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Choosing Institutions Locally: Determinants of Legislative Size in Brazil

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PONTIFÍCIA UNIVERSIDADE CATÓLICA
DO RIO DE JANEIRO

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Dissertação de Mestrado

Dissertação apresentada como requisito parcial para obtenção do grau de Mestre pelo Programa de Pós–graduação em Economia do Departamento de Economia da PUC–Rio

Orientador: Prof. Claudio Ferraz

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Prof. Claudio Ferraz
Orientador
Departamento de Economia — PUC–Rio

Prof. Leonardo Rezende
Departamento of Economia — PUC–Rio

Prof. Marcos Nakaguma
FEA–USP

Prof. Monica Herz
Coordenadora Setorial do Centro de Ciências Sociais – PUC–Rio

Rio de Janeiro, 09 de Abril de 2015

Ricardo Dahis

Graduou-se em Economia pela Pontifícia Universidade Católica do Rio de Janeiro (PUC-Rio).

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Resumo

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Como instituições são determinadas? Esse artigo estuda como legisladores escolhem uma dimensão importante de sistemas eleitorais locais, o tamanho do legislativo. Para alcançar esse objetivo, eu construo uma base de dados nova composta de propostas de cadeiras e votos individuais de vereadores para aumentar ou não o tamanho de suas câmaras no período pré-eleição de 2012 para uma amostra de municícipios no Brasil. Eu então descrevo e estimo um modelo estrutural de escolha discreta de escolha legislativa, no qual vereadores jogam um jogo estratégico e também decidem se concorrem a reeleição ou não. Eu encontro que vereadores pesam em média aproximadamente 34% payoffs de reeleição e 66% bem-estar social quando escolhendo cadeiras. Com esses resultados, eu faço análises de contrafactual, variando a função delimitadora de cadeiras que o governo federal escolhe.

Palavras–chave

Sistema eleitoral;   Tamanho legislativo;   Escolha discreta;

Abstract

How are institutions determined? This paper studies how legislators locally choose an important dimension of local electoral systems, namely legislative size. To achieve this end, I construct a novel data set comprised of seat proposals and individual legislators' votes to increase or not legislative size during the pre-2012 election period for a sample of municipalities in Brazil. I then outline and estimate a structural discrete choice model of legislative vote, in which legislators play a strategic game and also decide whether to run for reelection or not. I find that legislators weigh on average approximately 34% reelection payoffs and 66% social welfare when choosing seats. With these results, I run some counterfactual analyses varying the population caps' function that federal government chooses.

Keywords

Sumário

1
Introduction

How are institutions determined? Despite an extensive literature showing that institutions matter for explaining paths of economic development[1], little is known about how institutions evolve over time, in particular how they are chosen (Alesina (2007)). The choice of institutions is seldom observed[2] and, as consequence, the existing evidence on choice consists of case studies[3] or cross-country correlations[4]. Even when deliberative choice is observed, this process commonly takes place within federal government, and the quantitative literature on how institutions are locally chosen is scarce.

In this paper, I study local legislators' voting decisions when choosing a particular dimension of institutions, namely local legislative size. The main goal of the paper is to model and quantify motivations behind individual votes using individual-level data on a wide range of electoral, demographic and socioeconomic characteristics. To achieve this goal, I construct a novel data set that contains information on individual votes and available propositions that were voted between 2010 and mid-2012, before the 2012 elections in Brazil. Data was gathered from newspapers and direct contact with a sample of local councils. I then specify and estimate a structural discrete choice model based on Finan e Mazzocco (2013) in which legislators weigh individual electoral gains and social welfare in a strategic framework, choosing the number of seats that maximizes their objective functions. The model is designed to capture reduced-form patterns observed in the data and uses variation within and between municipalities to estimate the parameters of interest.

Results indicate that legislators weigh on average approximately 34% individual electoral payoffs and 66% social welfare when making the decisions to vote and to run for reelection. Two versions of the model are estimated and multiple counterfactual analyses are carried with the estimated parameters. Simulating increases in permitted seats for each municipality imply higher

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[1]See Knack e Keefer (1995), Acemoglu et al. (2001) and Besley e Case (2003).

[2]An example of direct and deliberative choice is the change of constitutions. See Persson e Tabellini (2004).

[3]Rahat e Sznajder (1998) describe how the Chilean Right engineered an electoral system biased for its advantadge during the transition from military to democratic government. A similar account is given by McElwain (2008), which describes how the democratization process in post-war Japan was manufactured for the Liberal Democratic Party to keep its dominance.

[4]Norris (2004) provides a comprehensive cross-country analysis of different electoral systems and its impacts on representation and on voting behavior.

proportion of legislators voting for an increase in seats. According to the interpretations provided by the model, legislators seem to greatly weigh social welfare in their decisions, perhaps surprisingly for a country such as Brazil where trust in politicians is historically low[5].

As described above, following Finan e Mazzocco (2013), the model is designed to capture important dimensions of legislators preferences and incentives when deciding how to vote. First, it explicitly incorporates two tradeoffs in legislators' choices. The model allows for the possibility that legislators may have altruistic motives about welfare measures, to be detailed below. This flexibility incorporates behaviors such as voting for an increase in seats even if this would mean a large decrease in reelection probability. The model also explicits the tradeoff between reelection probability and office wages once elected. Second, the voting decision is treated as strategic. Legislators are elected in multi-member councils and a bill is approved only with voting majorities[6]. Furthermore, the model accounts for the decision to run or not for reelection, and it is treated as simultaneous to the voting decision. Differently from executive offices, legislators in Brazil may be reelected indefinetely for 4 year terms, and those who don't run face different incentives from those who do[7].

I then proceed to the estimation, following the Industrial Organization literature on structural estimation of games with imperfect information (Ackerberg et al. (2007)). The method used is a two-step Simulated Maximum-Likelihood estimator, with beliefs being estimated in the first step and then used in the second step together with an imposed equilibrium condition to recover the parameters of interest. I assume legislators play a strategic game during the legislative process with asymetric information over other legislators' degrees of altruism and utility shocks received[8]. This assumption implies that legislators must form beliefs about other players' actions. In the model they do so based on others' previous elections' results and on personal characteristics. I estimate these beliefs using data across municipalities on legislators' choices and, afterwards, use them to build legislators' expected benefits from the decision to vote for or against the municipality-specific alternative proposal of seats.

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[5]http://g1.globo.com/politica/noticia/2015/03/aprovacao-ao-desempenho-do-congresso-e-de-9-diz-datafolha.html

[6]The model will be silent about the distinction between honest and strategic voting. For a general discussion on the topic, see Cox (1997).

[7]Career concerns in Brazil may be even more pronounced because of a low reelection rate and the fact that many higher-rank politicians began their careers as local legislators. Although this dimension is only indirectly included in the model, a large literature has explored the topic. See Diermeier et al. (2005), Mattozzi e Merlo (2008) and Ferraz e Finan (2011).

[8]See Baron e Ferejohn (1989) and Baron e Diermeier (2001) for models on legislative bargaining in proportional representation systems.

Brazil provides an appropriate context for doing this exercise for several reasons. First, two sequential law changes created cross-sectional variation in the number of seats per population size across municipalities, while also removing decision rights from local politicians and then giving it back to them. Second, Brazil is one of the most decentralized countries in the world, with local governments holding discretionary decision power over public services such as education, health and transportation. Since legislators interact with the executive branch to propose, approve and veto bills, the stakes for being in power are high[9][10]. Third, the institutional framework allows me to study how legislators choose legislative size across sub-levels of government, holding macro-institutions and national culture constant. Thus, several omitted-variable biases present in cross-country analyses are not present in this context (Boix (1999)).

The choice of electoral sytems is a classic topic in Political Science (Lijphart e Grofman (1984), Norris (2004), Taagepera (2009)), and it has also been an object of recent interest in Political Economy (Htun e Powell Jr. (2013)). The available literature is split between the question of what electoral systems ought to accomplish (Rae (1995), Carey e Hix (2011), Brooks et al. (2011)) and a positive analysis about the choices of particular rules. Boix (1999) shows that electoral systems derive from the decisions the ruling parties make to maximize their representation. If changes in the electoral arena happen with new parties appearing, the old parties choose proportional representation when the opponents are strong, and choose plurality representation when they are weak.

In a paper studying local choice of district magnitude (ie. legislative size), Trebbi et al. (2008) provide a theoretical framework backed by empirical evidence to show that white majorities tend to disenfranchise black minorities through strategic manipulation of electoral rules in the 1960's in the US. Majorities adopted at-large systems in response to an increase minority size when this minority was small, but chose proportional systems when this increase in size was large. Importantly, and analogous to the motivation to this paper, the decisions over electoral systems were local, with elites directly designing rules to maximize their posterior representation in power. Benoit (2004) creates a simple model to explain endogenous institutional change, in particular electoral systems. The author shows that electoral laws will change when a coalition of parties exists such that each party in the

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[9]See Ferraz e Finan (2011) on the autonomy of municipalities in Brazil and on the ways legislators influence public policy.

[10]In 2012 Brazil elected 56810 local legislators in 5565 municipalities, adding up to approximately R\$9.1 billion in municipalities' budgets.

coalition expects to gain more seats under an alternative electoral institution, and that also has sufficient power to effect this alternative through fiat given the rules for changing electoral laws. This paper adds to the literature above first by providing direct evidence into a local choice of electoral systems and second by directly modeling and quantifying motivations for the observed choices made by politicians. As stressed above, however, the analysis focuses on the determinants of legislative size, and is silent about the consequences of these changes[11].

Nevertheless, the paper contributes to the literature studying the electoral importance of this particular institutional dimension, the council size. Rae (1995) discusses how district magnitude (or the number of council seats) regulates two goals: increasing minority representation and producing sizeable majorities that can govern effectively. Simultaneously, council size also regulates party competition within an election. In a similar spirit, Carey e Hix (2011) study whether it's possible to find an electoral "sweet-spot" between majoritarian and proportional governments, where both representation and government accountability are maximized. With cross-country data the authors show that the ideal size stands approximately at six or seven. In this paper I extend this literature by modeling legislators choosing council size taking into consideration the issues of representation and "fractionalization", while also being held constrained by federal law. Finally, Brooks et al. (2011) substantiates the study by Carey e Hix (2011) by showing that more representative councils are also more irresponsive to single pivotal voter's preferences. As has already been discussed above, the important literature studying the "1/N" relationship between council size and public expenditures will not be directly referenced in this paper.

Moreover, this paper contributes to the literature on decentralization and the asymmetry in policy tools or in information access that is available to different levels of government (Mookherjee (2015), Gadenne e Singhal (2014)). In the context studied in this paper, when choosing local legislative sizes, the federal government may internalize externalities and may be less subject to local electoral interests or lobbying (Faguet (2004), Lipscomb e Mobarak (2014)). On the other hand, despite having direct reelection incentives, local politicians might have more relevant information about their cities' social fragmentation and representation needs, which would lead to a more informed and welfare-

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[11]The literature on the effects of larger council sizes is developed by the "1/N" Law since Weingast et al. (1981). See also Baqir (2002), Egger e Koethenbuerger (2010) and Pettersson-Lidbom (2012) for more recent empirical tests of the law. On a more general analysis of the impacts of different electoral systems on the economy, see Milesi-Ferretti et al. (2002).

enhancing decision (Rubinchik-Pessach (2005)). As Faguet (2014) argues, decentralization reforms carried by countries worldwide are centrally motivated by the quest to improve governance and accountability. The mechanisms for such outcomes would be increased political competition, more tailored policies to smaller and more homogenous groups, reducing political instability, among others. This paper adds to this literature by directly analysing how local politicians react to a decentralization policy[12], trying to assess whether its results fit into the goals described by Faguet (2014).

Finally, this paper builds on the literature about the determinants of reelection applied to Brazil by incorporating observable individual legislative votes to the decision to run or not in the next election cycle (Pereira e Rennó (2001), Pereira e Rennó (2003), Pereira e Rennó (2007)). The seminal paper by Ames (1995) introduces geographical models of electoral strategy for federal deputies, and the same kind of reasoning is developed below in the formulation of the model.

The rest of the paper proceeds as follows. Section 2 describes the institutional background in Brazil on which the analysis is carried. Section 3 describes the data sources with some descriptive statistics. Section 4 presents reduced-form analyses that motivate the key features of the model. Section 5 develops a discrete-choice model of legislators' vote. Section 6 describes necessary additional assumptions and the econometric implementation. Section 7 discusses the results. And section 8 concludes with some remarks on future agendas of research.

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[12]A decentralization policy is defined in the literature by a higher-level government delegating decisions over an outcome to lower-level governments (Mookherjee (2015)).

2
Institutional Background

In this section, I describe some features of Brazil's federal law changes regarding legislative size and the rules that govern local legislatives. The first change happened before the local elections of 2004, while the second happened before the elections of 2012. A timeline of events is sketched in figure A.1.

2.1
The 1988 Constitution and the 2002 Resolution

The Constitution of 1988 represents an important step towards democratization in Brazil. It brought about many changes to the country, such as a large descentralization of power from the federal government to more local administrations and the increase in scope of social programs and redistributive policies. Among many other changes, it was established a step-rule that specified limits of legislative size according to each municipality's population size. The rule created three broad bands of seats (with minima and maxima per population category) and allowed municipalities' descretion in the choice of size. However, the definition of proportionality was vague, which led to different interpretations of whether municipalities within a certain population bracket had the autonomy to choose legislative size. Extreme cases happened with municipalities choosing its number of seats close to the upper bound. For instance, two municipalities named *Nova Russas* and *Buriticupu* in 2000 with population sizes of 29435 and 53348 respectively, but the first with 21 legislators and the second with 9. It also allowed states to legislate on top of the Constitution, imposing different limits on the brackets. As a general result, there was large variations in effective council size, as shown in figure A.2.

However a radical change happened in 2002. State attorneys in the state of São Paulo filed a lawsuit against the council of *Mira Estrela* that had only 2600 inhabitants but increased its council size to 11 legislators, taking advantage of the ambiguous interpretation of the written law. The case grew to be carried by the minister Mauricio Corrêa to the Supreme Court, who decided to revise the Constitution's proportionality rule[12] and pushed the *Tribunal Superior Eleitoral* to approve the Resolution 21.702, following the Supreme Court's decision. The revision intended to enforce the proportionality

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[1] http://www2.uol.com.br/debate/1199/cidade/cidade01.htm

[2] http://www.conjur.com.br/2004-mar-24/supremo_fixa_criterios_definir_numero_vereadores

principle, in which municipalities should gain one legislator for every 47619 inhabitants in its population[3], but still respecting the lowest upper bound of 9 seats. Similar increasing steps applied to municipalities with more than 1 million inhabitants, with number of seats rising up to 55.

Importantly, apart from some outliers which will be analysed later, the size of the legislature was implemented by the population rule, with no more room for discretion. The new rule and its consequences for effective council sizes is illustrated in figures A.2. Despite some municipalities at the right side of the population distribution that gained seats with the change, on average for every population size there was a decrease in seats, the variation amounting to a loss of even 10 seats. Also, we notice that the new assignment rule created a quasi-smooth step function linking city population to council size in 2004 and 2008. Nevertheless, the rule still implied that legislative size changed discontinuously (discretly) at the cutoffs.

2.2
Regaining Discretionary Power over Legislative Size

The second important law change in Brazil happened in 2009. After years of controversy around the 2004's Resolution, various types of reactions by the local politicians and several rejected federal Amendments[4], the National Congress passed a new constitutional Amendment called PEC 58/2009 that redesigned the council size assignment function, creating an upper bound for municipalities based on their population, with no official lower bound. Besides shifting the caps' distribution to the right, the amendment restored local discretion on the choice of size given a certain limit that varied with population. That is, starting with the 2012 elections, each council must decide its number of seats and vote the change in its local *Organic Law*, the council's bylaws.

The change in the distribution of legislative sizes can be seen in figures A.2 and A.3. Figure A.3 plots the the changes in permitted seats versus the effective difference in seats after all local votes were completed, where the sizes of the circles correspond to the number of municipalities at that coordinate. The important takeway of the figure is that there is a wide variation in choices. We notice municipalities that had the opportunity to increase its council sizes by up to 10 seats but that took none, and even municipalities that gained two permitted seats but chose to actually decrease its council sizes. Moreover, in figure A.4 I plot the difference in seats between 2000-2004 and 2008-2012. It was suggested by anedoctal evidence that a municipality may have wanted to

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[3]This number results from dividing 1,000,000 inhabitants per 21 intervals.
[4]The PECs 333/2004 and 336/2009 are two much-debated examples.

bring its 2012 council size back to its original size in 2000, but that's not the general case.

Crucially, the new law first determined municipalities should choose its legislative size up to one year before the next elections. In this case, the day was 7th of October of 2011. Yet, as the date limit approached and many municipalities still had made no decision, the Supreme Court decided to extend the deadline given to municipalities to the last day before the parties' conventions in the election year, the 30th of june of 2012[5]. For this reason, we observe two atoms in the time distribution of municipal decisions in the data, one in late-2011 and another in mid-2012.

2.3
Local Legislative's Legal System

In order to change the number of seats in the local legislative, legislators must follow a sequence of steps described in the Federal Constitution that apply to any change on the city council's bylaws, called the *Organic Law*. First, a group of at least three legislators must present an official proposal to the legislative's president. Then the proposal is reviewed by two of the council's comissions before being set for two rounds of open voting with at least ten days in between each other. If the motion obtains at least two thirds of the votes in each round, it gets approved by the local legislative. The president of the house is obliged to vote only in the case of a draw. After this process the change in the text is reviewed by the state's *Tribunal Regional Eleitoral*, the electoral justice court. If it passes this phase, it is finally approved and will take effect in the city council's Organic Law.

During the period in which legislators were discussing and voting changes it was common for the population to organize protests and online campaigns to try to stop the increases in seats[6]. The majority of such cases were motivated by groups in the population declaring the councils were large and ineffective, with lots of money spent on assistants and "suit-assistance". On the other hand, legislators declared more seats were needed to increase the proportionality in the representation of population groups. Legislators also frequently promised to reduce their own wages after the increase in seats to keep the council's budget untouched, although I have no data to investigate this dimension

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[5]The consequences of this decision were not innocuous. Processes in state-level courts for all sorts of irregularities and compaints by local councils emerged. For specific examples, please contact the author.

[6]Some anedoctal examples happened in the municipalities of São José do Rio Preto, Foz do Iguaçu and Governador Valadres. See http://revistaepoca.globo.com/Brasil/noticia/2011/09/o-povo-contra-os-vereadores.html

empirically[7].

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[7]The claim is made based on anedoctal evidence originary from the data collection process on individual votes.

3
Data

I have assembled a data set of approximately 2300 legislators' individual votes across approximately 200 municipalities in Brazil. Data comes from two main sources: newspapers scraping and direct communication with local councils. The municipalities were not randomly selected and, thus, are not representative of the whole country.

The procedure to gather each municipality's data was the following. I started with municipalities in the state of São Paulo (SP), the largest and richest in the country and, supposedly, where more information would be available online. I followed an alphabetic list of names in the SP state, but as municipalities of other states were recomended in webpages "similar to" the one I was searching, I freely included them too. I first searched the websites of larger regional or national newspapers. When no information was found there, I also searched in local newspapers and blogs. When nothing was found, I directly contacted the city council by telephone or most often by email. As the degree of computerization in councils is correlated to the municipality's income per capita, response levels varied and came most frequently from richer municipalities. For instance, it may also be the case that municipalities with more developed communication vehicles are those where legislators vote more against increasing council size[1]. In total, I contacted and/or searched data for approximately 800 municipalities.

Along with binary votes I gathered what was the status quo number of seats and an alternative proposal in each municipality. Votes were cast between January 2010 and June 2012, which was the period allowed by the Resolution 21.702. These legislators were all elected in the 2008's local election, with some of them acting as substitutes to other legislators who left office. Excluding the substitutes from the analysis does not significantly change the results below.

Proposals and votes are encoded in the following way. Proposals to change the *status quo* number of seats - to increase or decrease it - is taken as the alternative proposal, while conserving the number of seats is taken as an existing "redundant" proposal. The vote variable takes value 0, if the legislator votes against the change in seats, and 1, if he voted for a change towards the alternative proposal. Importantly, in the cases where legislators changed their minds between the first and second round of voting, I take their second vote

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[1]This sampling nonrandomness would reduce the external validity of the results presented in the sections below, as will be discussed further.

as the definite vote whenever I have the data on both rounds available. When I have only one round, this is taken as the definite vote. I have made an effort to be as precise as possible, though there might be coding errors or arbitrary interpretations in ambiguous situations where data will include noise.

There are two possible sources of data noise. First, there is an attribution uncertainty for a subset of municipalities. That is, 126 municipalities have data from newspapers which didn't single out every legislator's name when describing individual votes. The text could say there was consensus in voting for or against, or that there was a certain number of legislators voting one way, but not mentioning names. This generates noise for approximately 1500 data points because I did not always have the information of which legislators were in power at the time. The second problem, a consequence of the first, is that I cannot fully differentiate what fraction of legislators voting were substitutes and what fraction were directly elected[2].

A typical piece of newspaper used to assemble the data set is presented in figure A.6. As discussed above, this example illustrates the sources of attribution uncertainty, as there is no precise information regarding who were the legislators present in the session. Descriptive statistics are presented in table A.1. The first point to notice is that, for the whole sample, the average alternative proposal adds 4.6 seats to the council, a sizeable average 35% increase in size. But proposals not always were made at the maximum level permitted by law, at an average 19.04 seats. When split between groups of legislators who voted against and in favor of the change of seats, interesting patterns emerge. Those who voted for a change in seats (most often an increase) were in municipalities with larger populations and elections, but other characteristics have small differences or are not statistically different at all. For instance, on average, those who were in favor of a change were in municipalities with 30% more candidates and 12.3% more candidates per seat. Also, these municipalities have larger and more expensive councils, with larger proposals and more permitted seats.

Using data from the full universe of municipalities that were allowed to change its legislative size, figures A.2, A.3 and A.4 show two interesting facts. First, there is great cross-section variation on permitted change of seats (how many seats the municipality could choose to increase) vs. the observed

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[2]Unless the presence of attribution uncertainty is correlated with municipal characteristics, the noise introduced here should only increase the estimated parameters' standard errors. But, even supposing there's a negative correlation between municipal income and attribution uncertainty, the estimated size of the problem is small. Of the observations with attribution certainty, only 2.3% of the legislators are substitutes at the time of voting. And there's no reason to believe this isn't a good estimate of the number of substitutes in the rest of the sample.

changed in seats. Figure A.3 shows that the fitted line has a slope of less than 45 degrees, ie. councils do not always choose to increase the number of seats to the maximum level allowed. Second, as figure A.4 illustrates, legislatives do not recover for 2012 as many seats as they have lost in 2004, with the first law change described in section 2. These figures merely illustrate some empirical characteristics of the institutional framework I use in the analysis. They don't describe the variation used below in the estimation, but are useful to build intuition in a little-studied context of law changes.

Additionaly, to include in the analysis the data on public finance and legislative expenditure, I collected data from the *Finanças Brasileiras* (Finbra), which provides data on a variety of municipality-level revenues and expenditures since 2001. With this data I construct a ratio for how much each city council is spending as a proportion of how much it was able to spend for that year. A set of descriptive statistics follows in table A.2.

The data for the elections of 2004, 2008 and 2012 comes from *Tribunal Superior Eleitoral*, the superior electoral court. It includes a variety of characteristics for every candidate that ran in each election, including vote numbers for the individual, party and coalition. This data set allows me to capture individual electoral characteristics of each legislator in the model, which in turn allows me to calculate each politician's costs and benefits in the game. A list of descriptive statistics for the 2008 election follows in table A.2.

Lastly, demographic and economic data for municipalities comes from the *Instituto Brasileiro de Geografia e Estatística* (IBGE). The censuses from 2000 and 2010 provide information about poverty rates, radio coverage, income levels, etc, while other surveys provide yearly data on population. Some descriptive statistics follow in table A.2.

Table A.2 displays summary statistics for municipalities, containing characteristics for the 2010 Census, legislative spending data for 2005 to 2008, and for the 2008 local elections.

From table A.2 we notice the differences between municipalities in-sample and out-of-sample. Municipalities included in the analysis below are richer, more educated, more populated, more fragmented, with larger elections and with larger legislatives. Not only that, in-sample municipalities have 104% more candidates per seat and 34% parties per seat when compared to out-of-sample municipalities, showing a much higher level of competition for each legislative seat. This fact is a direct consequence of the data assembly algorithm described above, and it will be considered in section 8, in which I discuss the external validity of the results.

4
Reduced-Form Evidence

In this section I discuss several assumptions commonly made in the Political Economy literature about politicians' behavior in terms of council size choices and reelection strategies. I then investigate some characteristics of the data sets presented in section 3 in light of these hypotheses to motivate the main features of the model presented in section 5.

If given the opportunity to choose its local legislative size, what would a legislator choose? To answer this question we must make assumptions about politicians' objective functions, and several suggestions are already present in the literature. As Diermeier et al. (2005) emphasize, politicians are forward-looking agents whose choices are dynamic in nature. If they decide to run for reelection, then the expected gains of reelection should matter in their decision over seats (Downs (1957)). And as Finan e Mazzocco (2013) discuss, politicians may also be motivated by social welfare considerations, to be more clearly defined below. Politicians who don't run for reelection may simply be motivated by social welfare, with no individual reelection incentives to be gained. As a clarification sidenote, every politician, be it an incumbent or not, has an election probability. However, for the purposes of this paper, as by construction the analysis only includes incumbents in their decisions over council size, I use the terms "election probability" and "reelection probability" interchangeably, for they are equivalent in this context.

Let's now define the expected reelection returns for a politician who runs for reelection. Suppose this quantity amounts for an expected value, a multiplication of his election probability and the wages received if elected. The election probability may be modeled as a function of individual and municipal characteristics interacting with council size[1]. Political competition and entry of new candidates *ceteris paribus* reduces the election probability for every candidate (Pereira e Rennó (2003)). On the other hand, wages may be assumed to be a decreasing function of seats[2]. With a fixed budget for the legislative, the

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[1]This paper doesn't account for retrospective voting and voters punishing or rewarding politicians' choices which deviate from median voters' preferences. This dimension matters for legislators' decisions, but it has not been implemented because of a lack of resources. For a discussion on politicians' responses to various characterizations of median voter's preferences, see Gerber e Lewis (2004) and Bardhan e Mookherjee (2010).

[2]This is obviously a simplification, but may be a sufficient one. The legislative budget is split between various obligations, including wages, assistants' wages, legislative bills and projects, etc. Moreover, the Article 29 in the Constitution regulates the maximum wage for legislators as fractions of state legislators' salaries.

composition of expenditures may be approximated by a simple equal division of wages to the present legislators. And thus legislators face a tradeoff: one more seat may increase the election probability however it certainly reduces office wages[3].

As mentioned above, legislators can be modeled to hold altruistic motivations when choosing seats (Finan e Mazzocco (2013)). A level of altruism would rationalize certain choices of seats that may be electorally attractive but simultaneously worsen dimensions like representation and disproportionality, to be defined below. And levels of these variables are predicted by demographic characteristics, such as population size or income fragmentation (Rae (1995)). This feature of preferences illustrates the second tradeoff faced by legislators, the balance between individual and welfare motivations.

In order to gain some insight into the data set characteristics, and to preliminarily test some of the claims above, I start by estimating a reduced-form aggregate regression of seat outcomes for each municipality on a list of variables. This list contains variables that proxy electoral competition (HH Index), legislators' election probability (Years of Schooling, Number of Terms, Share of Votes) and expected office wages (Legislative Expenditures). The functional form is an Ordinary Least Squares (OLS) and is given by

$$y_m = \alpha + \delta dif_m^p + \mathbf{X}_m \boldsymbol{\gamma} + \epsilon_m$$

where y_m represents three variables for municipality m: a dummy indicator for whether the municipality's council increased its number of seats, the effective difference in seats from 2008 to 2012, and, thirdly, the difference divided by the permitted difference in seats[4]. Also, dif_m^p represents the permitted difference in seats for municipality m and $\mathbf{X}_m$ represents municipality-level election and social characteristics. Note that here I do not observe which legislator voted for or against the alternative proposal. I only have data about the final outcome of the voting process. On other hand, this preliminary analysis

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[3]To assess the realism of these hypotheses, two stylized facts were established with different combinations of data. Crossing individual-level data from the elections in 2004 and 2008 with data on the observed number of seats, an OLS regression of the election probability over characteristics yields a negative coefficient for seats. In other words, in such reduced-form preliminary analysis, the entry of new candidates seems to outweigh the electoral coefficient decrease and cause the election probability to decrease. Second, since wages across municipalities are only observed for the year of 2004, with this data I regress wages on the number of seats in 2000, when legislators stil could choose council size, with population and revenue controls. The hypothesis discussed would predict a negative coefficient but the contrary is found. These two empirical findings are incorporated into the discussion in section 7.

[4]In other words, if s_m^{12} is the number of seats chosen in 2012 and $\bar{s}_m^{12}$ is the upper bound allowed by federal law, then $ratio_m = \frac{s_m^{12} - 9}{\bar{s}_m^{12} - 9}$

includes all municipalities contemplated by the law changes described in section 2. Lastly, in order to motivate a distinction of objective functions in section 5 for legislators who run and who don't run for reelection, the analysis is repeated differentiating the proportion of legislators running for reelection in each municipality in the last columns.

Results are presented in table A.3. In columns 1 and 4 the dependent variable is a dummy for whether the council chose to change its size, be it an increase or decrease. This measure is interesting because it captures simply the decision to change the *status quo*. The outcome for columns 2 and 5 is the natural difference in seats from 2008 to 2012. It captures the absolute difference voted by legislators in councils. And, finally, the outcome for columns 3 and 6 is the ratio of the increase relative to the permitted increase. In other words, it measures how much the council uses its opportunity to increase its size, and varies nonlinearly in the difference in permitted seats.

The general patterns are mostly consistent with the discussion above, despite some unexpected results. For instance, education or the number of terms have unexpected signals and significance because both are variables expected to positively predict candidantes' expected electoral performance. The variables that proxy the candidates' strength, including also the share of votes, were expected to have the same effect direction. Nevertheless, the tradeoffs discussed above receive support in columns 4 to 6, where the most important results are presented. We observe that municipalities with larger fractions of candidates running for reelection tend to increase more seats, and less so with higher share of votes in the past election and the share of legislative expenditures. In a simple calculation in column 4, running for reelection predicts positively a change in seats for municipalities where legislators received on average approximately 7% of the votes or less, and negatively when receiving more votes than 7%. In Column 5 the analogous calculation yields the turning point to be 5.7% of the votes in the municipality. Thus, there is evidence supporting the claim that strong candidates vote against an increase in seats, while weaker candidates vote for an increase. In sum, table A.3 motivates the assumptions in section 5 by illustrating the variation in the aggregate data, which is mostly consistent with the hypotheses discussed.

Furthermore, an aggregate analysis provides interesting but limited information about the choices of council size. With individual data I refine the analysis and explore individual variation in characteristics explaining the choice of seats. Motivated by the theoretical reasoning and by table A.3, figure A.5 shows the percentage of votes in favor of the alternative proposal split by quartiles of four variables discussed above, differentiated by legislators who ran

for reelection in 2012 and those who didn't. Legislators who ran for reelection vote more in favor of the status quo seats (most often not increasing seats) the higher their vote share in the 2008 elections, while those who did not run have a flat response to votes.

Analogously, the same reasoning applies to population size and representation[5]. If legislators account for population size when choosing the number of seats, then larger municipalities should have larger legislatives to keep representation constant, although not linearly because of gains of scale of larger legislatives. Figure A.5 supports this claim, as legislators vote more for increases in council size in municipalities with more inhabitants. Finally, if legislators care for representation levels, they should vote for more seats in municipalities with higher levels of representation. And legislators who don't run for reelection should produce this pattern even more strongly. However, in this dimension, those who don't run for reelection have a flat response in terms of votes, while those who do have a negatively sloped response.

Lastly, the aggregate analysis presented above can be replicated for the sample of municipalities with individual-level data on votes. The same theoretical discussion made above holds regarding what variables are relevant to explain votes, so I estimate a probit model with the following specification

$$Pr(v_{jm} = 1|X_{jm}) = Pr(\alpha + \mathbf{X}_{1,jm}\boldsymbol{\beta} + \mathbf{X}_{2,m}\boldsymbol{\gamma} + \eta_{jm} > 0)$$

where v_{jm} is a dummy taking value 1 if legislator j in municipality m voted in favor of the alternative proposal to increase seats and 0 otherwise. Individual-level characteristics are represented by the vector $\mathbf{X}_{1,jm}$, municipality-level characteristics are represented by $\mathbf{X}_{2,m}$ and η_{jm} is a legislator-municipality-specific shock with a standard Normal distribution.

Results for this regression are presented in table A.4, and they are basically consistent with the aggregate-level analysis with the universe of municipalities. Characteristics that proxy candidate's electoral strength have mostly negative signs and are statistically significant, such as education, vote share, rank in coalition, and others. Municipality characteristics have mostly their expected signs, with population and representation having a positive correlation with increases in seats. In other words, there is support for the theoretical claims discussed in the beginning of this section.

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[5]Representation in log form is defined by the log of population divided by the number of seats in the council.

5
Model

In this section I develop a model closely related to Finan e Mazzocco (2013). I adapt their framework and posterior estimation to the context of legislators making only a binary choice, but using variation across municipalities to recover the relevant parameters. The model is flexible enough to capture the variation evidenced in section 4, both aggregate-level and individual-level. Legislators appear to behave differently when choosing to run for reelection, with candidates' electoral strength weighing in favor of not increasing council size. Population size, representation levels and legislative expenditure levels all seem to affect legislators' decisions.

The main model in this section allows for candidates to decide to run for reelection or not, simultaneously to choosing to vote for or against a change in seats[1]. Besides, the model places the voting decision in a strategic context, where legislators take into account other legislatrs' votes in their decisions[2]. A solution to this game is characterized by a Bayesian Nash Equilibrium of votes and running decisions. A simplified version of the main model is outlined and estimated at the end of the section, where all legislators run for reelection and where voting is not a strategic decision[3]. The comparison of both models is discussed in section 7.

5.1
Framework

There are J legislators distributed in M municipalities, each one voting for a number of legislative seats and deciding whether to run for reelection or not. Let J_m be the number of legislators in municipality m, such that $J = \sum_{m=1}^{M} J_m$. For each municipality $m \in (1, \ldots, M)$ there is status quo number of seats called s_{0m} and an alternative proposal called s_{am}[4]. Each

---

[1]Failure to distinguish candidates running and not running for reelection could bias the altruism parameter upward, since gains from reelection would be higher to every candidate, and the weight given to social welfare would have to compensate in the estimation.

[2]Some type of strategic interaction is present in most of the literature on legislative bargaining and choice (Baron e Ferejohn (1989)). It is also present in Finan e Mazzocco (2013).

[3]An equivalence between the strategic model and the simplified one may exist since legislators will rarely be the swing-voter in a row vote. However this paper gives no formal proof of this idea.

[4]I assume the altenative proposal s_{am} is exogenously given for every municipality. This may not be accurate since municipal law requires at least 3 legislators to formulate a proposal for it to go to a vote. In the model I assume all legislators to have similar preferences, only with parameters varying.

legislator j simultaneously chooses $v_{jm} \in (0,1)$ and $d_{jm} \in (0,1)$[5]. I denote the votes of legislators in municipality m as $v_m = (v_{1m}, \ldots, v_{J_m m})$, the others' votes as $v_{-jm} = (v_{1m}, \ldots, v_{j-1m}, v_{j+1m}, \ldots, v_{J_m m})$ and all votes as $v = (v_1, \ldots, v_M)$. Further, I denote the decisions to run for reelection in municipality m as $d_m = (d_{1m}, \ldots, d_{J_m m})$, the others' decisions to run as $d_{-jm} = (d_{1m}, \ldots, d_{j-1m}, d_{j+1m}, \ldots, d_{J_m m})$ and all running decisions as $d = (d_1, \ldots, d_M)$.

Legislators care for individual incentives yet may also have welfare considerations. In terms of individual payoffs, as motivated by section 4, their voting choice v_{jm} generates a tradeoff where one more seat may imply a higher reelection probability[6] but also lower wages if elected. Their equilibrium votes choose a level of seats and thus a certain quantity of social welfare, which will be defined precisely below in section 6.

Let $X = (X_{1,jm}, X_{2,m})$ be a vector in individual and municipality characteristics, and $p(s_m, X)$ be the election probability of a legislator[7]. Given the other legislators' votes, the utility of legislator j in municipality m when running for reelection is given by

$$U^R_{jm}(v_{jm}, v_{m-j}) = (1-\beta_{jm})w_m p(s_m, X) + \beta_{jm} Z_m(s_m, X_{2,m}) - C^R + \varepsilon_{jm}(v_{jm}) + \nu^R_{jm}$$

The first term refers to the reelection incentives, ie. the expected wage the legislator will receive if elected. The second term, $Z_m(s_m, X)$, refers to a measure of social welfare in municipality m that depends on seats and local characteristics $X_{2,m}$, which will be specified below. Finally, each legislator running for reelection pays a fixed cost C^R[8] and receives two shocks unobserved by the econometrician: a choice-specific shock $\varepsilon_{jm}(v_{jm})$ and a decision-to-run-specific shock ν^R_{jm}. Furthermore, I will refer to β_{jm} as the legislator's *type*, and

[5]I assume legislators make a simultaneous decision of voting for seats and to run for reelection. As was explained in section 2, the voting period when municipalities could alter legislative size was before the local party conventions, when it was decided who would run in the next election. Thus, the model ignores this complexity and incorporates the endogeneity of the running decision by imposing it to be simultaneous with voting for seats.

[6]The model is silent about the effect of one more seat on candidates' entry on an intensive and extensive margin. Competition may increase through an intensive margin if, with a fixed pool of potential candidates, one more seat makes more candidates decide to run on the margin. It may also increase through the extensive margin by, on the margin, making new people join the pool of potential candidates.

[7]The model assumes legislators fully observe the function $p(s_m, X)$, ie. they know exactly how their election probability varies with seats and local characteristics. In a world with information asymmetries between politicians and voters this may not hold but in this framework I assume information to flow completely.

[8]This hypothesis is made despite its low plausibility. Decision-to-run costs are seldom constant across candidates because of many reasons, but in particular differences in campaign expenditures, opportunity costs and individual motivations (Besley (2007)).

this parameter will be constrained to vary inside the interval $[0,1]$[9].

A legislator j in municipality m that does not run for reelection, conditional on the other legislators' votes, receives the utility

$$U_{jm}^{NR}(v_{jm}, v_{-jm}) = \beta_{jm} Z(s_m, X_{2,m}) + \varepsilon_{jm}(v_{jm}) + \nu_{jm}^{NR}$$

There are no individual incentives for a legislator who will not run, ie. his expected wage is zero. This specification will also be useful for generating variation that reflects patterns observed in the data in section 4.

The function $p(s_m, X)$ indicates the probability of election for a legislator, and no hypothesis is necessary at the moment regarding its derivatives. Nevertheless, as discussed in section 4 and by Rae (1995), one would expect two effects of a higher s_m on $p(s_m, X)$ given characteristics X. On the one hand it may increase the probability of election, since it lowers the electoral threshold in the municipality, but on the other hand it may decrease chances if entry of new candidates is too high.

Moreover, I need to make several assumptions to deal with strategic interactions in the game. First, legislators do not know each other's type, which allows them to form only beliefs about other players actions. They, however, know the distribution $\pi(\beta_{jm})$ from which types are drawn[10]. I thus implicitly assume no coordination is possible, among all candidates or between subsets of candidates in parties and coalitions[11]. Second, they make decisions simultaneously. This hypothesis fits well the fact that the vote in a proposition is carried with a minimum number of legislators present, who vote virtually at the same time.

Since other legislators' types and shocks are private information, legislator j cannot calculate a precise prediction of his opponents' decisions. Therefore, each legislator forms beliefs about others' actions, defined as follows.

Definition 5.1: The probability (belief) that legislator j in municipality m assigns to legislator h choosing vote v_{hm} is given by $\sigma_j(v_{hm})$; and the probability

[9]This constraint builds the interpretation of the altruism parameter to be a percentage balance of two interests.

[10]I assume legislators's types β_{jm} to be private information. The model does not allow for beliefs updating since decisions are simultaneous. In practice, the average population of a municipality in Brazil is approximately twenty thousand inhabitants and legislators vote for motions everyday, so the assumption that they have no information on each other's type may be too strong.

[11]This assumption is slightly relaxed by the inclusion of individual characteristics in the model for predicting votes in table A.4.

that j assigns to legislators $-j$ choosing v_{-jm} is given by

$$\sigma_j(v_{-jm}) = \prod_{k \neq j} \sigma_j(v_{km})$$

5.2
Legislators' Decisions

In this section I outline the maximization problem of each legislator given his utility function, beliefs and strategic interactions. I proceed by first describing the utility accrued in deciding to vote for or against a change in seats given a decision to run for reelection; and then by comparing the values of running or not for reelection to point what decision is optimal.

A legislator that is running for reelection must choose what vote to cast given the votes of other legislators in his municipality. In other words, he chooses v_{jm}[12] so as to maximize the following expression:

$$
\begin{aligned}
V_{jm}^R(X, \theta) = \quad & \max_{v_{jm} \in \{0,1\}} \int_{v_{-jm}} [(1 - \beta_{jm}) w_m p(s_m(v_m), X) \\
& + \beta_{jm} Z_m(s_m(v_m), X_{2,m})]\, \sigma_{jm}(v_{-jm}) dv_{-jm} \\
& - C^R + \varepsilon_{jm}(v_{jm}) + \nu_{jm}^R \\
& \text{s.t. } w_m s_m(v_m) = D_m
\end{aligned}
\tag{5-1}
$$

where D_m represents the council's budget in municipality m. Given the legislative legal system in Brazil discussed in section 2, where one needs two thirds of the house to pass a local bill, the nature of strategic interactions is characterized by the fact that we have

$$s_m(v_m) = s_{0m} \mathbf{1} \left[\frac{\sum_{k=1}^{s_{0m}} \mathbf{1}[v_{km} = 0]}{s_{0m}} < \frac{2}{3} \right] + s_{am} \mathbf{1} \left[\frac{\sum_{k=1}^{s_{0m}} \mathbf{1}[v_{km} = 1]}{s_{0m}} \geq \frac{2}{3} \right]$$

Also, since local legislatives have a fixed upper bound for expenditures (that varies with the municipality's taxing revenues), a constraint is imposed over the choice of seats. In other words, the tradeoff between wage levels and election probability emerges.

Moreover, a legislator that is not running for reelection receives no reelection payoffs. Thus, the value of not running for reelection is given by

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[12] In the real world legislatives have committees and a board of presidents and vice-presidents, who may exert influence on the choice of seats by various means, but this is ignored in the model.

$$
\begin{aligned}
V_{jm}^{NR}(X,\theta) \;=\; & \max_{v_{jm}\in\{0,1\}} \int_{v_{-jm}} \left[\beta_{jm} Z_m(s_m(v_m), X_{2,m})\right] \sigma_{jm}(v_{-jm}) dv_{-jm} \\
& + \varepsilon_{jm}(v_{jm}) + \nu_{jm}^{NR} \\
& \text{s.t. } w_m s_m(v_m) = D_m
\end{aligned}
$$

$$(5\text{-}2)$$

Thus, legislator j chooses to run for reelection if, and only if, the value of running is greater than the value of not running, ie.

$$
d_{jm} = \mathbf{1}[V_{jm}^{R}(X,\theta) \geq V_{jm}^{NR}(X,\theta)]
$$

In conclusion of the model, the timing of events and definition of equilibrium are as follows. First, Nature reveals types $\{\beta_{jm}|j=1,\ldots,J_m, m=1,\ldots M\}$. Second, uncertainty realizes and legislators simultaneously choose whether to vote for or against the change in seats and whether to run for reelection. Finally, election happens and players receive their assigned utilities.

Definition 5.2: Votes $v^* = (v_1^*,\ldots,v_M^*)$ and decisions to run for reelection $d^* = (d_1^*,\ldots,d_M^*)$, in which $v_m^* = (v_1^*,\ldots,v_{J_m}^*)$ and $d_m^* = (d_1^*,\ldots,d_{J_m}^*)$ for every municipality $m = 1,\ldots,M$, constitute a Bayesian Nash Equilibrium if, conditional on (v_{-jm}^*, d_{-jm}^*), the choices (v_{jm}^*, d_{jm}^*) maximize the utility of legislator j in municipality m, for every $j \in J_m$ and $m = 1,\ldots,M$.

6
Estimation

This section deals with the implementation and estimation of the model described in section 5. I need to make a series of new assumptions over specifications and distributions in order to compute numerical solutions for the proposed model.

The first hypothesis necessary for estimating the model is a decision over the functional form for the election probability $p(s_m, X)$. Instead of directly calculating as a function of variables inside the model, I estimate a predictive model with data from the elections of 2004 and 2008 to find each legislator's predicted election probability. This model uses data of all candidates running for election, and not only those who were already incumbents[1]. One key feature of this method is that it remains agnostic about the processes endogenous to the change in seats, eg. entry of new candidates, coalition formation, etc. The drawback is the assumption that all politicians can predict their election probability based on this model. More precisely, I estimate the equation

$$p(elected_{jmt}) = f(1, s_{mt}, X_{1,jmt}, X_{2,mt}) + \epsilon_{jmt} \tag{6-1}$$

in a Linear Probability Model where $elected_{jmt}$ is a dummy taking value 1 if politician j was elected in municipality m in year t, s_{mt} is the number of seats in municipality m in year t, $X_{1,jmt}$ and $X_{2,mt}$ stand for candidate- and municipality-level characteristics, respectively, and ϵ_{jmt} is an i.i.d. shock. The model is saturated because the goal here is to simply obtain precise estimates on election probabilities. Although I include data from every candidate in each election, I include dummies indicating incumbency and other characteristics.

With the estimated coefficients I predict $\hat{p}_{jmt} = \hat{p}(elected_{jmt}|s_{mt}, X_{1,mt}, X_{2,jmt})$ for the year of 2012 with baseline characteristics pre-election. Notice the implicit assumption that reelection probability is uncorrelated to the choice-specific and decision-to-run shocks received by each legislator. In other words, I must assume that politicians receiving higher shocks in equations (5-1) and (5-2) are not also consistently the ones who have higher or lower election probability.

Moreover, the specification chosen for the welfare function is simply a sum of two terms, ie. $Z(s_m, X_{2,m}) = \left[\frac{s_m}{\ln(pop_m)} + disp(s_m)\right]^{-1}$, where $disp(s_m)$ stands for disproportionality in municipality m[2]. This choice is motivated

---

[1]A model with data only from incumbents who tried reelection yields a similar distribution of predicted probabilities.

[2]This variable is defined as in Gallagher (1991). We have $disp(s_m)$ =

by anedoctal evidence on the assemblage of the voting data set, where legislators often discussed matters of representation and disproportionality when deciding how to vote, and on literature discussing what goals electoral systems should try to accomplish (Norris (2004), Htun e Powell Jr. (2013)). Also, this functional form incorporates a concave relationship between seats and population observed in the data[3].

Other simplifying assumptions are necessary. I assume that $\beta_{jm} = \beta$ for every j and m, ie. there is only one type of politician. One possibility would be to allow for two types (a β_L and a β_H) but few explanatory power would be gained while sacrificing simplicity. Also, I assume $C^R \geq 0$, that is, the cost of running for reelection is equal or greater than zero. Furthermore, two types of shocks affect a politician's utility, the choice-specific shock $\varepsilon_{jm}(v_{jm})$ and the decision-to-run shocks $(\nu_{jm}^R, \nu_{jm}^{NR})$. For the first I assume the shocks to be drawn from an i.i.d. Extreme Value distribution with parameters (σ_ε^2) and for the second I assume them to be drawn from an i.i.d. Normal distribution with parameters (σ_ν^2)[4]. The i.i.d. hypotheses for the shocks' distributions are not very strong since municipalities are isolated "markets" and legislators' decisions in one place don't affect others in other municipalities. Thus, the hypotheses are sensible only for decisions intra-municipality. Finally, following Finan e Mazzocco (2013) and the literature on the structural estimation of non-cooperative games (Bajari et al. (2010)), I assume that only one equilibrium is observed in the data.

Given the structure of the model and all the assumptions above, there are 4 parameters to be estimated composing the vector $\theta = (C^R, \beta, \sigma_\varepsilon^2, \sigma_\nu^2)$. The first parameter captures the cost of running for reelection, the second measures the level of altruism for the sample of legislators, and the last two capture the shocks' variances necessary to explain the variation in observed choices apart from the model itself.

$\sqrt{0.5 \sum_{p=1}^{P_m} (\frac{v_{pm}}{v_m} - \frac{s_{pm}}{s_m})^2}$, where $p = 1, \ldots, P_m$ is a party in municipality m and v_{pm} is the number of votes received by party p in municipality m in the last election. Mechanically, this index is decreasing in the number of seats, as the granularity of seats' distribution is increased.

[3]Various other functional forms were experimented and abandoned for different reasons. For instance, since both the levels and the variation patterns differ between the two variables, a natural extension would be to estimate coefficients for each one. However, the optimization algorithm always takes these coefficients to 0 or infinity, given the model linearity in these parameters. A second natural and more agnostic specification would be a quadratic difference between the chosen level of seats and an ideal point, which in turn would be a linear function of observable characteristics with parameters being estimated. This format would be interesting because it would also add concavity to the function, implying an optimal choice. But, again, the parameters are taken to infinity and the optimization doesn't converge.

[4]Location parameters for the two distributions are not identifiable because of the structure of the model.

Finally, following the literature on estimation of structural models of strategic interactions with imperfect information (Haile et al. (2007), Bajari et al. (2010)) and also Finan e Mazzocco (2013), I estimate the model above in a two-step Maximum Simulated Likelihood (MSLE) method. First I estimate beliefs assuming a Probit specification and using variation from the cross-section of legislators in different municipalities. Let K_{jm} be a vector of characteristics for legislator j and municipality m, including the share of votes in the past election, education, competition, etc. Then we have the following functional form

$$
\begin{aligned}
Pr(v_{jm} &= 1|K_{jm}) = \frac{\exp(K_{jm}\phi)}{1+\exp(K_{jm}\phi)} \text{ for } j = 1,\ldots,J \\
Pr(v_{jm} &= 0|K_{jm}) = \frac{1}{1+\exp(K_{jm}\phi)} \text{ for } j = 1,\ldots,J
\end{aligned}
\tag{6-2}
$$

Second, the structural parameters are estimated using the equilibrium conditions in a Maximum Simulated Likelihood Estimation (MSLE) framework. Formally, I calculate

$$
\max_{\theta\in\Theta} \mathcal{L}(\theta) = \max_{\theta\in\Theta} \sum_{m=1}^{M}\sum_{j=1}^{J_m} \ln\left[g_{jm}(v_{jm},d_{jm}|\theta)\right]
\tag{6-3}
$$

where $\theta = (C^R, \beta, \sigma_\varepsilon^2, \sigma_\nu^2)$, $g_{jm}(\cdot)$ is the probability of observing in the data a specific pair of decisions (v_{jm}, d_{jm}) conditional on θ and $\sum_{m=1}^{M} J_m$ is the total number of legislators.

Notice however that the probability $g_{jm}(\cdot)$ may be decomposed into the product of two conditional probability functions

$$
g_{jm}(v_{jm},d_{jm}|\theta) = f_{jm}(v_{jm}|d_{jm},\theta)h_{jm}(d_{jm}|\theta)
$$

where now $h_{jm}(\cdot)$ stands for the probability of running for reelection conditional on the parameters. Therefore the likelihood of a legislator who is running for reelection to choose v_{jm} can be written as:

$$
\mathcal{L}_{jm|R}(\theta) = f_{jm}(v_{jm}|d_{jm}=1,\theta)h_{jm}(d_{jm}=1|\theta)
$$

while the likelihood of a legislator who is not running for reelection to choose v_{jm} can be written as

$$
\mathcal{L}_{jm|NR}(\theta) = f_{jm}(v_{jm}|d_{jm}=0,\theta)h_{jm}(d_{jm}=0|\theta)
$$

Thus, the objective function in equation (6-3) can be rewritten alternatively as

$$\mathcal{L}(\theta) = \sum_{m=1}^{M} \sum_{j=1}^{J_m} d_{jm} \ln \left[\mathcal{L}_{jm|R}(\theta) \right] + (1 - d_{jm}) \ln \left[\mathcal{L}_{jm|NR}(\theta) \right] \qquad (6\text{-}4)$$

This form clears the way for computation in the next section.

The complexity of the model implies that the functional forms of the probabilities are not known, which in turn impedes a direct computation of equation (6-4). Then, again following Finan e Mazzocco (2013), for a given set of parameters, the probability functions are substituted by their empirically simulated counterparts based on simulated values of shocks. The two natural simulators for probability functions of discrete variables are

$$\hat{f}_{jm}(v_{jm}|d_{jm}, \theta) \simeq \sum_{s=1}^{S} \mathbf{1}[v_{jm}^s|d_{jm}^s, \theta] \qquad (6\text{-}5)$$

and

$$\hat{h}_{jm}(d_{jm}|\theta) \simeq \sum_{s=1}^{S} \mathbf{1}[d_{jm}^s|\theta] \qquad (6\text{-}6)$$

where S is the number of simulations, $\mathbf{1}[\cdot]$ represents an indicator function and the superscript s indexes the decision taken at simulation s. Simulation variance is not going to be a problem if the number of simulations is sufficiently high. On the other hand, this choice of simulator has the drawback pointed out by McFadden (1989) that it is not a continuous function of the parameters, thus having poor computational properties. I therefore also approximate the indicator functions with a logit kernel smoother. Formally, let $V_{jm}(v_{jm} = a|d_{jm}, \theta)$ be legislator j's value of choosing vote a conditional on (d_{jm}, θ) and $(V_{jm}^R(\theta), V_{jm}^{NR}(\theta))$ be the values of running and not running for legislator j in municipality m, respectively. Then, given a smoothing parameter ω, we have

$$\mathbf{1}[v_{jm} = a|d_{jm}, \theta] \simeq \frac{\exp\left(\frac{V_{jm}(v_{jm}=a|d_{jm},\theta)}{\omega}\right)}{\sum_{b \in (0,1)} \exp\left(\frac{V_{jm}(v_{jm}=b|d_{jm},\theta)}{\omega}\right)}$$

$$\mathbf{1}[d_{jm} = 1|\theta] \simeq \frac{\exp\left(\frac{V_{jm}^R(\theta)}{\omega}\right)}{\exp\left(\frac{V_{jm}^R(\theta)}{\omega}\right) + \exp\left(\frac{V_{jm}^{NR}(\theta)}{\omega}\right)}$$

$$\mathbf{1}[d_{jm} = 0|\theta] \simeq \frac{\exp\left(\frac{V_{jm}^{NR}(\theta)}{\omega}\right)}{\exp\left(\frac{V_{jm}^R(\theta)}{\omega}\right) + \exp\left(\frac{V_{jm}^{NR}(\theta)}{\omega}\right)}$$

where $a \in (0, 1)$ represents the two possible votes for legislator j in municipality m. In the estimation, I set the smoothing parameter $\omega = 0.05$, a value that adjusted the scale of the other functions and that improved computational efficiency of the estimation. Additionally, the relevant constraints over

parameters are simply that $\beta \in [0,1]$, $C^R \geq 0$ and $(\sigma_\varepsilon^2, \sigma_\nu^2) \geq \mathbf{0}$.

Lastly, I also estimate a simplified version of the model that makes other assumptions together with all described above. In this simplified version legislators only choose whether to vote for or against the altenartive seats' proposition, ie. all legislators behave as if running for reelection. Also legislators don't play a strategic game, ie. their utility functions don't depend on other legislators' decisions and $s_m = v_{jm}$ for each $j \in J_m$ and J_m. Therefore, the model turns into a simple logit discrete choice model and the simplified utility function in it is expressed by

$$U_{jm}(v_{jm}) = (1-\beta)w_{jm}p(v_{jm}, X) + \beta Z(v_{jm}, X_{2,m}) + \varepsilon_{jm}(v_{jm})$$

where $D_{jm} = v_{jm}w_{jm}$ since each legislator chooses as if the council had only one member. Also let $U_{jm}(v_{jm}) = \bar{U}_{jm}(v_{jm}) + \varepsilon_{jm}(v_{jm})$, thus we have

$$\mathcal{L}(\theta) = \sum_{m=1}^{M} \sum_{j=1}^{J_m} \ln\left[f(v_{jm}|\theta)\right] \tag{6-7}$$

where

$$f(v_{jm}|\theta) = Pr(\bar{U}_{jm}(v_{jm}) + \varepsilon_{jm}(v_{jm}) \geq \bar{U}_{jm}(1-v_{jm}) + \varepsilon_{jm}(1-v_{jm}))$$

where, risking notational confusion, the parameters to be estiamted now are simply $\theta = (\beta, \sigma_\varepsilon^2)$. Estimation is carried by MSLE as for equation (6-4).

7
Results

In this section I describe the main results obtained from the estimation of the model described above. I estimate both the simplified and the complete version, and then make some counterfactual analyses using the estimated parameters.

7.1
Parameters Estimates

I start by describing the results obtained for the first stage probit, in which I predict each legislator's probability of voting in favor of the alternative proposal. The results are presented in table A.4. Following the discussion on section 4, we notice characteristics associated with politician's "strength" (in terms of probability of election) predict voting for an increase in seats with the correct signs, while variables associated with competition have the opposite signs. That is, education and rank inside the coalition predict less votes for the alternative, while trying reelection and population size predict legislators voting more in favor of the alternative. On the second stage each legislator will form his beliefs about other legislators' votes based on the predicted probabilities in this table. And, given the strategic nature of the model and the specification assumed for $Z(s_m, X_{2.m})$, one strange result is that Representation doesn't significantly predict the vote choice for legislators. But this doesn't imply that the model should be respecified since the pattern is only statistical.

The parameters estimated using data from the sample of legislators' individual votes are presented in table A.5. For each specification a number of simulations was chosen according to maximum computational capacity available. Column 1 presents the parameters for the simplified version of the model, and column 2 presents the results for the main version. Both models indicate a high value for β, the parameter that captures the weight of social welfare in legislators' utilities, the first 0.89 and the second 0.665. If interpreted as a direct measure of legislators' preferences, it shows that social welfare has more weight than individual payoffs in legislators' decisions. And, in light of the descriptive statistics presented in table A.1, the results are also consistent with the interpretation that legislators weigh social welfare heavily because representation and disproportionality levels are correlated to electoral competition. In other words, the municipalities that needed the largest increase in seats to improve population representation were also the ones with already

larger elections with more candidates per seat. For any of these two reasons, legislators seem to react and incorporate this incentive in their voting decisions.

Among the parameters characterizing the distributions of shocks, since a location parameter is not identifiable, we have simply the variance σ_ε^2 to be 0.2039 for the simplified model and 0.1638 for the full model. This small variance estimate may be due to the low variation in choices according to characteristics as described in figure A.5. And it indicates that little noise is necessary to rationalize the legislators' decisions, ie. it supports a good model fit.

Besides, when accounting for strategic interactions and reelection decisions, the model yields two interesting results. The cost of running for reelection is estimated to 0 while the variance of the shock σ_ν^2 is given by a high value of 16.197. This suggests the model explains poorly the decision to run for reelection, and that this decision is largely uncorrelated to the decision to vote for or against an alternative level of seats.

7.2
Counterfactual Analysis

The results described in the previous section show that the model fits the data well in regard to the voting decision and not so well on running decisions. Next, I use these results to perform counterfactual analyses of different federal policies. For each simulation I have to recalculate the legislators' beliefs since the ones estimated using the observed allocations correspond to the equilibrium that characterizes the data. Then for each counterfactual I use the estimated parameters to find equilibrium beliefs that match these parameters through a fixed-point optimization algorithm.

One question posed in section 1 is what type of policy the federal government should choose when deciding local legislatives' sizes. Depending on legislators' motivations and interests, the government should choose rules with seats' brackets per population size more tight or more permissive. And a related question federal governments would like to answer is what are the optimal sizes of legislatives for legislators. In other words, what is the level of permitted seats after which legislators would stop voting in favor of an increase in seats?

Since it's impossible to empirically experiment with different rules and municipalities, calculating these policy counterfactuals may provide a glimpse into the answers to these questions. To do so, I use the parameters' estimates and the equilibrium beliefs from the model together with variations in alternative proposals to calculate chosen votes and levels of seats. If the upper bound

of seats and alternative proposal for each municipality increased by 30% (with the total upper bound going from 3180 to 4134), then the model yields that legislators choose to go from 2281 to a total of 3997 seats. In terms of proportion, this amounts to 0.926 of the permitted seats, instead of the 0.9088 observed in the data. The proportion of legislators voting for a change goes from the 0.7804 observed in the data to 0.9396. That is, the simulation yields that a significant increase in permitted seats would make it even more attractive for legislators to increase their legislative size.

Several aspects of the model and the estimated parameters may explain the rigid counterfactual results above. First, the model chosen for these calculations is the simplified version, which entails little flexibility and may group various mechanisms into few mechanical channels. Also, votes are binary and the gains from each choice are linear in the parameters.

8
Conclusion

The question of how institutions are chosen is central to a complete characterization of political systems. And this choice must be studied in the framework of modern Political Economy, with politicians modeled as rational forward-looking agents playing strategic games of institutional choice (Benoit (2004)). A particularly relevant institution is local legislative size, and this paper aimed to develop a framework that captures key dimensions of legislators' incentives when given the chance to locally vote an increase in seats.

This paper explored two sequential law changes in Brazil to build and estimate a structural model of local legislative votes. Legislators were supposed to care for individual electoral payoffs and for social welfare defined in representation terms, with an "altruism" parameter regulating the weight given to each term. With a novel data set on individual votes between 2010 and mid-2012, before local elections, I could recover this parameter to be between 0.66 and 0.89. In other words, legislators vote as if taking social considerations more into account than individual motives, which may be counterintuitive in a country such as Brazil where politicians are perceived as pure rent-seekers. Finally, some counterfactual analyses were carried, providing some sensitivity analysis to the estimates and trying to answer key questions for future government policy.

Several issues may be raised in the interpretation of results. For instance, external validity may be low for other Brazilian municipalities with different characteristics, and even lower for other countries with different electoral systems. But the framework used in this paper may be easily adapted to other contexts if local voting behavior is observed. Second, the models estimated may still be too simple, and may not capture key dimensions of legislators' incentives. For example, many councils chose wage levels together with the number of seats, and since I don't have data on individual votes for wages, I cannot discard a bargain mechanism and may have over-estimated altruism parameters. The model also does not take into account outside options of those who didn't run for reelection, agenda power by council presidents, more complex voting decisions for inhabitants that could take into account expectations over future policy, and many other elements.

There are various paths to follow in future work. Expanding the analytical framework could solve some of the rigidity issues raised above. More detailed

data for a larger number of municipalities could increase external validity and improve estimation accuracy. More computational power could clear the way to more complex models with more simulations. And with a related question, one could use expenditures data for 2013 onwards to identify the impact of council size on legislative spending with a novel IV approach not present in the "1/N" literature.

Furthermore, a different approach could be taken over the model adapting the framework of Gerber e Lewis (2004). The voting decisions would be modeled in a setting where legislators have no welfare considerations in their objective functions and voters care for a combination of representation and legislative spending. Within a municipality, the setting would approximate the interests of different municipality's areas. Legislators then would vote, generating different levels of representation of the population groups' median voter interests. Equilibrium legislative votes would be a composition of legislators' individual interests maximizing expected election payoffs with voters' social interests, with discipline being created through electoral competition. The tradeoff faced by each legislator could be modeled as one between reelection probability and *power*[1] once in office.

---

[1] *Power* can be modeled as a generalization of wage levels. For instance, a legislator has more power in a council with fewer competitors because it's less costly to propose, vote and approve bills, and, thus, would strongly prefer a council with fewer seats conditional on her being elected. The wage level approximates power but only too imperfectly.

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A
Appendix

A.1
Figures

Figure A.1: Timeline of Institutional Changes
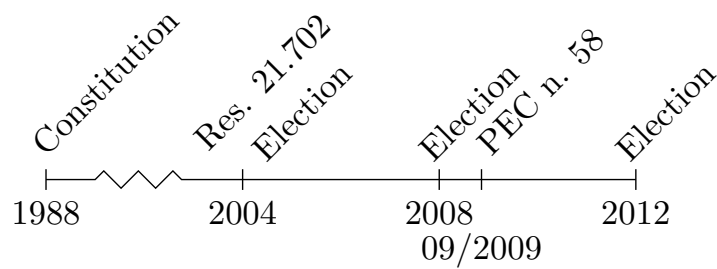
Figure A.2: Population and Council Seats

Notes: Observed seats data taken from TSE's election data. Permitted seats was assembled based on the applicable law's limits for each year. In 2000 it was the Constitution from 1988, in 2004 and 2008 it was the Resolution 21.702 ellaborated by TSE, and in 2012 it was the PEC 58/2009. The number of permitted seats was calculated for each municipality based on its estimated population on year before the election.

Figure A.3: Differences in 2012
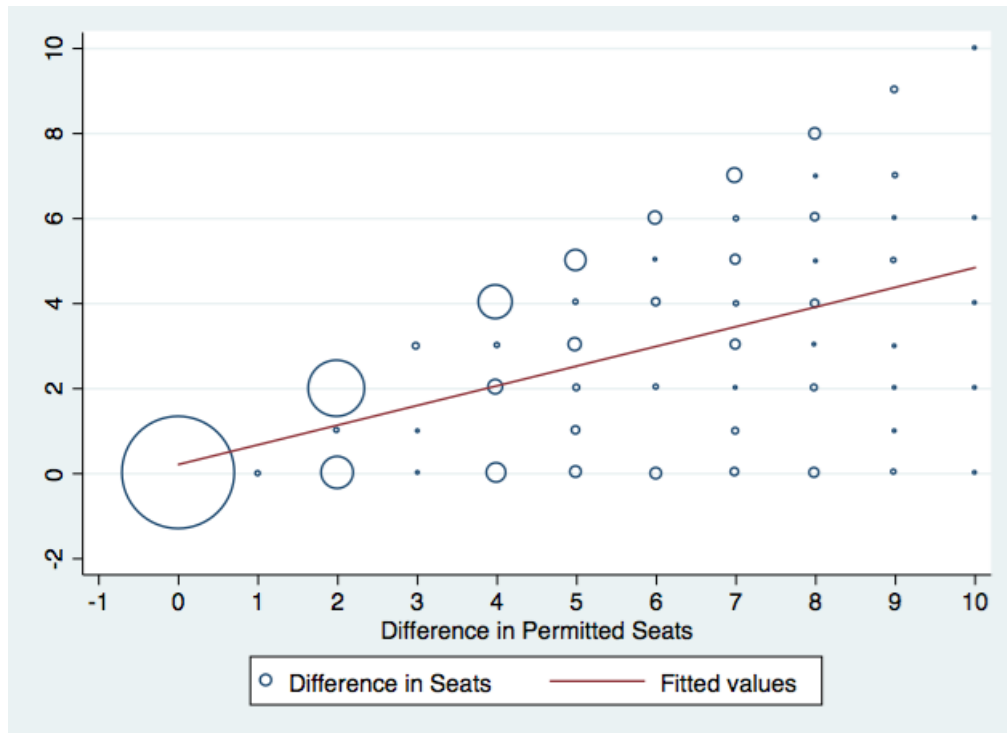
Notes: Difference in seats calculated as the difference observed from 2008 to 2012. Difference in permitted seats calculated as the difference from 2008 to 2012, already accounting for the change of laws.

Figure A.4: Seats Recovery from 2004 to 2012
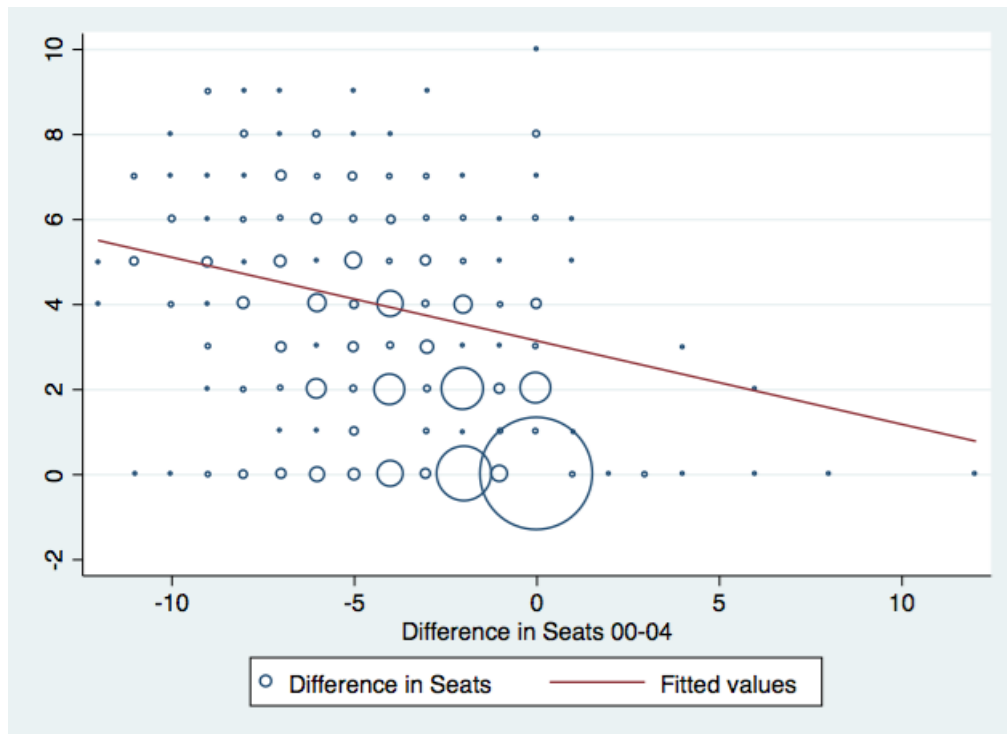
Figure A.5: Reduced-form Evidence
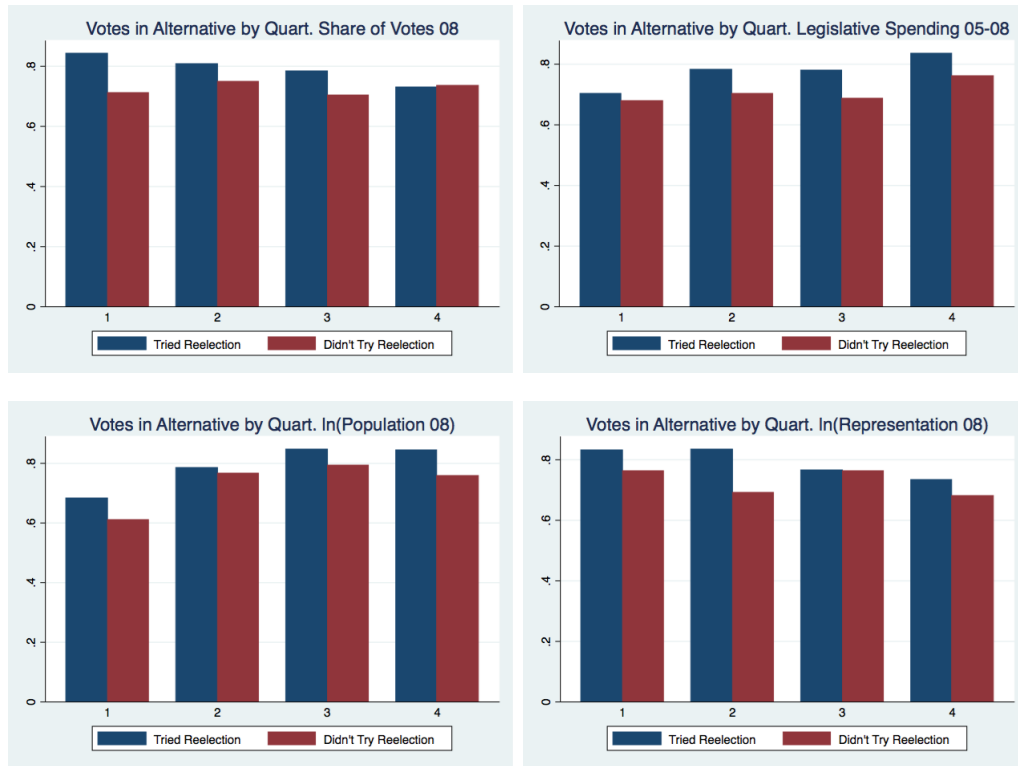
Notes: Each vertical bar represents the share of legislators voting for the alternative levels of seats, given its quartile in each graph and its decision to run for reelection or not.

Figure A.6: A Typical Newspaper Piece

ICNET .COM.BR

Bauru e grande região - Segunda-feira, 9 de março de 2015   máx. 29° / min. 19°   Carregando

17:11

Notícias
- Política
- Economia
- Geral
- Polícia
- Bairros
- Esportes
- Regional
- Cultura
- Nacional
- Internacional
- Eleições 2014

Canais
- Classificados
- Agendinha
- Cinema
- Bauru Pocket

Colunas
- Tribuna do Leitor
- Entrelinhas
- Em Confiança
- Horóscopo

Serviços
- Falecimentos
- JC na escola
- Loterias
- Atendimento JC

Pesquisa
- No JC

21/06/11 03:00 - Política

Câmara define 17 vereadores para 2013

Enfim, os parlamentares decidiram o que já era ampla maioria na Casa de Leis, apontando número ímpar para próxima legislatura

Vinícius Lousada

Compartilhar via Google+   g+1 0   Compartilhar via Facebook

Os vereadores da Câmara Municipal de Bauru finalmente aprovaram a emenda à Lei Orgânica do Município (LOM) que fixa em 17 o número de cadeiras da Casa municipal a partir da próxima legislatura, que será eleita no pleito do ano que vem. A matéria, que tinha a assinatura de 14 parlamentares, contou com o voto favorável de 15 dos 16 vereadores, com exceção de Natalino da Pousada (PV), que não participou da sessão ordinária na tarde de ontem.

Tema que provocou discussões calorosas e embates políticos envolvendo parlamentares e siglas partidárias, o aumento de uma vaga na Câmara para 2013 foi confirmado após manobra realizada na semana passada, na qual vereadores favoráveis ao inchaço do Legislativo articularam com o objetivo de postergar a votação. Na tarde de ontem, porém, o assunto foi pouco debatido pelos vereadores e ganhou espaço na sessão apenas no momento de sua votação.

Paulo Eduardo de Souza (PSB) foi o primeiro a ocupar a tribuna na discussão do projeto e lembrou ter sido favorável ao número de 17 cadeiras para a Câmara Municipal, tendo sido voto vencido nas discussões internas de seu partido, que defendia 21. O vereador, porém, despejou uma série de questionamentos acerca da representatividade do parlamento, relacionando os número de vereadores e de munícipes em Bauru e em outras cidades do Estado de São Paulo.

O vereador citou exemplos de municípios com população bastante inferior à de Bauru, que se igualaram no número de cadeiras do Legislativo municipal, citando a vizinha Jaú. Paulo apontou também que o Núcleo Habitacional Mary Dota tem 35 mil habitantes e nenhum representante na Câmara.

A.2
Tables

Table A.1: Individual-Level Evidence - Split per Votes

	Against		In Favor			
	N	Mean	N	Mean	*Difference*	*P-value*
Population (10th)	499	16.5	1773	30.1	-13.6	0
Literacy Rate	499	.939	1773	.918	.0202	0
Share High School	499	.16	1773	.154	.00576	0
Share Urban Population	499	.91	1773	.909	.00181	.73
Share Male Population	499	.492	1773	.49	.00177	.0032
Household Income per capita	499	1,007	1773	908	99.2	0
Share Households with Piped Water	499	.859	1773	.851	.0077	.278
Share Households with Electricity	499	.984	1773	.978	.00576	0
Share Households with Radio	499	.847	1773	.798	.0485	0
Share Households with Internet	499	.355	1773	.318	.0372	0
Income Fragmentation	499	.778	1773	.758	.0199	0
Racial Fragmentation	499	.428	1773	.487	-.0594	0
Legislative Exp. in Term 05-08, def. (mm)	350	5.72	1304	10.5	-4.8	0
Legislative Share in Term 05-08, def. (mm)	350	.458	1290	.518	-.0594	0
Seats	494	11.8	1741	13.7	-1.91	0
Number of Candidates per Seat	494	11.5	1741	12.7	-1.16	0
Number of Parties per Seat	494	1.5	1741	1.5	.000302	.987
Years of Education	499	13	1773	12.8	.148	.406
Reelection Rate	499	.501	1773	.53	-.0293	.0003
Reelection Rate (on Elected)	499	.371	1773	.406	-.0353	0
Number of Candidates	499	146	1773	191	-44.6	0
Number of Candidates, Party	499	13	1773	14.6	-1.63	.0003
Number of Candidates, Coalition	499	19.4	1773	22.6	-3.23	0
Number of Parties	499	17.2	1773	19	-1.74	0
Number of Coalitions	499	7.96	1773	8.64	-.682	0
Share Valid Votes	499	.839	1773	.836	.00331	.0766
Proposed Seats	499	16.3	1773	18.3	-2.01	0
Permitted Seats 2012	499	17.1	1773	19.6	-2.47	0
Share Votes in Municipality	499	.0286	1773	.0253	.0033	0
Terms in Power	499	.609	1773	.697	-.0873	.0268
Rank in Coalition	499	2.02	1773	1.95	.0722	.243
Tried Reelection	499	.8	1773	.852	-.0521	.005

Notes: *Individual Vote on Proposition* is coded as a dummy variable for whether the legislator voted for the alternative proposal to increase seats. The first set of variables, down to *Racial Fragmentation*, are measured for 2010 in each municipality in the Brazilian 2010 Census. Legislative expenditures are calculated for the 05-08 cycle and deflated with the IPCA index. *Seats* down to the end are variables calculated for the 2008 election. *Reelection Rate* represents the average of municipalities' proportions of incumbents that were reelected. *Reelection Rate (on Elected)* stands for the average of municipalities' proportions of elected candidates that were incumbents.

Table A.2: Descriptive Statistics - Demographics and Elections 2008

	Not In Sample		In Sample			
	N	Mean	N	Mean	*Difference*	*P-value*
Population (10th)	5365	2.86	198	17.6	-14.8	0
Literacy Rate	5365	.837	198	.92	-.0825	0
Share High School	5365	.119	198	.154	-.0352	0
Share Urban Population	5365	.629	198	.896	-.267	0
Share Male Population	5365	.505	198	.492	.0134	0
Household Income per capita	5365	550	198	905	-355	0
Share Households with Piped Water	5365	.675	198	.847	-.172	0
Share Households with Electricity	5365	.959	198	.978	-.019	.0001
Share Households with Radio	5365	.768	198	.811	-.0425	0
Share Households with Internet	5365	.141	198	.316	-.175	0
Income Fragmentation	5365	.683	198	.76	-.0773	0
Racial Fragmentation	5365	.464	198	.468	-.00423	.623
Legislative Exp. in Term 05-08, def. (mm)	5365	.968	198	5.14	-4.17	0
Legislative Share in Term 05-08, def. (mm)	5339	.469	198	.431	.0378	.016
North Region	5367	.0818	198	.0556	.0262	.184
Northeast Region	5367	.329	198	.136	.193	0
Southeast Region	5367	.292	198	.5	-.208	0
Center-West Region	5367	.0837	198	.0859	-.0022	.913
South Region	5367	.213	198	.222	-.00907	.76
Seats	5339	9.24	195	11.8	-2.53	0
Number of Candidates per Seat	5329	5.63	195	11.5	-5.88	0
Number of Parties per Seat	5329	1.15	195	1.54	-.386	0
Years of Education	5357	9.7	198	11.5	-1.83	0
Reelection Rate	5351	.554	198	.517	.0367	.0126
Reelection Rate (on Elected)	5357	.395	198	.391	.00398	.737
Number of Candidates	5357	54.6	198	146	-91.2	0
Number of Candidates, Party	5357	6.99	198	11.4	-4.4	0
Number of Candidates, Coalition	5357	12.9	198	18.9	-5.96	0
Number of Parties	5357	10.7	198	17.6	-6.89	0
Number of Coalitions	5357	4.32	198	7.83	-3.51	0
Share Valid Votes	5357	.874	198	.842	.0328	0

Notes: The first set of variables, down to *Racial Fragmentation*, are measured for 2010 in each municipality in the Brazilian 2010 Census. Legislative expenditures are calculated for the 05-08 cycle and deflated with the IPCA index. *Seats* up to the end are variables calculated for the 2008 election. *Reelection Rate* represents the average of municipalities' proportions of incumbents that were reelected. *Reelection Rate (on Elected)* stands for the average of municipalities' proportions of elected candidates that were incumbents.

Table A.3: Aggregate-Level Evidence

VARIABLES	(1) Changed	(2) Δs^{12}	(3) Ratio	(4) Changed	(5) Δs^{12}	(6) Ratio
Difference in Permitted Seats	0.0367***	0.603***		0.0395***	0.619***	
	(0.00635)	(0.0315)		(0.00674)	(0.0317)	
Individual-Level HH Index	3.390	13.71*	0.214	1.106	4.242	-0.480
	(2.148)	(8.100)	(2.015)	(2.231)	(8.311)	(2.129)
Years of Schooling, Elected	-0.0260***	-0.0327	-0.0123**	-0.0243***	-0.0245	-0.0132**
	(0.00585)	(0.0217)	(0.00535)	(0.00586)	(0.0219)	(0.00549)
Number of Terms, Elected	0.154***	0.505***	0.232***	0.144***	0.485***	0.206***
	(0.0425)	(0.160)	(0.0395)	(0.0424)	(0.160)	(0.0398)
Share of Votes	3.127	-0.0122	3.972	1.709	6.844	-8.074
	(3.214)	(10.83)	(3.086)	(5.679)	(17.47)	(4.999)
Same Party as Mayor	-0.259	-0.631	-0.295*	-0.326**	-0.912*	-0.319**
	(0.161)	(0.500)	(0.158)	(0.160)	(0.501)	(0.158)
Legislative Share Exp.	0.00959*	0.0310	0.00980*	0.0815*	0.263*	0.0879*
	(0.00490)	(0.0206)	(0.00545)	(0.0471)	(0.158)	(0.0510)
Tried Reelection				2.984***	10.76***	2.479***
				(0.570)	(2.052)	(0.556)
Tried Reelection * Share Votes				-42.74***	-187.8***	-4.687
				(13.35)	(50.23)	(11.43)
Tried Reelection * Leg. Share Exp.				-0.576	-1.863	-0.623
				(0.390)	(1.226)	(0.420)
Observations	1,659	1,659	1,659	1,659	1,659	1,659
R-squared	0.053	0.325	0.042	0.067	0.332	0.058
Mean Dep. Var.	0.766	0.0354	0.984	0.766	0.0354	0.984

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Dependent variables are a dummy indicating whether the municipality increased the number of seats from 2008 to 2012, the difference in seats observed and the proportion of seats increased over the maximum increase permitted. Aggregate variables are averages for every legislator in the municipality, when applicable. *Individual-Level HH Index* is the Herfindahl-Hirschmann Index for vote shares of elected politicians. *Legislative Share Exp.* is the proportion of legislative expenditures in a municipality over the upper bound allowed, that varies per municipality.

Table A.4: Probit - Vote on Alternative Proposal

VARIABLES	(1) Coefficients	(2) Marginal Effects
Share Votes in Municipality	-5.797	-1.708
	(3.539)	(1.042)
Rank in Coalition	-0.0698**	-0.0206**
	(0.0284)	(0.00836)
Terms in Power	0.0996**	0.0293**
	(0.0422)	(0.0124)
Tried Reelection	0.167**	0.0493**
	(0.0822)	(0.0242)
Individual-Level HH Index	-12.55	-3.698
	(8.292)	(2.444)
Same Party as Mayor	0.115	0.0338
	(0.0780)	(0.0230)
Years of Education	-0.0171*	-0.00503*
	(0.00919)	(0.00270)
Age in Years	-0.00769**	-0.00226**
	(0.00329)	(0.000969)
ln(Population)	0.281***	0.0827***
	(0.0662)	(0.0195)
ln(Representation)	0.622	0.183
	(0.444)	(0.131)
Legislative Limit in Term 05-08, def. (mm)	0.00390	0.00115
	(0.00374)	(0.00110)
Observations	2,134	2,134

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: Variables calculated for each legislator. All variables calculated for the 2008 election, except *ln(Population)* which is observed in 2011. *Share Votes in Municipality* is the proportion of votes obtained by a legislator in its municipality. *Years of Education* and *Age in Years* are inputed from education level and birth date. *Rank in Coalition* is calculated as the legislator's position in the coalition's rank, according to the Hondt method used by TSE. *Competition HH Index* is the Herfindahl-Hirschmann Index for vote shares of elected politicians. *Same Party as Mayor* is a dummy indicating whether the legislator was of the same party as the elected mayor. *Tried Reelection* is a dummy indicating whether the legislator ran for reelection in the next election, in 2012. *ln(Population)* is simply the ln of population for 2011, one year before the assignment of permitted seats. *ln(Representation)* is the ln of population in 2011 divided by the number of seats. *Legislative Limit* is the calculated deflated upper bound in expenditures for the municipality from 2005 to 2008.

Table A.5: Estimated Parameters

Parameter	Simplified	Full
β	0.8907	0.6657
C^R		0
σ_ε^2	0.2039	0.1638
σ_ν^2		16.1979
Log-Likelihood	-1210.9	-1436.3
Simulations	1000	150
ω	0.05	0.05