

Number of Legislators, Bargaining Costs, and Local Public Goods Provision*

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Job Market Paper

Abstract

What is the effect of the number of legislators on public service provision? Despite the importance of institution designs for young democracies, little is known about the particular features that may help improve welfare. This paper uses a formal model to show how increasing legislature size may affect service provision. I show that changes in bargaining costs depend on whether the additional legislator shares the Executive's party affiliation: More opposition members reduce the Executive's equilibrium public goods provision, while more government-aligned members increase it. I test this theory by exploiting sharp discontinuities in city council size in Brazil. I show that an additional city councilor has a 91% chance of belonging to the mayoral coalition, significantly improving primary school enrollment and infant mortality. To investigate the mechanism, I surveyed former councilors and analyzed 346,553 bills proposed between 2005 and 2008. This paper has implications for the design of representative institutions.

Keywords: Legislature Size; Legislative Bargaining; Local Public Goods Provision; Regression Discontinuity Design; Brazil

JEL Classification Codes: H41; H80; I31; I38

*This paper extends the paper "Legislature Size and Welfare," (<https://osf.io/preprints/socarxiv/8r97e/>) co-authored with Gabriel Cepaluni (UNESP - Brazil). I thank Gabriel Cepaluni for kindly agree to me use our previous results in my Job Market Paper. All the errors and inconsistencies here are my entire responsibility. The materials required to replicate this study are available at <https://github.com/umbertomig/legislators-bargaining-costs>.

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1 Introduction

Legislative institutions are crucial for welfare and service provision in democratic countries. Historically, the division of power and the birth of a representative government placed the legislatures at the center of popular consent. In modern democracies, most countries have assemblies at all levels of government. These institutions affect the information and quality of legislation, check and veto the other political powers, and influence policymaking. Moreover, they also determine taxation, government spending and oversee service provision (Weingast et al. 1981; Weingast and Marshall 1988; North and Weingast 1989; Auriol and Gary-Bobo 2012; Stasavage 2011; Poulsen and Varjao 2018).

Regardless of differences in electoral rules, social composition, and procedures, all legislatures share one feature: more than one representative composes them. Legislature size relates to collective action problems, bargaining between political powers, government spending, and representation, but how these components affect welfare remain understudied (Crain 1979; Weingast et al. 1981; Rogers 2002; Primo and Snyder Jr. 2008; Allen and Stoll 2014). On the one hand, enlarged legislatures may increase government spending and lawmaking, and this could improve some services (Weingast et al. 1981). On the other hand, adding a legislator may increase the number of veto players and broaden the collective action problems, hindering service provision (Tsebelis et al. 2002; Gottlieb and Kosec 2019). Therefore, what is the effect of increasing the legislature size on public service provision?

In this paper, I propose a local legislature size and welfare theory that incorporates two crucial features: Executive leadership and party politics. First, in mayor-council municipalities, mayors tend to be central in the local public service decisions. Mayors have the prerogative in proposing public investments, much as presidents in presidential systems. Second, partisanship is essential at the local level, even in settings where the ideological attachment is weak, such as in most young democracies. Party attachment helps structures political views (Samuels and Zucco Jr 2014), and local-level elites usually belong to different factions and parties. They fight for power in the municipality by controlling various parties and forming distinct pre-electoral coalitions.¹ In most cities, family ties are substitutes for the ideological component, but the most influential local leaders sort themselves in different political groups (Nunes Leal 1977; Ferraz et al. 2020).

This paper incorporates partisanship and mayoral first-move advantage to a Baron and Ferejohn

¹Elite political competition in the local level has also been linked to violence and conflict in Brazil and elsewhere (Hoelscher 2015; Mignozzetti and Sexton 2018).

(1989) bargaining model. Mayors make the initial policy proposal that consists of an investment in public goods provision, a decision to extract rents for personal gains, and a vector of side-transfers for councilors. If they fail to secure majoritarian support from councilors, a reversal stage occurs, where the decision leaves the mayor's office, and councilors then propose the public investments. In this mayor-council bargaining, costs come from the side-transfers required to secure a majority among councilors. I show that in a model without partisan concerns, bargaining costs always increase with larger city council size, lowering public goods provision and rents. However, adding partisanship decreases the bargaining costs when the chances of electing councilors aligned with the mayor are sufficiently high. Lower bargaining costs release funds for mayors to invest in public goods provision. In this case, a larger city council may have more partisan councilors aligned with the mayor, lowering the mayor's bargaining costs and increasing the equilibrium public goods provision.

I test these theoretical predictions by exploiting an exogenous variation in Brazilian city council sizes. In 2004, the judiciary reinterpreted the Constitution, unexpectedly changing the number of city councilors. Before the decision, towns could freely choose their legislature size, but in March 2004, the Superior Electoral Court created population thresholds, adding one councilor for each set of 47,619 inhabitants. Around these cutoffs, the decision represented an exogenous change in city council size, allowing me to investigate the effects of increasing the number of local legislators in Brazil.

Studying 2005 to 2008 Brazilian mayoral term, I find that increasing city council size changed the composition of the mayoral coalition and the number of appointed bureaucrats in the municipality. The extra city councilor had a 91 percent chance of belonging to the mayor's pre-electoral coalition. This enhanced chances of electing a councilor connected with the mayor decreased the bargaining costs for the mayor, freeing investments for public services. Moreover, the number of appointed bureaucrats increased by 104 with the additional councilor. In Brazil, more appointed bureaucrats lead to higher quality workers, better service provision, and more accountability (Toral 2019).

More support for the mayors and more politically appointed bureaucrats correlate with city councilors' service provision expectations and legislation approved in Brazilian municipalities. I surveyed 174 former councilors who served during the 2005-2008 term, and they corroborate that mayors use bureaucratic appointments and granting favors to secure support. As the formal model shows, bargaining with councilors has a resource transfer component. By investigating what

councilors prefer to provide to voters, I find that councilors demand job appointments, as these are helpful for their reelection chances and improve municipal welfare. These findings align with a novel dataset I build with 346,553 laws passed in 63 municipalities within ten thousand inhabitants away from the cutoffs. The legislation in municipalities on the left and on the right-hand side of the cutoffs comprised local public goods. However, municipalities with larger city councils had around 15.0 percent more public goods provision proposals, suggesting an increase in service provision legislation.

Finally, I show that the increase in legislature size significantly impacts municipal education and health care. Increasing the city council size by one legislator lowers infant mortality by 2.01 children per one thousand infants born and reduces postneonatal mortality by 0.90 children per one thousand infants that survived their first 28 days. A larger council size also increased enrollment by 2.58 children in elementary education classrooms without significantly diminish elementary school quality. These services are crucial for welfare and result from an eased bargaining between the mayor and the city council.

This paper contributes to three strands of the literature. First, this paper contributes to a large literature on multilateral bargaining. Repeated models of multilateral bargaining started with Baron and Ferejohn (1989), which extended the bilateral bargaining game proposed by Rubinstein (1982) to more than two players. Several papers followed Baron and Ferejohn (1989), adding endogenous recognition power, changing the size of the required majority, adding partisanship, and testing the predictions of these models in the lab (Calvert and Dietz 2005; Choate et al. 2019; Agranov et al. 2020; Baranski and Morton 2020).² In this paper, I extend the Baron and Ferejohn (1989) model under closed rules, adding the mayor's first move and political partisanship. Partisanship here is different from Choate et al. (2019) since I consider partisan as a zero-sum effect that is positive for politicians aligned with the mayor and negative otherwise. This paper investigates the often overlooked effect of legislature size on the bargaining equilibrium strategies.

Second, this paper contributes to the literature regarding the political and economic effects of larger legislatures. Following the contribution by Weingast et al. (1981), the "law of $1/n$ " posits that larger legislatures increase the legislative pressure for providing targeted public goods to local supporters at the expense of the entire polity (Alptekin et al. 2021). The corollary of the "law of $1/n$ "

²See Eraslan and Evdokimov (2019) for a comprehensive review of the multilateral bargaining and Ray and Vohra (2015) for a review on coalition formation.

is that increasing legislature size should promote excessive public spending.³ In the US metaphor, this would explain significant infrastructure spending in smaller districts. However, the “law of $1/n$ ” literature left aside the public goods provision and welfare. This paper is one of the first papers to study the number of local legislators on welfare. The model provides a theoretical expectation based on the chances of electing a politician aligned with the mayor. The empirical estimates confirm the theoretical predictions, with the additional fact that legislature size has a null effect on expenditures in Brazil.

Finally, it contributes to a growing literature on municipal partisan politics. Most papers in this area estimate the effects of the mayor’s party on political outcomes. For instance, Gerber and Hopkins (2011) and de Benedictis-Kessner and Warshaw (2016) find differences in governance when comparing Democratic and Republican mayors. Specifically about Brazil, Gouvea and Girardi (2021) shows that social policy expenditure increase with left-wing mayors. Frey (2020), using the discontinuities in city council size after the 2009 constitutional amendment that reverted the thresholds I study here, shows that changes in council size lower the support for candidates backed by the municipal mayors. This paper reinforces the view that partisanship matters locally, even in countries with weak ideological linkage.

2 A Theory of Legislature Size, Legislative Bargaining, and Welfare

Several cities in the world are governed by the mayor-council system. In mayor-council cities, the power is divided between a mayor that controls the Executive branch and a city council that supports or sanctions the policies proposed by the mayor. In this setting, consider an strategic interaction between a mayor (M) and $N \geq 3$ city councilors, indexed in $i \in \{1, 2, \dots, N\}$. The mayor has the prerogative of proposing a vector of policies that is voted by the city councilors. The provision of public goods is then a bargain between the mayor and the city council. Policy proposals are a combination of public goods provision g , rents for the mayor r , and a vector of transfer for city councilors \mathbf{x} .

The city council votes the mayor’s proposal, and if councilors accept it, the mayor implements

³Primo and Snyder Jr. (2008) show that legislature size may result in positive or negative expenditures, depending on factors such as the degree that local public goods can exclude non-locals or deadweight costs associated with taxation.

it. Otherwise, a reversal policy takes place. Reversal policy in this context means that the mayor's proposal failed to secure the majority of council votes. The decision process leaves the mayor's office, and it is transferred to the council. The types of reversal policies are crucial for my argument, as it changes the relative strength of the council in their bargaining with the mayor. I investigate two types of reversal policies: a baseline reversal with no parties and a hybrid mechanism with partisan and non-partisan concerns. The differences between these two mechanisms are that the non-partisan councilors only care about rents, while partisan councilors care about both rents and policy.

To govern, the mayor must convince at least half of the city councilors to support her policy proposals. Similar to Bueno De Mesquita et al. (2005), I assume that the selectorate, i. e., the individuals that have a say in the mayor's policy proposals, are the N city councilors. The winning coalition, the minimum number of members that must be convinced to implement the policy, is equal to half of the selectorate $N/2$. City councilors are moved by policy concerns p and transfers received from the mayor or the councilor recognized as the proposer \mathbf{x} . I leave the definition of these transfers open, as this facilitates the relationship with several instruments that mayors can use to pressure city councilors. Transfers may be granting electoral favors, favoring clientelistic brokers, spending in areas that the councilor has political or personal interests, providing portfolio (municipal offices) and public jobs within the municipal bureaucracy, or even campaign contributions and bribes. The use of transfers to affect the councilors' choices generate a bargaining cost of C_G . The bargaining costs vary with the reversal mechanism and the legislature size.

Finally, after learning the bargaining costs, the mayor decides a level of public goods provision (g) and pockets rents (r). Public goods provision helps the mayor to get reelected. Rents are for direct mayor's consumption, and they do not contribute to the mayor's electoral success.⁴ This makes the mayor's expected utility a sum of the gains from rents and the benefits from reelection. Both the utilities from rents $u(\cdot)$ and the probability of reelection $\pi(\cdot)$ are concave functions, meaning that more rents or public goods increase the utility at a decreasing rate. The probability of reelection is multiplied by the benefit from holding office $B_M > 0$. This benefit captures the tangible and intangible gains that the mayor perceives from holding the public office. I assume that the benefits are high enough to rule out an equilibrium with only rents and transfers, which is equivalent to saying that mayors strongly prefer to be reelected. If the mayor's policy proposal is approved, then the expected

⁴This model, similarly to Cowen et al. (1994) and Bueno De Mesquita et al. (2005) combines public goods provision and rent extraction. For a dynamic bargaining model that incorporates transfers to districts and public goods provision, see Battaglini et al. (2012).

utility for the mayor is:

$$\mathbb{E}U(r, g) = u(r) + B_M \pi(g)$$

The policy choices of the mayor are subject to the municipal budget constraint. The municipality has $R > 0$ resources, and cannot run debts, meaning that the budget must be balanced. I also assume that there are enough resources for the mayor to govern.

Let C_G be the bargaining costs. The budget balance constraint requires the offers that the mayor makes to the city councilors to satisfy the following inequality:

$$r + g + C_G \leq R$$

The expected utility for the city councilors depends on the reversal policy. In the baseline non-partisan reversal, when the council rejects the mayor's proposal, a reversal stage starts with resources diminishing by a factor of $\delta \in (0, 1)$ and the selection of one councilor randomly. The selected councilor becomes the new proposer. If her proposal is accepted, it is implemented. If councilors reject the offer again, the budget shrinks by a factor δ , and another city councilor is recognized to propose. The process repeats until a proposal is finally accepted.

After studying the non-partisan baseline, I consider a situation that combines both partisan and non-partisan legislature concerns. Each councilor has a party affiliation. Party affiliations are mutually exclusive, and if a city councilor is aligned with the mayor's party, then she belongs to the government coalition $G \subset \{1, 2, \dots, N\}$. Otherwise, the city councilor belongs to the opposition $O = \{1, 2, \dots, N\} \setminus G$. The mayor's policy generates a political value of $p > 0$ for the councilors, and whether it adds or subtracts from the councilor's utility depends on the party affiliation of the councilor. If councilors reject the mayor's proposal, no public goods are provided ($p = 0$). Moreover, in equilibrium, I assume that city councilors would prefer to receive transfers instead of providing public goods.⁵

The timeline of the strategic interaction is as follows:

1. The mayor learns how many government $|G|$ and opposition $|O|$ legislators were elected.

⁵In the online supplemental materials, I consider a version of the model where public goods provision depends on the party affiliation of the proposer so that it affect choices in any potential history of the game. The equilibrium public goods provision level is even higher than in the model presented here, as city councilors prefer to approve the mayor's proposal than run the risk of an opposition member becoming the proposer.

2. The mayor proposes a policy vector $(r, g, x)_M$.
3. The city council votes the proposal.
 - If the council accepts, the policy is implemented, and the game ends.
 - Otherwise, the reversal policy is implemented.
4. (Reversal Policy) The budget is discounted by a factor $\delta \in (0, 1)$, and one councilor is randomly selected to make an offer. If the offer is accepted, it is implemented. If rejected, the reversal policy stage restart.⁶

The solution concept I use in this model is the Subgame Perfect Nash Equilibrium. A Subgame Perfect Nash Equilibrium requires that the strategies played are a Nash Equilibrium in each of the subgames of the game. The solution is found using backward induction. In the model with infinitely repeated proposals, any strategy can be shown to be a Nash equilibrium. Thus, a natural assumption is to extend the equilibrium concept to require the equilibrium to be stationary. A Stationary Subgame Perfect Equilibrium requires that, at each given point of the game, if a politician accepts an offer at time $k + 1$, she should take the same offer at time k (Rubinstein 1982). Stationarity gives us an objective of finding a proposal that would be accepted at any stage in the game. Applying this reasoning, I can characterize a sequence of offers for each point k in time. For the mayor, the optimal offer is at $k = 0$, representing a no delay in policy implementation. Moreover, I assume that the players play no dominated strategies, even when there is less than sufficient support for implementing the policy.

For the solution to be of general interest, I solve bargaining costs for the expected number of opposition and government-aligned city councilors. This is because the solution for each fixed number of opposition and government councilors is trivial and does not help understand the overall relationship between council size and bargaining costs.

2.1 The Mayor's Decision Stage

Solving the game by backward induction requires us to start with the councilor's strategies. However, for exposure convenience, assume that I solved the game for the councilors and found the equilibrium bargaining costs $C_G(N)$ when there are N city councilors. I now derive the optimal rents (r) and

⁶In section B.1 of the online supplemental materials, I solved three reversal mechanisms. The two in here, plus a mechanism with only political concerns.

public goods provision (g) proposed by the mayor. The mayor benefits from public goods provision, as it increases the chances of her reelection. However, she prefers to invest as minimum as necessary in public goods and extract the remaining resources as political rents. The mayor's objective is to maximize her expected utility, subject to the municipal budget constraint.

$$\begin{aligned} \max_{r,g} \quad & u(r) + B_M \pi(g) \\ \text{s.t.} \quad & r + g + C_G(N) \leq R \end{aligned}$$

In equilibrium, the budget binds, and the first-order condition for an optimal public goods provision makes the marginal benefits to increase rents, in this case, marginal costs of providing the public goods, equal to the marginal benefits of reelection:

$$u'(R - g - C_G(N)) = B_M \pi'(g)$$

The optimal level of public goods provision equates the marginal gains accrued from rents with the marginal benefits from reelection.

Proposition 1. *The provision of public goods increases with legislature size when the bargaining costs decrease with legislature size.*

All proofs are in section B.1 of the online supplemental materials. The proof's intuition involves finding what happens to the mayor's marginal utility when I increase both g and N . As N increases discretely on a complete lattice, I use monotone comparative statics to derive the conditions for increasing differences (Milgrom and Shannon 1994; Ashworth and Bueno de Mesquita 2006). Increasing differences mean that higher N leads to higher equilibrium g .

Proposition 1 provides the first empirical hypothesis to test: *if the bargaining costs decrease when the legislature size increases, then the provision of the public goods increases when the legislature size increase.* Now I study each reversal mechanism to determine the condition under which the bargaining costs decrease when legislature size increases.

2.2 Baseline: Non-Partisan Legislative Bargaining

In the non-partisan reversal, I assume that when the council rejects the mayor's office, a reversal stage starts with the selection of one councilor randomly. This formulation is similar to the closed

rules proposal in Baron and Ferejohn (1989). To find a Stationary Subgame Perfect Nash equilibrium, suppose that there were $k - 1$ rejections, and the game is at the k -th stage. A councilor accepts the proposer's offer if, and only if, to accept the offer at k is better than or equal to wait until the next stage $k + 1$. If the offer is x_i , then:

$$x_i \geq \frac{1}{N} \left[\delta^{k+1} R - \frac{N}{2} x_i \right] + \left[1 - \frac{1}{N} \right] \left[\frac{1}{2} x_i \right]$$

On the left-hand side, I place the offer. On the right-hand side, there are two components. The first is the amount that the councilor i gets when she is the proposer. It is equal to the chance that she is recognized as the proposer times the budget in the next round minus the offers she makes to convince half of the councilors. The second part is the gains if the councilor rejects the current received offer but still gets an offer in the following round. It is equal to the chance that she is not recognized as the proposer times the chance that she receives a transfer times the transfer amount. Note that the offer the councilor makes as the proposer is the same as the offer she wants to receive. This is because the city councilors are exchangeable. The solution is symmetric for all councilors receiving an offer (this means that, without loss of generality, I could have dropped the i in the solution). After some algebra, the offer x_i must be greater than or equal to:

$$x_i \geq \frac{2\delta^{k+1}R}{2N+1} \equiv \underline{x}(k, N)$$

The proposer always offers the minimum required to get the proposal approved. In this case, the offer at any given stage k is going to be equal to $\underline{x}(k, N)$.

Proceeding backwards, at the mayor's proposal stage $k = 0$ the mayor is going to offer $\underline{x}(0, N) = \frac{2\delta R}{2N+1}$ to half of the councilors. In this context, the bargaining costs for the mayor are:

$$C_G(N) = \frac{N}{2} \left[\frac{2\delta R}{2N+1} \right] = \frac{\delta R N}{2N+1}$$

Proposition 2. *In the baseline non-partisan reversal, the bargaining costs always increase when the size of the legislature increases.*

The intuition for the results is that every additional councilor will demand more resources from the mayor. Thus, more councilors represent higher bargaining costs. And if the bargaining costs increase with legislature size, then any increase in public goods provision associated with legislature

size has come from a different mechanism. Below I show that partisanship is the key to understand how larger legislature sizes can increase public goods provision.

2.3 Partisan and Non-Partisan Bargaining

In a reversal mechanism that incorporates partisan and non-partisan motivations, a city councilor aligned with the government favors the mayor's offer if:

$$x_i \geq \frac{2\delta R}{2N+1} - p$$

An opposition politician, on the other hand, favors the mayor's offer if, and only if:

$$x_i \geq \frac{2\delta R}{2N+1} + p$$

I decompose these costs into two components—first, the costs in terms of rents. Second, the costs (or benefits) from political alignment. In this context, the bargaining costs depend on the mayor's offers for councilors in the mayor's coalition versus the mayor's proposals for councilors in the opposition. The ex-ante chance of an opposition member be elected is equal to $1 - \gamma$, and taking the weighted averages, these costs become:

$$C_G(N) = \frac{N}{2} \left(\frac{2\delta R}{2N+1} - p \right) + \left(\frac{N}{2} - \gamma N \right) 2p$$

Proposition 3. *In the reversal mechanism that incorporates partisanship, if $\gamma \geq \frac{1}{p} \left[\frac{1}{(2N+1)(2N+3)} \right] \equiv \underline{\gamma}$, then the bargaining costs decrease when the legislature size increases.*

The intuition for the proof is that as partisanship influences the costs and benefits of legislators, more government-aligned councilors make it cheaper to govern. When the partisan benefit is higher than the additional cost that a legislator generates, adding a councilor will benefit mayors if the councilor has a higher chance of sharing the same party as the mayor. Therefore, a higher probability of electing a legislator aligned with the mayor reverts into lower bargaining costs.

Also, the threshold $\underline{\gamma}$ that captures the probability of electing a politician aligned with the government is decreasing in the political value of the mayor's policy p and the size of the legislature

N . This means that intensive partisanship and larger legislatures make it easier to satisfy the electoral threshold.

2.4 Main Hypotheses

My model provides two empirically testable hypotheses. Consider a municipality with a city council comprised of N legislators. If the city increases the size of the council to $N + 1$. Then, in a partisan setting:

- H1. The bargaining costs decrease with legislature size when the chance of electing a government-aligned legislator is sufficiently high.
- H2. The provision of public goods increases when the bargaining costs decrease with legislature size.

2.5 Competing Hypotheses

In the paper, I show that the provision of education and healthcare improves in Brazil. This is because the chances of electing a city councilor aligned with the mayor are 91%, thanks to the rule of distributing seats adopted in the country.

However, other pathways could explain the nexus between city council size and welfare. First, improvements in representation could cause changes in health care and education. Increasing legislature size without changing the population makes councilors represent fewer people. For example, in a town with 50 thousand voters and ten councilors, each councilor represents five thousand voters. If the same city has eleven councilors, then each councilor represents 4.5 thousand voters. This facilitates the representation of minorities, as they have to gather fewer votes to elect a city councilor. A minority representative can advocate for policies that would improve the welfare of marginalized groups (Pande 2003; Chattopadhyay and Duflo 2004; Chin and Prakash 2011). Diversity could also improve governance in municipalities (Rugh and Trounstein 2011). Moreover, more women in public offices can shift the service provision toward welfare expenditure (Duflo 2012; Brollo and Troiano 2016; Hernández-Nicolás et al. 2018; Funk and Philips 2019). Therefore, an alternative hypothesis to explain the increased service provision is that larger legislatures are improving female and minority representation.⁷

⁷For a description of the barriers faced by non-white politicians in Brazil, see Janusz (2021).

Second, more seats could increase the competitiveness in the election, making politicians provide more services (Arvate 2013). In a political system with around thirty parties and a sample average of almost ten parties in the municipalities I study, candidates per seat can increase exponentially. According to the Brazilian electoral law, each party can sponsor 1.5 times the number of seats as candidates. If a party form a pre-electoral coalition, this number increases to two times the number of seats (Coneglian 2008). An election in a small town, with ten councilors, may end up with 600 candidates: (30 parties) x (two times the number of seats) x (ten seats). Therefore, an alternative hypothesis to explain the increased service provision is that larger council size increase the competitiveness of the election.⁸

Finally, the mayor and the legislature carry out the provision of services. Similar to what happens in firms, an extra employee can increase the firm productivity frontier by improving cooperation and a synergistic output (Alchian and Demsetz 1972; Holmstrom 1982). A similar argument can view the increase in council size as augmenting the public service production capability in the municipality. As the production of the legislature manifests into legislation, an alternative hypothesis to explain the increased service provision is that more laws proposed by the city councilors are being approved.

AH1. The representation of females increases with legislature size, improving public goods provision.

AH2. The representation of non-whites increase with legislature size, improving public goods provision.

AH3. The competitiveness of the election increases with legislature size, improving public goods provision.

AH4. The legislative production increases with legislature size, improving public goods provision.

I show below that hypotheses H1 and H2 hold, while the data falsify the alternative hypotheses AH1 to AH4.

3 Background on the Brazilian Case

In 2004, Brazil comprised 5,560 municipalities. According to the Brazilian Constitution, each city must provide healthcare, primary education, transportation, and infrastructure to its citizens.

⁸Despite the common assumption that competitiveness improve welfare, Boulding and Brown (2014) and Gottlieb and Kosec (2019) can increase budgetary pressure, lower social policy, lead to bargaining inefficiencies.

Municipalities have the authority to enact local laws and collect taxes on housing and services. However, their room for fiscal manipulation is limited. On average, municipal taxes account for only 5% of the local budgets, while mandatory transfers from state and federal governments correspond to the remaining 95%. This reduces the ability of municipal legislators to effectively increase local spending, which makes improvements in local services dependent only on the composition of their local investments.

With regards to their political organization, municipalities have one mayor and one city council. Citizens choose their representatives by direct vote in the same election. Mayors oversee the provision of public services and propose laws and amendments to the tax code. Proposals submitted by the mayor are subject to the approval of the city council. Councilors, in turn, have two primary duties. First, they should discuss and vote on legislation put forward by the mayors or by their peers. Second, they oversee the public budget and sanction mayors who do not comply with fiscal legislation. Councilors and mayors also provide an array of public and personal services for their constituents, such as helping voters access public hospitals, facilitating school enrollment, and even paying their voters' utility bills (Nichter 2011; Lopez and Almeida 2017).

Until 2004, there was no specific regulation on the size of city councils. The 1988 Brazilian Constitution set only broad guidelines about the number of council seats in each municipality, which allowed cities to determine how many legislators they should have in their local chambers. This led to severe imbalances in the proportion of representatives per citizen across the country. For instance, the Nova Russas municipality had 30,009 inhabitants and 21 councilors, accounting for one legislator per 1,429 citizens. In contrast, the city of Sorocaba had only 15 councilors for 528,735 inhabitants, that is, one legislator per 35,249 citizens. In 2003, this malapportionment problem gained national visibility when Mira Estrela, a small municipality with only 2,651 residents, reduced its city council from 11 to 9 seats because of fiscal considerations. The change motivated a legal dispute that reached the Brazilian Supreme Court. The Court favored the city's decision and ruled that the size of every local council should correspond to precise population thresholds.

Following the ruling of the Supreme Court, in March 2004, the Brazilian Electoral Court established a series of population cutoffs for all municipal legislatures. Following the Brazilian Constitution, the Court specified that cities with up to one million residents should have between 9 and 21 legislators. The number of seats was allocated as follows. Each town starts with nine councilors, then adds one

legislator for every 47,619 inhabitants until their councils reach 21 members. This threshold implies that cities with a population between 571,428 and one million should all have the same number of legislators, that is, 21 of them. Conversely, cities between one and four million inhabitants should have at least 33 councilors, and this number increases up to 41 members following the previous formula of one additional legislator per 47,619 inhabitants.

This decision makes Brazil the ideal testing ground for my theory. Although an endogenous decision motivated the Electoral Court ruling, the population cutoffs created sharp discontinuities in the distribution of local council seats. Cities close to the cutoffs had very similar characteristics, but those just above the threshold gained a new legislator. Moreover, cities could not self-select into any group, as their population estimates were calculated using the 2003 projections by the Brazilian Census Bureau (IBGE). This change in council size also happened only seven months before the election, making it impossible for candidates to adjust their service provision strategies for the 2004 election. Therefore, the ruling allows us to study the effect of larger legislatures on public service provision during the 2005-2008 term while holding all else constant.

4 Variables and Data Sources

I use four groups of city-level variables in the models. The first group includes pre-treatment control variables that were not affected by the 2004 council size resolution. I add them to the models to improve the balance between treated and non-treated units. The covariates are: 1) the number of council seats in the previous term; 2) city population; 3) city GDP; 4) the proportion of low-income families in each municipality. The data come from the Superior Electoral Court (Tribunal Superior Eleitoral–TSE) and the 2000 Brazilian census.

Second, I look into municipal data, city councilors' characteristics, approved legislation, and an online survey with 174 former city councilors that served during 2005–2008 term to investigate the political mechanism.⁹ The municipal data contains: 1) the number of councilor's belonging to the mayor's pre-electoral coalition; 2) the number of appointed bureaucrats; 2) the councilor's gender and race; 3) the competitiveness of each city council seat; 4) the proportion of laws proposed by the

⁹I also analyzed 108 structured interviews conducted by Lopez and Almeida (2017) at the Brazilian Economics Planning Institute (IPEA) in 2009. The authors asked councilors about their daily work. The interviews reinforced that the mayor's agenda dominates councilors' work and is partisan without strictly following party lines. Municipal politics is divided into families or poles of power, belonging to different party affiliations. Councilors from other parties gravitate around either of these groups, hence the opposition and government-aligned logic.

city council that was approved. All variables come from the Superior Electoral Court, the Senate legislative support Interlegis, and the Brazilian Bureau of Statistics (IBGE).

Third, I also collected 346,553 bills from cities within ten thousand inhabitants from the 2004 population thresholds. I selected 63 out of 202 municipalities whose voting records were available online. I evaluate proposal types, discriminating between local public goods, oversight, and other legislative activity. Examples of the local public goods are investing in a public health clinic, requesting school bureaucracy to accommodate an extra child, renovating sewage, and fixing potholes on a given street.¹⁰ Oversight bills are accountability and transparency mechanisms meant to keep public services undertaken by the bureaucracy in check. Other legislation comprises bills that do not fit in the previous categories. Examples are changes in street names, motions to honor citizens or groups, and legislative and internal city council procedures. I provide further information about the legislation dataset and the city council survey in sections B.13 and B.14 of the online supplemental materials.

The last set of variables quantify social welfare. The focus is on the impact of legislature size on education and healthcare, which are the two most important public services the municipal government should provide to citizens. I measure access to education with the average enrollment in primary (K–4) municipal public schools. I assess education quality with the Education Development Index ('Índice de Desenvolvimento da Educação Básica–IDEB), which the Ministry of Education has issued biannually since 2007. The index is a weighted average of student scores in Portuguese and Mathematics (0–10) multiplied by the harmonic mean of public school promotion rates in a given year (0–100). To test the effect of the 2004 ruling on healthcare, I collect data on infant mortality per thousand children born and on postneonatal infant mortality, which is the death of infants that survived more than 28 days, but died before completing one year old. The source of all healthcare variables is the Brazilian Ministry of Health Data Center (DataSUS).

Together, this evidence provides a clear picture of local-level politics patterns in Brazil, from the political mechanism to the municipal welfare consequences of the larger city council size ruling. Summary statistics and variable descriptions follow in section B.2 of the online supplemental materials.

¹⁰My theory does not differentiate between clientelism and broad service provision, as it is hard to disentangle differences in the local level legislation. A voter may request a particular service, such as fixing a pothole. Attending this request can be interpreted as a clientelistic practice. Still, the provision of the service generates non-excludable benefits to the adjacent neighborhood.

5 Empirical Strategy

I employ a regression discontinuity design (RDD) using the population thresholds established by the 2004 Superior Electoral Court resolution as treatment indicators. Figure 1 displays the distribution of municipalities within each city council size. These population thresholds remained in effect until 2009 when Congress amended the Brazilian Constitution. This study covers 2005 to 2008, which constitutes the full mayoral and city-council term following the 2004 Brazilian elections.

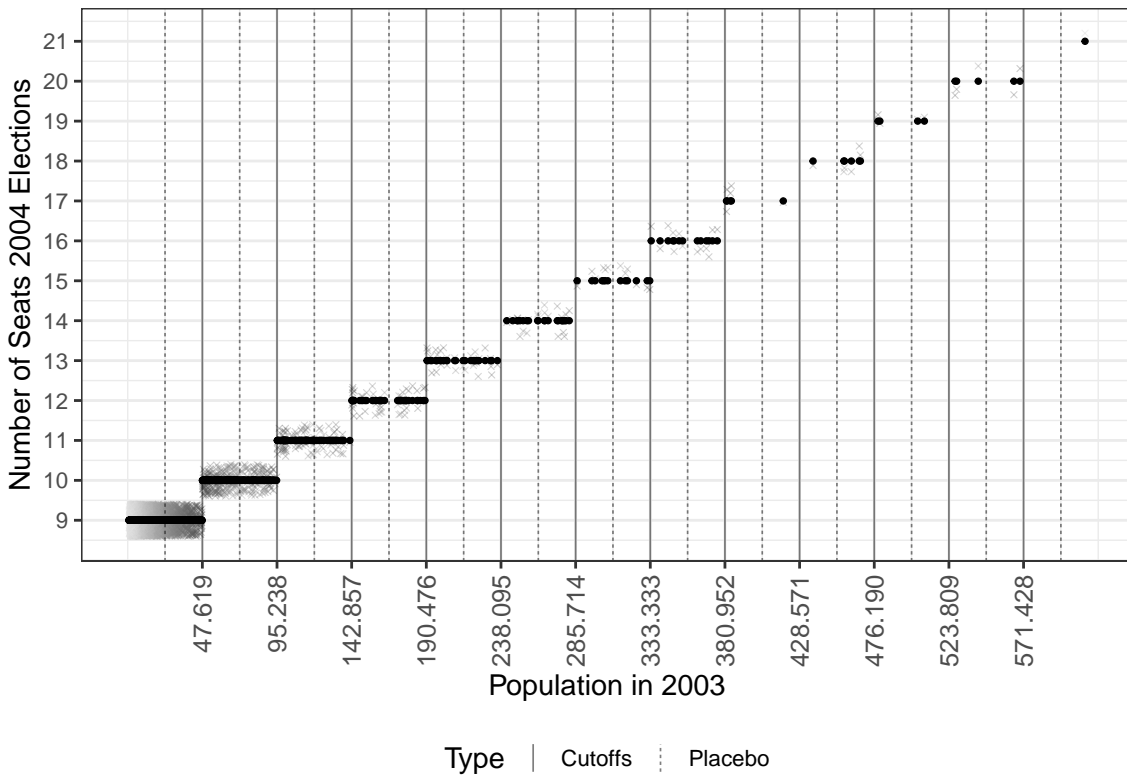


Figure 1: Distribution of Municipalities by Population and City Council Size

My identification strategy relies on three assumptions. First, no municipality should be able to self-select into each side of the discontinuity. Second, as I estimate a sharp RDD, the council size should increase precisely as the law mandates. Third, this design assumes that the pre-treatment variables, collected before the 2003 Supreme Court decision, were not affected by the 2004 ruling on council size. Moreover, for all the actual models estimated here, I fitted placebo cutoffs to check whether the estimation technique leads to consistent results. The placebo cutoffs are the dashed lines in Figure 1.

For the first assumption, in section B.3 of the online supplemental materials, I test distribution

imbalances running the McCrary (2008) and Cattaneo et al. (2019) tests. The tests show no distribution imbalances.

For the second assumption, running RDD in multiple thresholds may lead to inconsistent estimates when there are differences in the distribution of cases around the cutoffs (Cattaneo et al. 2016; Eggers et al. 2018; Bertanha 2020). In the dataset, there are twelve discontinuities. At each threshold, there is a sharp increase of one councilor, from 9 to 21. When running an RDD on these discontinuities, a consistent estimator should fit the exact change of one councilor. However, if I pool all the discontinuities together with no correction, I find an increase in council size of 1.63 councilors (see the first estimate in Table 1). This imbalance is because when combining all the discontinuities, the estimation is implying that municipalities below the 47,619 cutoffs (9 to 10 councilors) are comparable to changes in towns right above the 571,428 cutoffs (20 to 21 council members). That is incorrect because the comparison is inconsistent in council size, and these municipalities diverge in many other aspects.

To avoid this problem, in section B.5 of the online supplemental materials, I show by simulation that adding controls, especially the variables responsible for the multiple threshold assignments (in my case, the population in 2003), improves the consistency and efficiency of the estimates. Relying on this fact, I add five controls to the estimates: population in 2003; GDP per capita; the number of seats in 2000; year; and a dummy for the northeast municipalities. The reason for the first variable is the multiple threshold assignments. I add GDP per capita because wealthier cities tend to have better public services. The number of seats in 2000 intends to control that some municipalities could experience a change provoked by the previous council size, confounding my estimates. The year and the northeast dummies serve to improve efficiency. Adding controls improves efficiency in RDD and also enhances the consistency in the multiple thresholds RDD (Calonico et al. 2019).

For the last assumption, there should be no changes in pre-treatment covariates. These pre-treatment covariates are variables measured before the primary outcomes. As the threshold rule selected by the Brazilian Electoral Court was unpredictable, it should not detect any variation before the thresholds were in place.

Table 1 displays the results of the validity checks. I run the first-stage regressions at the top of the Table, both using and not using the controlling covariates strategy proposed, for both real and placebo cutoffs. At the bottom, I estimate the pre-treatment covariate balance. Furthermore, in the

online supplemental materials, I run placebo checks for all the models using placebo cutoffs within the real ones. The results are in sections B.6 to B.12.

Table 1: Research Design Validity Check

Panel A: Validity Check — Treatment Effect on City Council Size				
	(1)	(2)	(3)	(4)
	Additional Num. Seats 2004 (Without Controls)	Placebo Add. Num. Seats 2004 (Without Controls)	Additional Num. Seats 2004 (With Controls)	Placebo Add. Num. Seats 2004 (With Controls)
LATE	1.63*** (0.51)	-0.31** (0.14)	1.00*** (0.0004)	-0.00 (0.0000)
N Left	5184	4621	5184	4621
N Right	343	906	343	906
Eff N Left	199	638	49	886
Eff N Right	145	385	51	477
BW Loc Poly	8.717	6.700	3.008	8.629
BW Bias	13.620	12.114	5.008	13.466
Panel B: Validity Check — Pre-Treatment Variables				
	(5)	(6)	(7)	(8)
	Number of Seats 2000	Population 2000 Census	GDP 2000 Census	% of Poverty 2000 Census
LATE	0.17 (0.67)	-2057.60 (1926.33)	0.06 (0.18)	-9.72 (6.27)
N Left	5178	5131	5131	5131
N Right	343	343	343	343
Eff N Left	208	219	200	194
Eff N Right	147	157	145	142
BW Loc Poly	8.970	9.368	8.739	8.530
BW Bias	13.860	15.029	14.752	13.035

Note: *** $p < .01$; ** $p < .05$; * $p < .1$. RD local linear estimates using Calonico et al. (2019) optimal bandwidth quadratic selection and triangular kernel. Robust standard errors, clustered at the municipal level, in parentheses. Controls: population, GDP per capita, number of seats in 2000, year, and dummy for northeast region. *N Left* and *N Right* represent the total number of observation in the left and right sides of the thresholds (untreated). *Eff N Left* and *Eff N Right* are the number of cases within the bandwidth. *BW Loc Poly* is the Bandwidth used to compute the Local Average Treatment Effect (LATE). *BW Bias* is the Bandwidth used to compute the standard errors.

Note that without adding covariates, the first stage overestimates the change in the primary treatment and underestimates the effect in the placebo regressions. After adding covariates, the results improve, and the point estimates are now one for the primary model and zero for the placebo regressions, which are the correct values. Moreover, Panel B of Table 1 shows that the pre-treatment covariates remain unchanged around the thresholds. These tests reinforce the validity of my research design.

6 Results

To test the formal model's predictions, I present four sets of empirical results. First, I show that the alternative hypothesis, which emphasizes representation, competitiveness, and legislative productivity, fails to receive empirical support. Second, I show that the bargaining costs hypothesis is confirmed and that the additional legislator also promotes more appointments of bureaucrats. This aligns with the councilor's reported strategies employed by mayors to consolidate their support from city councilors. Third, I show that municipalities with an extra city councilor approve more public goods laws in general and on education and healthcare. Finally, I show that all these pieces of evidence result in improvements in infant mortality and elementary school enrollment, two vital services for welfare.

6.1 Council Size, Bargaining Costs, and Alternative Hypotheses

Table 2 tests the first hypothesis and the alternative hypotheses about the nexus between city council size and bargaining costs. The formal model's central premise is that larger legislature sizes produce lower bargaining costs when the chances to elect politicians aligned with the mayor are sufficiently high. However, the results could stem from different mechanisms, such as minority and female representation, competition, and increased council-sponsored legislative productivity. In Panel A, I counter the alternative explanations, while in Panel B, I present evidence that corroborates my findings.

Table 2: Political Effects of Increasing the Number of Legislators

Panel A: Representation, Competition, and Legislation Approval				
	(1)	(2)	(3)	(4)
	Num. Female councillors	Num. Non-white councillors	Candidates Per Seat	Prop. Laws Approved Council
LATE	0.22 (0.38)	0.60 (0.85)	-0.19 (1.11)	-0.02 (0.08)
N Left	5183	239	5184	3424
N Right	343	158	343	269
Eff N Left	195	47	179	227
Eff N Right	145	47	132	141
BW Loc Poly	8.623	2.958	8.144	10.976
BW Bias	13.565	4.922	12.018	16.708
Panel B: Partisan Alignment and Bureaucratic Appointments				
	(5)	(6)		
	Mayoral Coalition Size	Num. Politically Bureaucrats		
LATE	0.91* (0.50)	104.49* (61.53)		
N Left	5179	15536		
N Right	343	1027		
Eff N Left	244	372		
Eff N Right	162	343		
BW Loc Poly	10.025	6.242		
BW Bias	15.889	10.243		

Note: ***p < .01; **p < .05; *p < .1. RD local linear estimates using Calonico et al. (2014) optimal bandwidth quadratic selection and triangular kernel. Robust standard errors, clustered at the municipal level, in parentheses. Controls: population; GDP per capita; number of seats in 2000; year; and dummy for northeast region. *N Left* and *N Right* represent the total number of observations on the left and right sides of the thresholds (untreated). *Eff N Left* and *Eff N Right* are the number of cases within the bandwidth. *BW Loc Poly* is the Bandwidth used to compute the Local Average Treatment Effect (LATE). *BW Bias* is the Bandwidth used to compute the standard errors.

Panel A (Table 2) tests the hypotheses AH1 to AH4. AH1 and AH2 established that better representation of under-served groups could improve welfare. However, columns (1) and (2) show that neither gender nor representation of non-white legislators significantly increases with changes in city council size. AH3 stated that enhanced competition could improve responsiveness, increasing service provision. Looking at competition per seat in municipalities with larger city councils, Column (3) in Panel A shows a null effect of council size on the competition. Finally, AH4 stated that council-sponsored legislation could be increasing in larger councils. Yet, Column (4) shows that it remains unchanged when there is an increase in council size.

Panel B (Table 2) illustrates the mechanism put forward in the formal model. Column (5) shows a 91% chance of the extra legislator belonging to the mayoral coalition. The model hypothesis stated

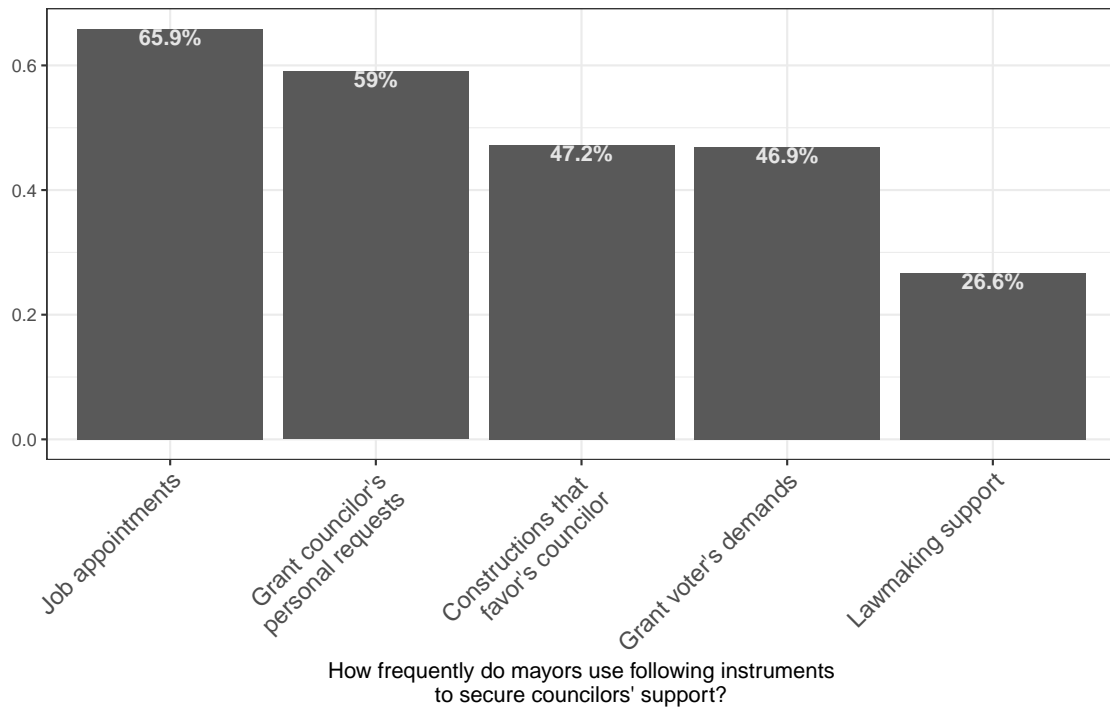
that the probability of electing a city councilor allied with the mayor is sufficiently high. However, sufficiently high can be ambiguous, and it depends on the intensity of the political disagreement and the current legislature size. In any case, 91% chance is a considerably large quantity, and the extra city councilor is going to the mayoral coalition nine in every ten legislature size increases. This strengthens the bargaining position of the mayor and diminishes bargaining costs.¹¹ Column (6) demonstrates that adding one councilor increases appointed employees by around 104 extra employees per additional city councilor. When negotiating with city councilors, these employees are a great bargaining chip, and they are also associated with better service provision.

6.2 Approved Legislation and City Councilor's Survey

To evidence the mechanism's operation, I build two novel datasets. First, I run a survey with former city councilors, asking how the mayor consolidate its coalition support within the city council. Second, I collected 346,553 laws approved in 63 municipalities within ten thousand inhabitants away from the city council size thresholds. I hand-coded 3,466 laws into four categories: public goods, oversight, education and healthcare-related legislation, and other legislative duties. After hand-coding these laws, I used a supporting vector machine to classify the remainder laws. From the algorithms I used, the supporting vector machine performed better than the alternatives.

¹¹The effect of city council size on the number of mayor-aligned politicians stems from the rounding rule adopted by the proportional representation system in Brazil. The rounding rule favors the coalitions with more votes. Most of the time, the coalition of the elected mayor is the one that receives more votes.

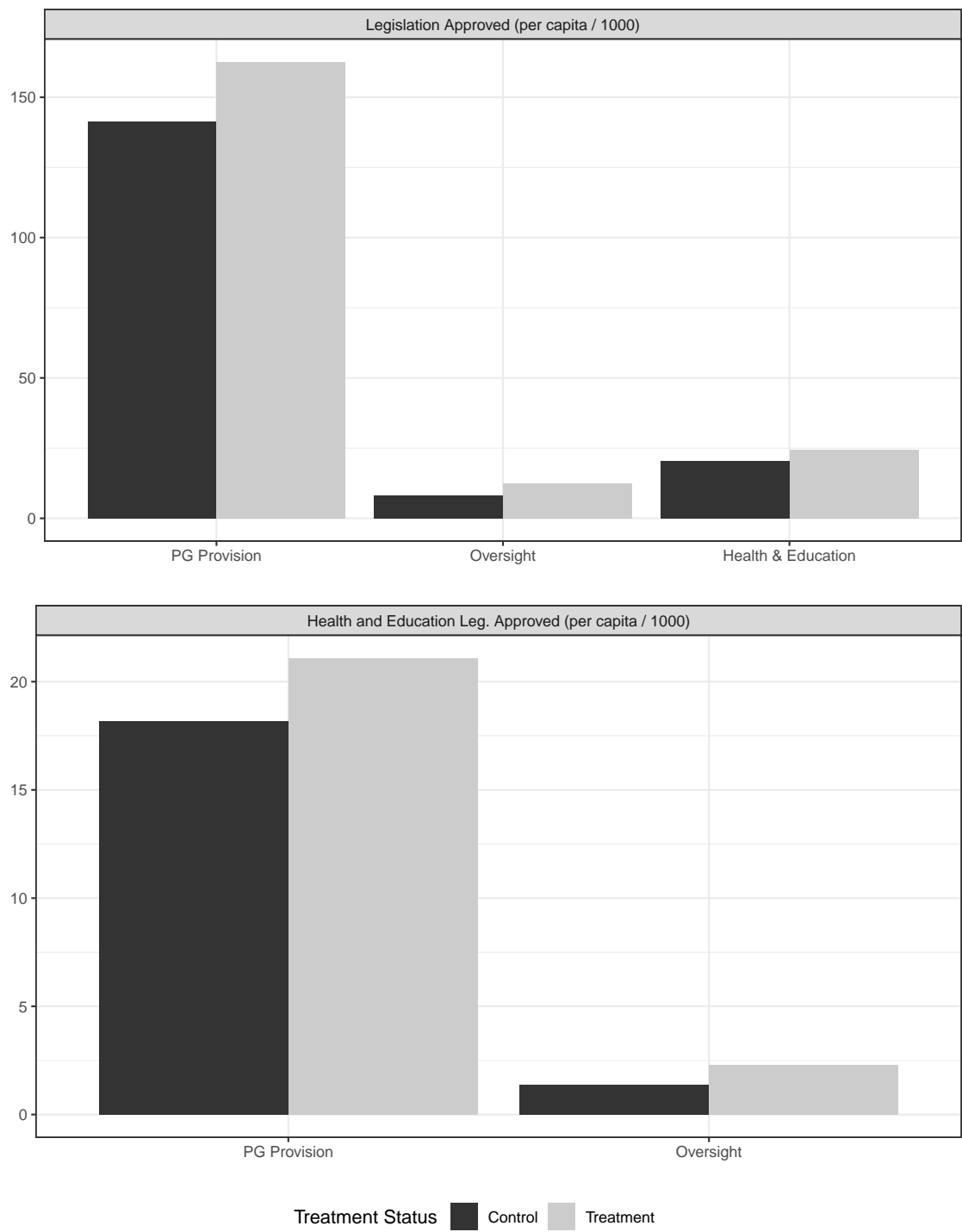
Figure 2: Mayoral Instruments for Securing Councilors' Support



This paper assumes that city councilors want to extract rents and to get reelected. The rents come from their continuation value in the repeated game, and the partisanship discounts them. Figure 2 shows that 65.9 percent of councilors mentioned that mayors use job appointments to consolidate their coalition support. 59.0 percent of the surveyed councilors mentioned that mayors use personal favors, such as shifting resources to places where the councilors have electoral support, to solidify their governing coalition. Granting favors works as rent transfers for councilors. Job appointments are also convenient for the mayors because patronage in Brazil has positive results in terms of welfare (Toral 2019).

I have established in Table 2 column (4) that the quantity of laws approved by councilors remain constant. However, this tells us little about the composition of the legislation in municipalities with larger council sizes. In Figure 3, I show that the per capita amount of laws related to local public goods provision increased in the towns that received the extra legislator, vis-a-vis the baseline of cities that did not get an additional councilor. One additional city councilor increased the amount of per capita public goods laws by 15.0 percent. Also, the number of laws that focus on healthcare and education increased by 19.7 percent. Looking specifically into healthcare and education legislation, the proportion of public goods laws increased by 15.7 percent, showing that the policy proposals of

Figure 3: Legislation Approval Patterns in the Municipalities Closer to the City Council Size Thresholds



the mayor and councilors shifted toward local and citywide public goods.¹²

¹²Public goods here are not restricted to citywide goods. Any service that benefits citizens, regardless of whether they are targeted to citizens or not, is considered public goods. For example, building a health clinic in a particular district can virtually exclude the citizens that are not living in the neighborhood. However, I am still considering these public goods, albeit targeted at a specific locality.

6.3 The Effect of Legislature Size on Welfare

I study the impact of legislature size on education and health care. I collect four indicators: two in education and two in health care.

Table 3: Legislature Size and Welfare

	Council Size and Welfare – Main Estimates			
	(1) Infant Mortality	(2) Postneonatal Mortality	(3) School Enrollment	(4) Education Quality
LATE	-2.01** (0.79)	-0.90* (0.48)	2.52*** (0.80)	-0.03 (0.13)
N Left	12299	5441	10156	8597
N Right	1029	672	686	669
Eff N Left	501	324	206	409
Eff N Right	381	244	208	291
BW Loc Poly	7.527	7.564	5.425	9.05
BW Bias	11.95	11.01	10.58	15.107
	Council Size and Welfare – Placebo Estimates			
	(5) Infant Mortality	(6) Postneonatal Mortality	(7) School Enrollment	(8) Education Quality
LATE	-1.14 (1.05)	-0.19 (0.22)	0.44 (0.61)	-0.10 (0.11)
N Left	10613	17236	9040	7528
N Right	2715	3624	1802	1738
Eff N Left	1210	780	1210	1255
Eff N Right	890	664	728	752
BW Loc Poly	4.838	2.807	6.364	6.873
BW Bias	7.143	8.041	9.68	10.291

Note: ***p < .01; **p < .05; *p < .1. RD local linear estimates using Calonico et al. (2014) optimal bandwidth quadratic selection and triangular kernel. Robust standard errors, clustered at the municipal level, in parentheses. Controls: population; GDP per capita; number of seats in 2000; year; and dummy for northeast region. *N Left* and *N Right* represent the total number of observations on the left and right sides of the thresholds (untreated). *Eff N Left* and *Eff N Right* are the number of cases within the bandwidth. *BW Loc Poly* is the Bandwidth used to compute the Local Average Treatment Effect (LATE). *BW Bias* is the Bandwidth used to compute the standard errors.

Table 3 shows that increasing the city council in one legislator generates welfare improvement in municipalities. In healthcare, increasing legislature size decreases infant mortality in 2.01 deaths per 1,000 children born. This impact is significant in absolute terms and represents an effect of 0.14 in standard deviations. Moreover, postneonatal mortality decreases by 0.90 casualties per 1,000 births, which remains around the 0.14 standard deviations improvement as infant mortality. Infant mortality is a primary outcome for welfare, and it correlates with several other indicators of well-being (Organization et al. 2005). The fact that infant mortality improved in the Brazilian case shows that

the increased mayor's support mechanism results in sizable welfare effects. As expected, placebo regressions were statistically insignificant.

In terms of education, with the addition of a city councilor, enrollment in elementary schools increased by 2.58 children on average per school. This represents a change of around 0.20 standard deviations. Besides the influence of the mayoral support, enrollment can also directly impact the councilor's representation: Councilors can pressure the bureaucracy to accommodate a few extra students. With support from the mayor, they can help voters get access to schools, improving the voter's welfare. The education quality remains unchanged, but with more students in the classroom, it could potentially decrease. As expected, the placebo regressions are insignificant.

7 Discussion

This paper shows that partisanship considerably decreases bargaining costs, improving welfare. The crucial actors in providing public goods are the mayors, but they cannot do it alone. Legislatures are a solid check to the mayor's policy. Bargaining with them in a country plagued by corruption can be costly (Bertholini and Pereira 2017). Therefore, an extra ally in the city council may help ease the bargaining and improve welfare.

Increasing the council size results in gains in elementary school enrollment and decreases infant mortality. Education quality remains unchanged but increasing enrollment without affecting quality should be interpreted as positive. The analysis of the legislation approved shows that the frequency of local public goods legislation increases in municipalities above the council size thresholds. Finally, the city council survey demonstrates that councilors and mayors align regarding appointing more public servants to the public administration.

Ames (2001) argues that the Brazilian democracy is deadlocked because the Executive has its hands tied by a legislature that demand constantly provision of particularistic and private goods. Indeed, the most successful presidents after 1995 had to build multiparty coalitions by negotiating with parties (Limongi and Figueiredo 1998; Raile et al. 2011). Despite evidence that side payments cemented these coalitions, many social and economic policies have been implemented. For instance, education and healthcare improved tremendously during the Cardoso and Lula governments (Acemoglu and Robinson 2012). Of the presidents that defied the coalition system, Rousseff was impeached in her second term. Bolsonaro can be considered one of the most ineffective presidents in Brazilian history.

Municipalities work very similarly in terms of the incentives for legislative-executive bargaining. The stakes are lower, and the negotiations involve only one legislative branch. Still, in a system such as the Brazilian, with more than thirty-five registered parties, mayors have a difficult task in aggregate and consolidate support for their agendas. Having extra help in the council can tilt the bargaining towards cheaper governing, improving public goods provision.

Moreover, this paper is not arguing that these benefits result from the absence of corruption or clientelism. Both the formal model and empirical evidence by Britto and Fiorin (2020) show that corruption increases with legislature size. As the model shows, city councilors receive a side transfer from mayors to support their agenda. Mayors also divide the resources saved in the bargain into public goods and rents. The rate for the division depends on the marginal changes of the rents and public goods, but these two components receive the extra resources. In this case, the mayor's rents may be primarily corruption, and the councilor's transfers can be clientelistic, aimed at improving the councilor's reelection chances.

This paper opens two critical questions for future analysis. First, if the mechanism I claim is at work, more support means better public goods, which brings the question: Why having a city council, if when the city council checks the mayor, public goods provision may decrease? The evidence is inconclusive, and Poulsen and Varjao (2018) show that checks for the mayors also improve service provision. It may be that there is a non-linear effect in the relation between rents and public goods, making after some threshold mayors revert to only rents. Moreover, it could be that after some threshold of support, support is ineffective and even harmful, as it may trigger an intense form of elite capture. This question needs further investigation, and my results suggest that mayors with more support improve welfare. Second, it remains uncertain how other legislative design parameters affect welfare. For example, city councils may vary in size and the monetary compensation for councilors, committee structure, and internal power structure. These components may interact with size and within each other, and understanding how size plays with other features would contribute to building a better theory of how the city council size affects welfare. Both these questions are crucial for institution design and welfare in developing democracies.

References

- Acemoglu, D. and Robinson, J. A. (2012). *Why nations fail: The origins of power, prosperity, and poverty*. Currency.
- Agranov, M., Cotton, C., and Tergiman, C. (2020). Persistence of power: Repeated multilateral bargaining with endogenous agenda setting authority. *Journal of Public Economics*, 184:104126.
- Alchian, A. A. and Demsetz, H. (1972). Production, information costs, and economic organization. *American Economic Review*, 62(5):777–795.
- Allen, G. and Stoll, H. (2014). Representation as a numbers game: The link between legislative size and the representation of minorities and women. Retrieved from <http://www.scpiviii.org/SCPIVIII/Stoll18.pdf>.
- Alptekin, H., Freire, D., Mignozzetti, U., and Roman, C. (2021). The effect of legislature size on public spending: A meta-analysis.
- Ames, B. (2001). *The Deadlock of Democracy in Brazil*. University of Michigan Press, 1 edition.
- Arvate, P. R. (2013). Electoral competition and local government responsiveness in brazil. *World Development*, 43:67–83.
- Ashworth, S. and Bueno de Mesquita, E. (2006). Monotone comparative statics for models of politics. *American Journal of Political Science*, 50(1):214–231.
- Auriol, E. and Gary-Bobo, R. J. (2012). On the optimal number of representatives. *Public Choice*, 153(3-4):419–445.
- Baranski, A. and Morton, R. (2020). The determinants of multilateral bargaining: A comprehensive analysis of baron and ferejohn majoritarian bargaining experiments.
- Baron, D. and Ferejohn, J. (1989). Bargaining in legislatures. *American Political Science Review*, 83(4):1181–1206.
- Battaglini, M., Nunnari, S., and Palfrey, T. R. (2012). Legislative bargaining and the dynamics of public investment. *American Political science review*, 106(2):407–429.

- Bertanha, M. (2020). Regression discontinuity design with many thresholds. *Journal of Econometrics*, 218(1):216–241.
- Bertholini, F. and Pereira, C. (2017). The price of governing: coalition management costs in brazil’s presidential system. *Revista de Administração Pública*, 51:528–550.
- Boulding, C. and Brown, D. S. (2014). Political competition and local social spending: evidence from brazil. *Studies in Comparative International Development*, 49(2):197–216.
- Britto, D. G. and Fiorin, S. (2020). Corruption and legislature size: Evidence from brazil. *European Journal of Political Economy*, 65:101940.
- Brollo, F. and Troiano, U. (2016). What happens when a woman wins an election? evidence from close races in brazil. *Journal of Development Economics*, 122:28–45.
- Bueno De Mesquita, B., Smith, A., Siverson, R. M., and Morrow, J. D. (2005). *The Logic of Political Survival*. MIT Press.
- Calonico, S., Cattaneo, M. D., Farrell, M. H., and Titiunik, R. (2019). Regression discontinuity designs using covariates. *Review of Economics and Statistics*, 101(3):442–451.
- Calonico, S., Cattaneo, M. D., and Titiunik, R. (2014). Robust nonparametric confidence intervals for regression-discontinuity designs. *Econometrica*, 82(6):2295–2326.
- Calvert, R. L. and Dietz, N. (2005). Legislative coalitions in a bargaining model with externalities. In *Social Choice and Strategic Decisions*, pages 227–247. Springer.
- Cattaneo, M. D., Jansson, M., and Ma, X. (2019). Simple local polynomial density estimators. *Journal of the American Statistical Association*, 0(0):1–11.
- Cattaneo, M. D., Titiunik, R., Vazquez-Bare, G., and Keele, L. (2016). Interpreting regression discontinuity designs with multiple cutoffs. *The Journal of Politics*, 78(4):1229–1248.
- Chattopadhyay, R. and Duflo, E. (2004). Women as policy makers: Evidence from a randomized policy experiment in india. *Econometrica*, 72(5):1409–1443.
- Chin, A. and Prakash, N. (2011). The redistributive effects of political reservation for minorities: Evidence from India. *Journal of Development Economics*, 96(2):265–277.

- Choate, T., Weymark, J. A., and Wiseman, A. E. (2019). Partisan strength and legislative bargaining. *Journal of Theoretical Politics*, 31(1):6–45.
- Coneglian, O. (2008). *Lei das Eleições Comentada*. Jurua.
- Cowen, T., Glazer, A., and McMillan, H. (1994). Rent seeking can promote the provision of public goods. *Economics & Politics*, 6(2):131–145.
- Crain, W. M. (1979). Cost and output in the legislative firm. *The Journal of Legal Studies*, 8(3):607–621.
- de Benedictis-Kessner, J. and Warshaw, C. (2016). Mayoral partisanship and municipal fiscal policy. *The Journal of Politics*, 78(4):1124–1138.
- Duflo, E. (2012). Women empowerment and economic development. *Journal of Economic Literature*, 50(4):1051–79.
- Eggers, A. C., Freier, R., Grembi, V., and Nannicini, T. (2018). Regression discontinuity designs based on population thresholds: Pitfalls and solutions. *American Journal of Political Science*, 62(1):210–229.
- Eraslan, H. and Evdokimov, K. S. (2019). Legislative and multilateral bargaining. *Annual Review of Economics*, 11:443–472.
- Ferraz, C., Finan, F., and Martinez-Bravo, M. (2020). Political power, elite control, and long-run development: Evidence from brazil.
- Frey, A. (2020). Larger legislatures and the cost of political brokerage: Evidence from brazil.
- Funk, K. D. and Philips, A. Q. (2019). Representative budgeting: Women mayors and the composition of spending in local governments. *Political Research Quarterly*, 72(1):19–33.
- Gerber, E. R. and Hopkins, D. J. (2011). When mayors matter: estimating the impact of mayoral partisanship on city policy. *American Journal of Political Science*, 55(2):326–339.
- Gottlieb, J. and Kosec, K. (2019). The countervailing effects of competition on public goods provision: When bargaining inefficiencies lead to bad outcomes. *American Political Science Review*, 113(1):88–107.
- Gouvea, R. and Girardi, D. (2021). Partisanship and local fiscal policy: Evidence from brazilian cities. *Journal of Development Economics*, 150:102637.

- Hernández-Nicolás, C. M., Martín-Ugedo, J. F., and Mínguez-Vera, A. (2018). Women mayors and management of spanish councils: An empirical analysis. *Feminist Economics*, 24(1):168–191.
- Hoelscher, K. (2015). Politics and social violence in developing democracies: Theory and evidence from brazil. *Political Geography*, 44:29–39.
- Holmstrom, B. (1982). Moral hazard in teams. *The Bell Journal of Economics*, pages 324–340.
- Janusz, A. (2021). Race and resources in brazilian mayoral elections. *Political Research Quarterly*, page 10659129211032279.
- Limongi, F. and Figueiredo, A. (1998). Bases institucionais do presidencialismo de coalizão. *Lua Nova: revista de cultura e política*, pages 81–106.
- Lopez, F. and Almeida, A. (2017). Legisladores, captadores e assistencialistas: A representação política no nível local. *Revista de Sociologia e Política*, 25(62):157–181.
- McCrary, J. (2008). Manipulation of the running variable in the regression discontinuity design: A density test. *Journal of Econometrics*, 142(2):698–714.
- Mignozzetti, U. and Sexton, R. (2018). Predatory elections: How norms of democracy and the rural economy incentivize electoral violence and fraud.
- Milgrom, P. and Shannon, C. (1994). Monotone comparative statics. *Econometrica*, pages 157–180.
- Nichter, S. (2011). Electoral clientelism or relational clientelism? Healthcare and sterilization in Brazil. SSRN Working Paper. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1919567.
- North, D. C. and Weingast, B. R. (1989). Constitutions and commitment: the evolution of institutions governing public choice in seventeenth-century England. *Journal of Economic History*, 49(4):803–832.
- Nunes Leal, V. (1977). Coronelismo: the municipality and representative government in brazil. *New York: Cambridge UP*.
- Organization, W. H. et al. (2005). *Health and the millennium development goals*. World Health Organization.

- Pande, R. (2003). Can mandated political representation increase policy influence for disadvantaged minorities? theory and evidence from india. *American Economic Review*, 93(4):1132–1151.
- Poulsen, A. and Varjao, C. (2018). Political opposition, legislative oversight, and politician performance: Evidence from brazil.
- Primo, D. and Snyder Jr., J. M. (2008). Distributive politics and the law of 1/n. *The Journal of Politics*, 70(2):477–486.
- Raile, E. D., Pereira, C., and Power, T. J. (2011). The executive toolbox: building legislative support in a multiparty presidential regime. *Political Research Quarterly*, 64(2):323–334.
- Ray, D. and Vohra, R. (2015). Coalition formation. *Handbook of game theory with economic applications*, 4:239–326.
- Rogers, J. R. (2002). Free riding in state legislatures. *Public Choice*, 113(1-2):59–76.
- Rubinstein, A. (1982). Perfect equilibrium in a bargaining model. *Econometrica: Journal of the Econometric Society*, pages 97–109.
- Rugh, J. S. and Trounstein, J. (2011). The provision of local public goods in diverse communities: Analyzing municipal bond elections. *The Journal of Politics*, 73(4):1038–1050.
- Samuels, D. and Zucco Jr, C. (2014). The power of partisanship in brazil: Evidence from survey experiments. *American Journal of Political Science*, 58(1):212–225.
- Stasavage, D. (2011). *States of credit: size, power, and the development of European polities*, volume 35. Princeton University Press.
- Toral, G. (2019). The benefits of patronage: How the political appointment of bureaucrats can enhance their accountability and effectiveness.
- Tsebelis, G. et al. (2002). *Veto players: How political institutions work*. Princeton University Press.
- Weingast, B., Shepsle, K., and Johnsen, C. (1981). The political economy of benefits and costs: A neoclassical approach to distributive politics. *Journal of Political Economy*, 89(4):642–664.
- Weingast, B. R. and Marshall, W. J. (1988). The industrial organization of congress; or, why legislatures, like firms, are not organized as markets. *Journal of Political Economy*, 96(1):132–163.

A Appendix (print)

Online Supplemental Materials Content

In the online appendix we present the following complementary information:

1. A formal model of number of legislators, bargaining costs, and service provision with all proofs.
2. The source of the variables and descriptive statistics.
3. Threshold manipulation and sorting tests.
4. A discussion of the before and after of the Brazilian 2003 city-council-size decision.
5. The identification strategy for the multiple thresholds estimation, where we show how our correction works.
6. The identification strategy for the marginal returns, with simulations.
7. The placebo regressions for the mechanism outcomes.
8. The sensitivity analysis for the bandwidth selection.
9. The sensitivity to the polynomial degree, varying from local linear to quartic.
10. The sensitivity to covariates used in the estimate.
11. The sensitivity to the heterogeneous effects of different Brazilian states.
12. The sensitivity to eliminate one or more cutoffs from the estimation.
13. Further analysis on revenues, transfers, and mayor's characteristics.
14. A description of the bills dataset collected for the 63 municipalities that had this information online.
15. A description of the city councilors' survey.

The Online Appendix can be found here: <https://github.com/umbertomig/legislators-bargaining-costs>.

Replication Materials

The replication materials can be found here: <https://github.com/umbertomig/legislators-bargaining-costs>.