentina, Australia, Brazil, Canada, Germany, Mexico, Spain, Switzerland and the United States, Dragu & Rodden (2011: 8602) conclude that “the positive relationship between representation and redistribution found in a handful of previous single-country studies is quite general in a very diverse set of federations.” They interpret their results
as offering strong support for propositions derived from formal theories of legislative bargaining, according to which “overrepresented regions are favored in the process of building legislative coalitions, both because they are more likely to have the opportunity to set the agenda and because they are more attractive coalition partners for others (2011: 8603).

In this paper we focus on the last aspect: the attractiveness of legislators from overrepresented districts as coalition partners. Assuming a purely distributive context, legislators from overrepresented districts are relatively cheap to ‘buy;’ for any given amount of resources available to coalition builders, a legislator from an overrepresented district can be attracted with fewer resources than legislators from underrepresented districts. This conclusion rests on two assumptions that are often left implicit: that the district has an identifiable and unique interest that is to be represented by the legislator; and that the legislator can credibly claim the credit, and presumably benefit electorally, for bringing the resources obtained through legislative bargaining to the district. Both assumptions imply majoritarian elections in a single-member or small-magnitude district.

But what happens when legislators are elected in relatively large multi-member districts? In these cases, the identifiable and unique interest of a district no longer exists. A district that is geographically large will, for example, likely contain both urban and rural areas and, consequently, will have both urban and rural constituencies. If only one representative is elected in that district, she will have to find a way to ‘aggregate’ those different interests, whether aggregating means finding a common denominator among them, or favoring whichever interest is stronger in the district. If the district returns multiple seats and these seats are allocated proportionally, the constituency for any two legislators may be quite distinct. In order to be successful, legislators can focus on specific segments of the electorate with no need to ‘aggregate’ interests in the same way as legislators from SMDs. Thus, in multi-member districts, speaking of the interest of the district, which all legislators from that district will represent is meaningless: legislators in the same district may represent quite different, and sometimes opposite, interests.
Moreover, legislators in MMDs cannot as plausibly as in SMDs claim credit for the resources that flow into their district. This, of course, implicitly assumes an MMD electoral system in which voters can choose candidates (in addition to or instead of parties), such as flexible or open list PR systems. In closed-list systems, parties and not individual candidates ‘aggregate’ the district’s interests, thus creating the correspondence between these interests and multiple legislators. Even in candidate-centered PR systems, however, the lack of one-to-one correspondence between the legislator and the district could be at least mitigated by the creation of informal districts (Cain et al. 1987). This is what Ames (2001), for instance, believes happens in Brazil. Even though districts are large, both in magnitude and area, candidates create electoral bailiwicks that allow them to operate as if they were in single-member districts.

Even though some legislators may successfully build electoral strongholds, we find it to be almost impossible that a system with large MMDs will informally evolve into a de facto SMD system. The evidence that legislators are widely capable of creating such districts is not very strong, in spite of the widespread belief that they are. Brazil is the country about which this claim has been made most forcefully. Even there, however, the evidence is weak. Ames (2001) finds that successful candidates for the Brazilian Chamber of Deputies were equally distributed among the four types of electoral strategies he identifies, one of them being the electoral ‘bailiwick’ (see also Carvalho 2003). Others who studied the degree of geographic concentration of successful candidates’ votes, a necessary condition for the existence of a ‘bailiwick,’ have found low levels for the vast majority of candidates (Avelino et al. 2011; Silva & Davidian 2013). Moreover, all these studies are methodologically problematic, if not necessarily with respect to the measures of spatial dispersion used, certainly for using municipalities as the unit of analysis.¹ Finally, we do not know of one study, in Brazil or elsewhere, that has looked at the stability of the electoral bailiwicks, or informal SMDs, where they exist. Precisely because they are informal, we should expect them to be unstable: their borders are not legally protected from competition by ‘outsiders;’ anyone

¹ Part of the problem is the extremely skewed distribution of municipalities in Brazil, both in terms of territory and population.
allowed to seek votes in the district can campaign in the existing bailiwick. And this, of course, implies that legislators’ credit claims for benefits brought to specific areas can be challenged by others, thus making them less credible.

Thus, electoral systems with MMDs and candidate vote do not devolve into de facto SMDs. What makes these systems unique is the fact that voters choose their constituencies (Rehfeld 2005) and one district may contain heterogeneous constituencies, all of which can be represented in the legislature. This, of course, is not the same as in SMD-FPTP systems, where all constituencies are territorial, or in MMDs with CLPR, where voters choose parties who operate as aggregator of district’s interests and intermediaries in their relationship with representatives. Systems with MMDs and candidate vote may contain these two types of constituencies... and many more.

The implications of this fact for the relationship between malapportionment and fiscal transfers are two-fold. First, unlike in systems with SMD-FPTP elections, it is not necessarily true that legislators from overrepresented districts will be cheaper as coalition partners than legislators from underrepresented districts. Intra-district heterogeneity of representation implies that there may be ‘cheap’ and ‘expensive’ legislators, their relative prices being a function of the type of constituency the legislator represents. Second, the reasoning that goes from overrepresentation to legislators who would champion ‘traditional’ or ‘conservative’ interests, is no longer valid, or at least not universally valid. In MMDs, even the most ‘backward’ district may contain legislators who represent ‘modern’ interests: a poor rural district may contain an urban and industrial enclave, from which at least one legislator is elected.

Our hypothesis, thus, is that the effect of malapportionment on fiscal transfers is conditional on the type of electoral system used to elect the legislative chamber. Malapportionment affects transfers from the center through the behavior of legislators, who have differential prices for joining the winning legislative coalition. To the extent that we can observe how legislative coalitions are formed, we should find that the impact of malapportionment is stronger in chambers formed on the basis of SMD-FPTP than in chambers formed on the basis of MMDs.
Among MMD Chambers, the effect of malapportionment should be stronger in those formed on the basis of CLPR than in those formed on the basis of OLPR or FLPR. In this paper we compare a chamber formed in MMDs with OLPR and one formed in single/two member districts elected by majority. The comparison between different types of PR systems is the subject of ongoing work and will not be discussed here.

In the next section we demonstrate the relationship between malapportionment and fiscal transfers to states in Brazil. In the following section we discuss our research design, after which we present the results of our analysis.

3. MALAPPORTIONMENT AND UNEQUAL DISTRIBUTION OF RESOURCES IN BRAZIL

Measuring malapportionment. We follow Ansolabehere, et al. (2003) and measure disproportionality in apportionment of seats to districts and fiscal transfers from the center through a relative representation index (RRI) and a relative resource distribution index (RRD).

Relative representation index (RRI):

\[
RRI = \frac{SeatPC_{PROVINCIAL}}{SeatPC_{COUNTRY}}
\]

Where

\[
SeatPC_{PROVINCIAL} = \frac{SEATS_{PROVINCIAL}}{POPULATION_{PROVINCIAL}}
\]

and

\[
SeatPC_{COUNTRY} = \frac{SEATS_{COUNTRY}}{POPULATION_{COUNTRY}}
\]
Relative resource distribution index (RRD):

\[
RRD = \frac{PC_{\text{Transfers}}_{\text{PROVINCE}}}{PC_{\text{Transfers}}_{\text{COUNTRY}}}
\]

\[
PC_{\text{Transfers}}_{\text{PROVINCE}} = \frac{\text{Transfers}_{\text{PROVINCE}}}{\text{Population}_{\text{PROVINCE}}}
\]

\[
PC_{\text{Transfers}}_{\text{COUNTRY}} = \frac{\text{TotalTransfers}}{\text{Population}_{\text{COUNTRY}}}
\]

Both RRI and RRD take a value of 1 when representation and resource distribution, respectively, are proportional to the population of each subnational unit. If the indices are greater than 1, the subnational unit is overrepresented and receives more resources than it would have received under perfect proportionality. If the indices are smaller than 1, the units are underrepresented and receive fewer resources than they would under perfect proportionality.

We compute RRI for both the Chamber of Deputies (CD) and the Senate (SEN). The Chamber today elects 513 representatives from 27 multi-member districts, which correspond to the 26 states plus the Federal District of Brasília. The district magnitude ranges from 8 to 70, with a median magnitude of 10. The districts are large both geographically and in terms of population [figures about area and inhabitants]. Voters in CD elections have one vote, which they can cast for a party or a candidate. Candidates must belong to a party list, but the list is not organized in any specific way. As a matter of fact, voters do not see a ‘list’ of names belonging to any party, whether during the campaign or at the voting booth. Knowledge of the other candidates in the

\[\text{footnote 2}
\]


\[\text{footnote 3}
\]

3 It is physically impractical for lists to be presented to voters in their entirety. For example, in the state of São Paulo, the district with the largest magnitude, there were 1239 candidates competing for the CD in 2014. In one of the many districts with the smallest magnitude (8), there were 62 candidates.
list is, of course, public, but it does not figure in any significant way, we would claim, during the campaign. The allocation of seats occurs in four steps. First, votes given to a party and all candidates from that party (or coalition of parties) are pooled to form the party (or coalition) total. Second, seats are assigned to lists on the basis of the Hare quota. Third, the D’Hondt formula is employed to distribute the seats unallocated in the previous step. Finally, seats are allocated within each list according to the number of personal votes each candidate received: the \( n \) seats received by a party are allocated to the top-\( n \) candidates in terms of personal votes. In this sense, while the distribution of seats to lists is proportional to the votes they get, the distribution of seats within the party is majoritarian.

The Senate is composed of 81 members, wo are elected for an 8 year term in the same districts as the deputies. The Senate is renovated by 1/3 and 2/3 every four years, in plurality elections in districts with magnitudes of 1 and 2 depending on the year.\(^4\) Importantly, bicameralism in Brazil is symmetrical. With the exception of a few rules that pertain specifically to either house, both need to consent for legislation to be approved. In particular, both are equally involved in the budget process via their participation in the *Comissão Mista do Orçamento* (CMO). This committee, composed by 30 members from the Chamber and 10 from the Senate, is central in the bargaining around the budget (Figueiredo & Limongi 2008).\(^5\)

Both Chambers are malapportioned. Samuels and Snyder (2001: 661, 662) report that, in the period they analyze, 9% of seats in the CD and 40% in the Senate were misallocated in terms of population. Figure 1 plots the average RRI between 1988 and 2014 for the 27 electoral districts

\(^4\) During two years in our analysis – 1989 and 1990 – the Senate had 75 members. In our period, elections for one Senator occurred in 1990, 1998, 2006 and 2014, and for two Senators in 1994, 2002 and 2010.\(^5\) Information about the CMO can be found at [http://www12.senado.leg.br/noticias/glossario-legislativo/comissao-mista-de-planos-orcamentos-publicos-e-fiscalizacao-cmo](http://www12.senado.leg.br/noticias/glossario-legislativo/comissao-mista-de-planos-orcamentos-publicos-e-fiscalizacao-cmo). In future work related to this project we will analyze this commission, considering in particular the participation of legislators from overrepresented districts.
in both chambers. The average RRI in the CD is 1.73, ranging from a minimum of 0.61 for São Paulo) and a maximum of 8.54 (for Roraima). In the Senate, the average RRI is 3.29, ranging from 0.17 (again for São Paulo) to 19.5 (again for Roraima). The median in each house is 1.06 and 2.06, respectively.

We compute RRD for the period 2004-2014. The literature on fiscal transfers in Brazil has not been consistent regarding the type of resources it considers. There are three main rubrics to categorize transfers: constitutional, non-constitutional but earmarked (‘transferências especiais/delegadas’), and voluntary. Each of these categories, alone or in combination (including combination into ‘total transfers’), has been the focus of at least one paper. Although all of them may reveal something about the impact of malapportionment, we find that only voluntary transfers are amenable to being annually distributed through a regular legislative bargaining
process. Constitutional transfers, for instance, may or may not reflect the overrepresentation of some districts. But even if they do, they have been decided at a specific point in time and were purposefully protected from the operation of normal politics. Although Earmarked transfers are not as insulated as constitutional transfers, they are not the object of year to year bargain. In this sense they too should not be as influenced by overrepresentation.

[To be added: A figure with the relationship between RRI and RDD in CD and SEN. RRI is less accentuated in the CD than in the SEN. The relationship between malapportionment and RDD in the CD is dependent on the presence of a few outliers as most of the districts hover around an RRI equal to 1. Thus, the relationship between RRI and RDD in the CD disappears if the outliers are removed, whereas in the Senate it persists, whether or not outliers are included.]

4. RESEARCH DESIGN

Our basic strategy is to compare the impact of malapportionment on the behavior of members of the CD and the Senate. This provides an opportunity to test our hypothesis about the impact of the electoral system on the relationship between malapportionment and legislative behavior and, indirectly, their effect on fiscal transfers. Because legislators in the CD are elected in large multi-member districts, we expect them to represent heterogeneous constituencies and to participate in coalitions that do not necessarily translate into distributive benefits for the district, however it is characterized. Each legislator’s ‘price’ to join a winning coalition will also be heterogeneous and the fact that they come from overrepresented districts may or may not make them equally ‘cheap’ as potential allies. Senators, on the other hand, are elected in one- or two-member districts via plurality rule. They are more likely to represent the district as a whole; their ‘price’ is directly related to the degree in which their district is overrepresented.

Our goal is not to establish the relationship between representation and fiscal transfers. We take it for granted and seek to observe whether legislators from overrepresented districts behave in
ways that are consistent with what we would expect on the basis of models of distributive legislative bargaining. In the broader project of which this paper is a part, we employ a number of strategies to observe whether and how malapportionment affects legislative behavior:

- We analyze voting cohesion of overrepresented legislators. The presumption is that legislators from overrepresented districts will be more cohesive than legislators from other districts. But since in the CD legislators from the same district may represent different constituencies, they are more likely to belong to different coalitions and thus display a less cohesive behavior than in the Senate.

- We analyze the probability that two legislators will vote together given the overrepresentation of their districts. In each roll-call vote in the CD and in the SEN we register the vote cast by each possible pair of legislators. We then estimate the probability that any two legislators will vote in the same way, given that they come from overrepresented districts, belong to the governing coalition, belong to the same party, etc. We then analyze the distribution of marginal effects for each of these factors across different subsets of votes.

- Finally, we analyze the frequency with which legislators from overrepresented districts participate in winning coalitions. If their relative ‘price’ makes these legislators more attractive coalition partners, we should them see that they are more likely than others to participate in winning coalitions. But because of the differences in the way members of the CD and the SEN are elected, this effect should be stronger in the latter than in the former.

The first two strategies, we believe, provide only a tangential opportunity to refute the expectations from distributional legislative bargaining theories. This is so because these theories do not require that ‘cheap’ members behave in unison or always vote with one another. While finding that they do is suggestive of the behavior expected under these theories, finding that they
do not does not refute them. In this paper we only present the last analysis. We believe that this is the one that most directly allows for a test of expectations from distributional legislative bargaining. Because of the differences in electoral systems, we argue, we should find that malapportionment has a stronger effect in the Senate than in the Chamber of Deputies. Recall, however, that the Senate is more malapportioned than the CD; any difference between the two chambers that is in line with our expectation, therefore, can result from either the higher degree of malapportionment that exists in the Senate or, as we hypothesize, from the difference in electoral systems. We need, therefore, to find a way to separate the two effects.

We do so by focusing on the behavior of legislators coming from the cheapest districts in both chambers. If what drives participation in winning coalitions is the relatively low ‘price’ of legislators from overrepresented districts, we should observe that the cheapest members in either chamber should be more frequent participants in winning coalitions. Because we are holding the relative ‘prices’ of legislators in each house constant, differences in the frequency with which legislators from the ‘cheapest’ delegations join winning coalitions cannot be attributed to the fact that one house is overall more malapportioned than the other. We interpret a stronger effect of malapportionment in the Senate by comparison to the Chamber of Deputies, therefore, as evidence in support of our hypothesis. That is, as evidence that it is the variation in the way legislators are elected and not the degree of malapportionment that leads to differences across the two houses. The cheapest districts are the same in the CD and in the SEN, which prevents any concern with differences being caused by characteristics of the districts and not the way

---

6 Two other strategies were suggested to us. One consists of investigating the frequency with which the set of overrepresented legislators (that is, legislators from overrepresented districts) was rolled, that is, how frequently the majority of overrepresented legislators sided with the losing alternative in a given vote. Although we will conduct this analysis, we find that, like with strategies 1 and 2, the evidence it will provide is only suggestive; finding that overrepresented legislators are frequently rolled does not imply that some of them are not used in winning coalitions. The second suggestion is to compare the behavior of Senators elected alone with that of Senators elected in pairs. Since the formula is the same in both cases and the difference in district magnitude small, we do not expect to find significant differences in the behavior of Senators according to when they are elected. Nonetheless, in years when Senators are elected in pairs, it could be the case that they draw votes from different ‘interests’ in the district and the behavior of these two Senators could be systematically different. We will examine these possibilities in this paper’s next version.
legislators are elected. The cheapest districts in both houses are: Roraima, Tocantins, Acre, Amapá and Roraima. In our analysis, we refer to these five districts when we talk about malapportioned districts. The behavior of legislators from these five states is contrasted with the behavior of legislators from the remaining 22 districts.

5. ANALYSIS

Table 1 and figure 2 summarize the main results of our analysis. Table 1 presents aggregate figures for the CD and the Senate whereas figure 2 summarizes the individual-level analysis.

As can be seeing, after we exclude non-valid roll-calls (those that were registered but failed to reach the required quorum for a decision to be made) we are left with 1,680 in the CD and 589 in the Senate. A large number of votes are unanimous: 33.8% of the valid votes in the Chamber of Deputies and 63.5% in the Senate. These are votes in which no more than 90% of participants voted for one alternative.

The remaining rows of table 1, all of which are expressed in percent, contain information about aggregates related to Deputies and Senators from over- and non-overrepresented districts. Recall that we consider only the five cheapest districts in each chamber as part of the set of overrepresented districts. Thus, our comparison is between the cheapest five districts in each house (they are the same) and all the other districts, some of which are strictly speaking overrepresented. For example, for the CD, the ‘non-overrepresented’ group includes fourteen districts with a relative representation index (RRI) between 1.02 and 1.50. For the Senate, the ‘non-overrepresented’ group includes fourteen districts with RRI between 1.03 and 3.57. We chose to proceed this way because we wanted to compare the cheapest districts in both houses so that we can separate the effect of the electoral system from that of the degree of malapportionment on the behavior of legislators. One of the next steps in revising the paper is
to include results for when we contrast the behavior of the cheapest legislators with the behavior of legislators elected in districts that are underrepresented or proportional.\footnote{The reason we cannot compare the behavior of the cheapest legislators in both houses with that of legislators from strictly underrepresented districts is that in the Chamber only the state of São Paulo is in this category. To get sufficient numbers and not simply have legislators from one district as a baseline, we must also add legislators from proportional districts.}
Table 1 - Aggregate Participation of Legislators from Over- and Underrepresented Districts in the Chamber of Deputies and the Senate, Brazil, 1988-2014

Except for the first two data rows (which contain just the count), all entries are percentages.

<table>
<thead>
<tr>
<th></th>
<th>CD</th>
<th>SENATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of valid roll-calls</td>
<td>2,539</td>
<td>1,593</td>
</tr>
<tr>
<td>No. of valid and non-unanimous roll-calls</td>
<td>1,680</td>
<td>589</td>
</tr>
<tr>
<td>Legislators from overrepresented states</td>
<td>7.8</td>
<td>18.2</td>
</tr>
<tr>
<td>Rate of roll-call participation by legislators from overrepresented states</td>
<td>69.5</td>
<td>63.5</td>
</tr>
<tr>
<td>Rate of roll-call participation by legislators from underrepresented states</td>
<td>72.2</td>
<td>74.1</td>
</tr>
<tr>
<td>Legislators from overrepresented states who voted with winning coalition</td>
<td>55.8</td>
<td>49.8</td>
</tr>
<tr>
<td>Legislators from underrepresented states who voted with winning coalition</td>
<td>53.1</td>
<td>52.8</td>
</tr>
</tbody>
</table>

Counterfactuals

1. Were legislators from overrepresented districts pivotal for winning coalitions?
   (Legislators from overrepresented districts who voted for winning proposition vote for losing proposition)
   - All legislation: 8.7 34
   - Executive decrees ('medidas provisórias'): 12.5 47.2
   - Constitutional amendments: 3.1 25
   - Ordinary laws: 11.3 33.6
   - Other: 9.8 34.4

2. Would non-participating legislators from overrepresented districts have made the losing proposition win had they participated?
   - All legislation: 1.7 6.8
   - Executive decrees ('medidas provisórias'): 2.6 8.3
   - Constitutional amendments: 0.4 2.8
   - Ordinary laws: 1.9 2.5
   - Other: 1.8 8.5

Note: With the exception of the first two data rows, all entries in the table represent percentages in each roll-call, averaged over all valid and non-unanimous roll-calls. Non-unanimous roll-calls are those in which the winning coalition comprised no more than 90% of legislators. Source: CEBRAP legislative dataset, compiled by authors.

Table 1 shows that the number of legislators from the cheapest districts in both the CD and the Senate is far from being sufficient to constitute a majority. Therefore, these legislators will have to either lead the formation of, or join, a winning legislative coalition. The cheapest legislators
comprise on average 7.8% and 18.2%, respectively, of the members voting in any roll-call. The average legislator from the cheapest districts participated in almost 70% of the roll-calls in the CD and 64% in the Senate. Legislators from the other districts have a higher rate of participation than overrepresented legislators. The difference between over and other legislators in the Senate is ten percentage points, whereas in the CD it is less than three percentage points. Furthermore, the cheapest legislators are not more likely to participate in the winning coalition than 'regular' legislators. In both houses, all legislators, over or under-represented, have close to a 50% chance to vote with the winning coalition.

We simulated two counterfactuals to try to assess the weight of overrepresented legislators in bringing about victory in legislative votes. In the first case we simulated the case in which overrepresented legislators who actually voted for the winning alternative now vote for the losing alternative. This exercise gives us an aggregate sense of how pivotal overrepresented districts were for victories in the legislative vote. In the second case, we asked whether overrepresented legislators who did not participate in the vote (either because they were absent or because they abstained) could have shifted the outcome if they had voted with the losing alternative. One way legislators can affect the legislative outcome is to not participate in the vote. With the exception of constitutional amendments, all other votes for which we have data are decided by relative majority, that is, a majority of the legislators present. Non-participation in a context such as this can be used strategically to help relatively weak majorities. The question, thus, is whether overrepresented legislators who did not participate in the vote could with their participation have changed the losing alternative into the winning one.

We computed theses counterfactuals for all roll-call, as well as for groups of different matters being voted: executive decrees ('medidas provisórias), constitutional amendments (which are decided by 3/5ths of members), ordinary laws, and a residual category with all remaining projects. With respect to the first counterfactual, we find that overrepresented legislators were
pivotal in a non-trivial share of roll-calls in the CD, but in a considerably larger share of those taken in the Senate. In total, overrepresented legislators in the CD could have changed victory into defeat in 8.7% of all roll-calls had they not voted as they did; while in the Senate they could have reversed 34% of all roll-calls. This is consistent with our hypothesis that we should see in the Senate stronger effects of malapportionment. The share of victories that could have become defeats if overrepresented senators changed their vote is also close to 34% for ordinary laws and the residual proposals. But as to executive decrees, overrepresented senators could have changed the outcome had they changed their vote in almost 50% of the votes. The rate of change in outcome is, predictably, lower for constitutional amendments, 'only' 25%, since the threshold for victory is higher. The same relative variation across types of bills exists in the CD, except that the proportion of affected roll-calls in this chamber is considerably smaller than in the Senate.

In general, affected roll-calls in the Senate are about 3 times more numerous than in the CD, and for all types of bills, with the exception of constitutional amendments. In this particular case, the number of affected roll-calls in the Senate is more than 8 times higher than in the CD. These numbers are also consistent with our hypothesis. Recall that we are comparing a set of legislators who are identically positioned in each house regarding their relative representation index (RRI). In this sense, they have the same relative price and should be equally as pivotal in the CD as in the Senate if their weight were an exclusive function of malapportionment.

It is true that overrepresented Senators constitute, on average, 18% of every roll-call, whereas in the CD overrepresented deputies constitute only 8% of the average roll-call participants. For this reason, overrepresented Senators should be more likely than Deputies to change the outcome if they changed their vote. Yet, the share of overrepresented Senators is just over 2 times as high as the share of overrepresented Deputies. And yet, in every type of proposal, overrepresented

(Proposta Delegação Legislativa) ,PDN (Projeto de decreto legislativo do Congresso Nacional) ,PDR (Projeto de Decreto Legislativo CR-CN) ,PDS (Projeto de Decreto Legislativo do Senado) , PLD (Projeto de Lei Delegada) ,PLN (Projeto de Lei do Congresso Nacional) ,PLP (Projeto de Lei Complementar) ,PDR (Projeto de Decreto Legislativo do Congresso Nacional) ,QOD (Questão de Ordem) ,RCP (Requerimento relativo a CPI) ,REC (Recurso) ,REP (Representação do Conselho de Ética) ,REQ (Requerimento) ,VET (Veto).
Senators could hypothetically overturn the outcome at least 3 times as frequently as Deputies. Thus, even though the higher rate of 'pivotality' for overrepresented Senators can be partly explained by the fact that the Senate is a smaller chamber and overrepresented Senators constitute a higher share of members, there is a part of it that should be attributed to the fact that members of the CD have different coalition incentives and opportunities than the members of the Senate.

The results for the second simulation are qualitatively identical to the first one. Here the question is whether overrepresented legislators who did not vote could change the outcome if they had cast a ballot for the losing alternative. There are two things to observe in this case. First, that the magnitude of the effect is drastically smaller when compared to the effect in each house for the first simulation. However, second, the patterns are more or less the same. From our point of view, the most important point is that Senators are always more capable to change the outcome than Deputies.

We now move to the individual-level analysis. Here we have information about each legislator who participated in roll calls in the CD and the Senate. We analyze the likelihood that an individual legislator from an overrepresented district (in our sense) joins in the winning coalition. According to the models of legislative bargaining discussed earlier, the almost general disproportionate distribution of fiscal resources to overrepresented sub-national units happens because their overrepresentation makes them relatively ‘cheap’ to be brought into a winning coalition. If this is the case, then overrepresented legislators should be considerably more likely to be in a winning coalition than non-overrepresented legislators.

We estimate a probit model in which the dependent variable is whether a legislator voted with the winning alternative in a given roll-call. If so, the variable is coded 1; if not, it is coded 0. Our model includes only two independent variables, which enter the estimation individually and in interaction: an indicator for whether the legislator comes from one of the five cheapest states (the overrepresented), and an indicator variable for legislators who belong to the governing
coalition. The reason we enter the latter variable and interact it with the indicator of overrepresentation is that the effect of overrepresentation may be felt through the legislator’s participation in the governing coalition. As we will see below, and consistent with the existing literature, the single most important factor influencing whether a legislator votes with the winning coalition is the legislator’s membership in a party that is in the governing coalition (CITES). There is considerable work demonstrating that the patterns of voting in Brazil’s Congress (the CD and the Senate) are mostly structured by membership in the governing coalition: proposals submitted to either house by the government have high rates of approval; approval, in turn, is mostly on the basis of votes cast by individual legislators who belong to parties in the governing coalition (Cheibub et al. 2002; Cheibub et al. 2009; Figueiredo & Limongi 2001). Although not perfect, this pattern in Brazil and in some other presidential systems is sufficiently robust and relatively stable to allow the government to conduct its business with a high rate of success. Thus, it could be the case that the effect of malapportionment is intermediated by membership in the government coalition. Moreover, the executive is crucial for the formulation and implementation of the budget, from which the resources that constitute ‘voluntary transfers’ in table [not presented] come from. Most importantly, as it has been widely documented (Limongi & Figueiredo 2005; Soares & Neiva 2011), the budget in Brazil is not binding in the sense that the government does not need to implement all that was approved by the legislature, or that, if it does, it needs to do it in the amounts specified in the budget. Instead, the resources that are voluntarily transferred from the federal government to the subnational units (the states, which are the electoral districts for the Chamber and the Senate, and municipalities) is a combination of what both houses have approved and the funds the Executive actually provides (‘liberate’) for the budget items. Since the executive is constitutionally allowed to spend all, some, or nothing of what is approved by Congress, the executive is in a position to use these resources to build and keep together the coalition that sustains its legislative program. For this reason, it is highly likely that the executive is the main formateur of legislative coalitions and, in this capacity, differentiates legislators in terms of their ‘costs’ as expressed in terms of overrepresentation.
Figure 2 summarizes the main results. For a number of conditions, it displays the difference between the marginal probability that a legislator from an overrepresented district will vote with the winning coalition and that probability for a regular legislator. We estimate the same models for the CD and the Senate. Our goal is to compare the effects of these variables, particularly of overrepresentation, in the two chambers, with the expectation that the estimated effect will be higher in the Senate than in the CD. Table A1 in the appendix contains the numeric probabilities used to generate figure 2. In addition to a basic model involving only indicators of overrepresentation, participation in the government coalition, and their interaction, we also estimate models with triple interactions; we add, separately, three variables that allow us to see whether the relationship uncovered in the basic model changes according to some relevant conditions. The first variable indicates whether the roll-call took place in the administration of Fernando Henrique Cardoso (FHC) (1995-2002); the second variable indicates whether the roll-call took place in Lula’s administration (2003-2010); finally, the third variable indicates whether the vote was on an Executive Decree. Both presidents, FHC and Lula, were legislatively very successful. Some authors claim that Lula faced a more complex coalition environment and, for this and other reasons, in his government ‘coalition management’ was less effective [CITES]. We find that the jury is still out regarding the comparative effectiveness of these two presidents in approving their legislative agenda. Thus, we do not have clear expectations about what we should find with respect to how each of these presidents affected the interaction between coalition membership and overrepresentation in its effect on a legislator’s chances of voting with the winning coalition. Finally, executive decrees are more or less unique in the sense that they are voted on with some urgency (as required by constitutional provisions and each house’s rules) and can be reasonably seen as being of special interest to the government. For this reason, decree votes could also modify the participation of overrepresented legislators in winning coalitions.
In all models we control for the share of metropolitan votes obtained by the legislator. Regarding this variable, for the moment suffice it to say that we conceived of it as a way to capture some of the alternative coalitions that legislators from MMD in PR systems can participate in. It turns out that this variable did not always behave as we would have expected. But before we report and analyze these findings, we need to understand better what the variable is exactly capturing and how close whatever it is capturing is to the legislator’s attribute we want to observe. In all honesty, we enter this variable in the models so that we can have a continuous control variable. Thus, in addition to reflecting on what this variable is doing, we also need to think about ways to expand our empirical model of the conditions under which legislators join winning coalitions.

Before we plunge into the details of the models we have estimated, let us make one observation that will help keep the discussion in perspective. The factor that really has a massive impact on the chances that a legislator will vote with the winning coalition is whether her party belongs to

Figure 2 - Difference in the Marginal Probability of Voting with the Winning Coalition between a ‘Cheap’ and a ‘Regular’ Legislator

![Figure 2](image-url)
the government coalition. For example, our basic model estimates that, in the Senate, the probability that a legislator from the opposition would vote with the winners is 0.4914; the same probability for members of the government coalition is 0.7871. Similarly, in the CD, the probability of voting with the winners is 0.3552 for opposition deputies and 0.6607 for members of the government coalition. We note this to highlight the fact that the really large factor underlying the chances that a legislator will join the winning coalition is whether that legislator belongs to the government or the opposition. All other effects we uncover are milder, but nonetheless still relevant. We now move to a more detailed discussion of the different effects.

Generally speaking, as we expected, the impact of malapportionment on the probability of being in the winning coalition is larger in the Senate than in the CD. For instance, in the CD, the overall chance that an overrepresented legislator will vote with the winning coalition is 1.9% higher than if the legislator were from a regular district. In the Senate, this difference is 5.5%. This relationship gets modified in the CD for members of the opposition, where the difference in the chances of voting with the winning coalition is 6.07% higher for an overrepresented deputy than for a regular deputy. Deputies who are members of the government coalition are equally likely to vote with the winning coalition, whether they are from an over or non-overrepresented district. In the Senate, the impact of being from an overrepresented district is positive and higher for members of the opposition when compared with members of the government: 7.36% and 4.64%, respectively.

Next we consider whether being one of the ‘cheapest’ legislators affects the probability of being in the winning coalition differently under FHC and Lula; we also examine the possibility that this relationship is different when executive decrees are being voted. During FHC’s two terms, the cheapest opposition members in the CD were more likely to be brought into the winning coalition: their chances were 43%, as compared to 28% for regular members of the opposition. In the Senate, the effect was actually the opposite: the cheapest opposition Senators were less likely to participate in the winning coalition than their more expensive peers: the chances went from 34% to 43%. Deputies supporting the government, however, were less likely to vote with
the winning coalition if they were ‘cheap’, whereas Senators were 3% more likely to be with the winners. Under Lula, the effect of being from an overrepresented district was small in the CD for both opposition and government legislators. In the Senate, however, a ‘cheap’ opposition deputy was considerably more likely to be a member of the winning coalition than a regular deputy; the respective probabilities are 0.6822 and 0.4809, a difference of twenty percentage points. For Senators from the government coalition, the difference was 6% in favor of overrepresented Senators. Finally, a similar pattern exists when executive decrees are being voted: little effect of overrepresentation in the CD, large effect in the Senate for members of the opposition, and a smaller effect for members of the government coalition.

Further analysis is needed, but this is what we conclude for the moment: in both chambers, legislators from overrepresented districts are more likely to join the winning coalition than legislators from regular districts. This effect, however, is stronger in the Senate than in the CD, and it is modified by whether the legislator was allied with the government or was a member of the opposition. Although still visible, the effect of overrepresentation is considerably mitigated for government legislators and accentuated for opposition legislators. This is true for votes taken during the Lula governments and for votes on executive decrees. For votes taken during the FHC governments, the impact of overrepresentation on opposition legislators was like the one found for the Lula governments in the CD: positive and quite large. However, overrepresented Senators from the opposition were less, not more, likely to participate in the winning coalition. We do not know how to account for this unexpected result. But we believe that alone it does not invalidate the overall message delivered by our estimates: overrepresented legislators in both the CD and the Senate are marginally more likely to be part of the winning legislative coalition. The effect, however, is stronger in the Senate than in the CD. This supports our hypothesis.

6. CONCLUSION

[TO BE WRITTEN]
<table>
<thead>
<tr>
<th>CONDITION:</th>
<th>CD</th>
<th>Senate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
<td>FHC</td>
</tr>
<tr>
<td>Opposition + regular + no-condition</td>
<td>0.3965</td>
<td>0.3635</td>
</tr>
<tr>
<td>Opposition + regular + condition</td>
<td>0.2751</td>
<td>0.3271</td>
</tr>
<tr>
<td>Opposition + 'cheap,' + no-condition</td>
<td>0.4009</td>
<td>0.4454</td>
</tr>
<tr>
<td>Opposition + 'cheap,' + condition</td>
<td>0.4300</td>
<td>0.3378</td>
</tr>
<tr>
<td>Government + regular + no-condition</td>
<td>0.6331</td>
<td>0.6716</td>
</tr>
<tr>
<td>Government + regular + condition</td>
<td>0.6902</td>
<td>0.6399</td>
</tr>
<tr>
<td>Government + 'cheap,' + condition</td>
<td>0.6473</td>
<td>0.6542</td>
</tr>
<tr>
<td>Government + 'cheap,' + no-condition</td>
<td>0.6672</td>
<td>0.6613</td>
</tr>
<tr>
<td>Regular, no-condition</td>
<td>0.5476</td>
<td>0.3599</td>
</tr>
<tr>
<td>Regular, condition</td>
<td>0.5582</td>
<td>0.4086</td>
</tr>
<tr>
<td>'Cheap,' no-condition</td>
<td>0.5402</td>
<td>0.6608</td>
</tr>
<tr>
<td>'Cheap,' condition</td>
<td>0.5815</td>
<td>0.6567</td>
</tr>
<tr>
<td>Opposition, no-condition</td>
<td>0.3968</td>
<td>0.3699</td>
</tr>
<tr>
<td>Opposition, condition</td>
<td>0.2871</td>
<td>0.3279</td>
</tr>
<tr>
<td>Government, no-condition</td>
<td>0.6342</td>
<td>0.6703</td>
</tr>
<tr>
<td>Government, condition</td>
<td>0.6884</td>
<td>0.6415</td>
</tr>
<tr>
<td>Opposition, regular</td>
<td>0.3505</td>
<td>0.3413</td>
</tr>
<tr>
<td>Opposition, 'cheap'</td>
<td>0.4112</td>
<td>0.4141</td>
</tr>
<tr>
<td>Government, regular</td>
<td>0.6610</td>
<td>0.6591</td>
</tr>
<tr>
<td>Government, 'cheap'</td>
<td>0.6567</td>
<td>0.6564</td>
</tr>
<tr>
<td>no-condition</td>
<td>0.5485</td>
<td>0.5613</td>
</tr>
<tr>
<td>condition</td>
<td>0.5428</td>
<td>0.5282</td>
</tr>
<tr>
<td>Government</td>
<td>0.6607</td>
<td>0.6588</td>
</tr>
<tr>
<td>Opposition</td>
<td>0.3552</td>
<td>0.3470</td>
</tr>
<tr>
<td>'Cheap'</td>
<td>0.5679</td>
<td>0.5685</td>
</tr>
<tr>
<td>'Regular'</td>
<td>0.5488</td>
<td>0.5488</td>
</tr>
</tbody>
</table>
REFERENCES