

Legislature Size and Welfare: Evidence from Brazil

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Abstract

How does legislature size impact public service provision? Despite the importance of institutional design for democratic governance, the effect of legislative features on citizen welfare remains little understood. In this paper, we use a formal model to show that increasing legislature size improves public goods delivery. We argue that changes in bargaining costs depend on whether additional legislators share the executive's party affiliation: More opposition members reduce the equilibrium public goods provision, while more government-aligned members increase it. We test this theory by exploiting sharp discontinuities in city council size in Brazil. We show that an additional city councilor has a 91% chance of belonging to the mayoral coalition, and this significantly improves primary school enrollment and infant mortality rates. To explore possible mechanisms, we surveyed 174 former city 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

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1 Introduction

Legislative institutions are crucial for citizen welfare and public service provision in democratic countries. Historically, the separation of powers and the birth of representative governments placed legislatures at the center of the political stage. In modern democracies, most countries have assemblies at all levels of government. These institutions regulate the quantity and the quality of legislation, check and veto other political powers, and influence policymaking. Moreover, legislatures also determine taxation, government spending and oversee public programs (Auriol and Gary-Bobo 2012; North and Weingast 1989; Poulsen and Varjao 2018; Stasavage 2011; Weingast et al. 1981).

Regardless of eventual differences in electoral rules, social composition, and internal procedures, all legislatures share one common feature: They are collective bodies. As such, the number of elected representatives has important consequences for the whole polity. Legislature size is known to have a significant effect on collective action strategies, the bargaining power between state branches, government spending, and representation (Crain 1979; Freire et al. 2021; Gerring and Veenendaal 2020; Primo and Snyder Jr. 2008; Rogers 2002; Weingast et al. 1981). However, how legislature size impacts social welfare remains less understood. On the one hand, enlarged legislatures may reduce political particularism and increase overall government spending, which can lead to more public goods (Gerring and Veenendaal 2020; Gilligan and Matsusaka 2001; Weingast et al. 1981). On the other hand, adding more representatives to a legislature may exacerbate collective action problems, thus hindering service provision (Gottlieb and Kosec 2019; Tsebelis et al. 2002). Therefore, what is the effect of larger legislatures on public service delivery?

In this paper, we propose a theory based on executive leadership and party politics to explain how city council size impacts local public goods provision. First, in mayor-council municipalities, mayors are the main responsible for public service decisions and can boost local public investments by altering the government budget. Second, partisanship plays a key role in city politics, even in countries in which ideological attachment is relatively weak. Party attachment 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 many cities, family ties may be substitutes for the ideological component,

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).

but influential local leaders usually sort themselves into different political groups (Ferraz et al. 2020; Nunes Leal 1977).

This paper incorporates partisanship and mayoral first-move advantage to a Baron and Ferejohn (1989) bargaining model. Mayors make the initial policy proposal, which consists of investments in public goods provision, rents for personal gains, and a vector of side-transfers for councilors. If mayors fail to secure majoritarian support from councilors, a reversal stage occurs, in which the decision leaves the mayor's office and councilors propose the public investments. In this mayor-council bargaining process, costs come from the side-transfers required to secure a majority among councilors. We show that in a model without partisan concerns, bargaining costs always increase with larger city councils, which in turn lower public goods provision and rents. However, partisanship decreases bargaining costs when the chances of electing government-aligned councilors are sufficiently high. Lower bargaining costs release funds for mayors to invest in public goods provision. In this case, a larger city council may add more members to the government coalition, thus reducing the mayor's bargaining costs and increasing the equilibrium public goods provision.

We test these theoretical predictions by exploiting exogenous variation in city council size in Brazil. In 2004, the judiciary reinterpreted the Brazilian Constitution and unexpectedly changed the number of councilors in several municipalities. Until then, cities could freely determine their legislature size, but in March 2004 the Supreme Electoral Court created population thresholds and added one councilor to each set of 47,619 inhabitants. Around these cutoffs, the decision represented an exogenous change in city council size, allowing us to investigate the effects of increasing the number of local legislators in Brazil.

We find that larger city councils changed the composition of mayoral coalitions 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. With a larger coalition, mayors face lower bargaining costs and are able to boost public investments with fewer constraints. Each additional legislator also leads to 104 new appointed bureaucrats, and research shows that political appointees civil servants improve public service provision and enhance accountability in Brazil (Torralba 2019).

To provide further evidence for our mechanisms, we surveyed 174 former councilors who served during the 2005-2008 term, the period we analyse in this paper. They confirm that mayors indeed use bureaucratic appointments and political favors to secure legislative support. As our formal

model shows, bargaining with councilors requires offering transfers to the representatives. By asking councilors what they would like to provide to voters, we find that councilors mainly demand job appointments, which are regarded as an effective means to boost their reelection prospects and improve municipal welfare. These findings are in line with quantitative results from a novel dataset we built with 346,553 laws passed in 63 municipalities within ten thousand inhabitants away from the cutoffs. While all municipalities mention public goods in their legislation, those with larger city councils have 15 percent more proposals about public service delivery, which is consistent with our argument.

Finally, we 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 who survived their first 28 days. Larger councils also increase enrollment by 2.58 children in elementary education classrooms without reducing school quality. These services are crucial for citizen welfare and result from eased bargaining between the mayor and the city council.

This paper contributes to four strands of the literature. First, this paper dialogues with a large literature on multilateral bargaining. Repeated models of multilateral bargaining started with Baron and Ferejohn (1989), who extended the bilateral bargaining game proposed by Rubinstein (1982) to more than two players. Several papers followed Baron and Ferejohn (1989) and included endogenous recognition power, the size of the required majority, and partisanship in the model (Agranov et al. 2020; Baranski and Morton 2020; Calvert and Dietz 2005; Choate et al. 2019).² In this article, we extend the Baron and Ferejohn (1989) model under closed rules and add the mayor's first move and political partisanship. We consider partisanship as a zero-sum effect that is positive for politicians aligned with the mayor and negative otherwise. We investigate the often overlooked effect of legislature size on the bargaining equilibrium strategies.

Second, this paper contributes to the literature on the effects of larger legislatures in service provision. Following the seminal 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 (Freire et al. 2021). This question has become more relevant since legislature size has increased consistently over time (Gerring and Veenendaal 2020). The

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

corollary of the “law of $1/n$ ” is that increasing legislature size promotes excessive public spending, regardless of the partisan makeup of the legislature (Gilligan and Matsusaka 2001).³ In the US metaphor, this would explain significant infrastructure spending in smaller districts. However, the “law of $1/n$ ” literature rarely mentions the relationship between public goods provision and welfare. This paper is one of the first to study how the number of local legislators affects welfare. Our model provides a theoretical expectation based on the chances of electing a politician aligned with the mayor. The empirical estimates confirm our theoretical predictions, with the additional fact that legislature size has a null effect on expenditures in Brazil.

Third, our article also contributes to the growing literature on municipal partisan politics. Most papers in this field estimate the effects of the mayor’s party on political outcomes. For instance, de Benedictis-Kessner and Warshaw (2016) and Gerber and Hopkins (2011) 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 (2021), using discontinuities in city council size after the 2009 constitutional amendment that reverted the thresholds we study here, shows that changes in council size lower the support for candidates backed by the municipal mayors. Our paper reinforces the view that partisanship matters locally, even in countries with weak ideological linkage.

Finally, this paper contributes to the literature on the causes and effects of legislature sizes. While most papers on legislature size analyse the trade-off between representation and efficiency (Frederick 2008; Jacobs and Otjes 2015; Muzzio and Tompkins 1989; Stigler 1976), recent articles have explored the effects of legislature size on lawmaking and partisanship in further detail. Kirkland (2014) shows that larger legislatures make it harder for politicians to know and collaborate with each other, so they rely more heavily on party cues and committee structures. In considering the causes of changes in legislature sizes, Jacobs and Otjes (2015) show that population shifts increase and economic crises decrease the number of legislators. Marland (2019) questions the economic crises mechanism, showing that political elites shrink legislatures mostly to signal to the public the priority of their austerity agenda. In this article, we show that council size affects welfare by changing the partisan composition of the legislatures.

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.

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

Institutional design has a major impact on long-term welfare (Acemoglu and Robinson 2012; Bueno De Mesquita et al. 2005; North and Weingast 1989) and democratic consolidation (Gandhi 2019; Lijphart and Waisman 2018). One particular problem that all polities face is how to determine the optimal size of their legislative bodies. The literature on this topic is extensive, and modern attempts to provide a solution to the legislature size problem started in the early eighteenth century with the Federalists versus Anti-Federalists debates (Muzzio and Tompkins 1989; Stigler 1976).

The literature on legislature size highlights that the number of legislators causes tension between representation and efficiency (Frederick 2008; Jacobs and Otjes 2015; Muzzio and Tompkins 1989; Rush 2013; Stigler 1976; Taagepera 1972). Larger legislatures improve representation as both the election thresholds and the ratio of population-per-politician decrease, which facilitate the electoral success of ethnic and political minorities (Allen and Stoll 2014; Gerring and Veenendaal 2020). However, better representation is often countered by the decline in efficiency in larger legislatures (Weingast et al. 1981). The enlarged size makes it harder for members to coordinate and collaborate without partisanship and legislative structures (Kirkland 2014; Rush 2013). It also increases the potential number of veto players, decreasing policymaking efficiency (Tsebelis et al. 2002). Balancing these two incentives is crucial for the optimal legislative composition (Auriol and Gary-Bobo 2012; Taagepera 1972).

This literature has often overlooked two important questions. First, does legislature size matter in contexts where legislative bodies are not the pivotal decision-maker? And second, what is the ultimate effect of legislature size on welfare? These gaps are likely generated by the predominance of the “law of 1/n” scholarship in political economy debates, which focus mainly on the relationship between legislature size and overspending. Since Weingast et al. (1981), 30 papers have systematically tested the effects of legislature size on government expenditures (Freire et al. 2021). Of these papers, only Lewis (2019) investigates its effects on welfare, showing that larger legislatures have a negative welfare effect.⁴ Frey (2021) analyzes the Brazilian case after the 2009 legislature size change and finds

⁴Koppel (2004) also shows, using a repeated game where the proposal prerogative rotates in a legislature, that larger legislatures increase the chances of non-cooperative outcomes, lowering public goods provision.

a null effect in service provision from 2012 to 2016. Yet, Gilligan and Matsusaka (2001) find that in the US legislature size is associated primarily with higher spending on geographically concentrated benefits, such as education and highways. These results suggest that the legislature size and welfare nexus needs a dedicated theoretical and empirical assessment.

Despite the importance of legislatures, the executive still dominates the public debate on public service provision in most mayor-council (or presidential) systems. For instance, while in 2021 the New York Times cited Mayor Bill De Blasio 2,084 times, it mentioned the 49 seating city councilors only 440 times in the same year. When we expand the search for the past five years, we see that De Blasio was mentioned 8,978 times while the 49 seating city councilors were mentioned only 2,046 times.⁵ On average, the mayor was cited four times more often than all the city councilors combined. This executive dominance has implications for policymaking, as coalitions and affinity with the executive are going to be crucial for service provision (Bueno De Mesquita et al. 2005).

2.1 Model Setup

In a mayor-council setting, consider a 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 on which city councilors vote. 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 proposal is implemented. 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 then leaves the mayor's office and is transferred to the council. The types of reversal policies are crucial for our argument, as they change the relative strength of the council when legislators bargain with the mayor. We 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.

The mayor must convince at least half of the city councilors to support her policy proposals.

⁵We computed these figures using the Dow Jones Factiva Database in November 2021.

Similar to Bueno De Mesquita et al. (2005), we assume that the selectorate, that is, the individuals who 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 motivated by policy concerns p and transfers received from the mayor or the councilor nominated as the proposer \mathbf{x} . We leave the definition of these transfers open, as this allows us to analyze how mayors combine transfers with other incentives to pressure city councilors. Examples of transfers are granting electoral favors, funding 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 giving campaign contributions and bribes. The use of transfers to influence the councilors' choices generate a bargaining cost of C_G . Bargaining costs vary according to the reversal mechanism and the size of the legislature.

Finally, after learning the bargaining costs, the mayor provides a level of public goods provision g and pockets rents r . Public goods provision helps the mayor to get reelected. Rents are for the mayor's direct consumption and do not contribute to the mayor's electoral success.⁶ 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 receives from holding the public office. We 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 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 municipal budget constraints. The municipality has $R > 0$ resources and cannot run debts, meaning that the budget must be balanced. We also assume that there are enough resources for the mayor to govern.

Let C_G be the bargaining costs. The budget balance constraint requires that the offers the mayor

⁶This model, similar 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).

makes to the city councilors must satisfy the following inequality:

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

The expected utility for the city councilors depends on the type of 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 random selection of one councilor. The selected councilor becomes the next proposer. If the new proposal is accepted, it is implemented. If councilors reject the offer again, the budget shrinks by δ and another city councilor is nominated to propose. The process repeats until a proposal is finally accepted.

We now 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.⁷ If councilors reject the mayor's proposal, no public goods are provided ($p = 0$). Moreover, in equilibrium, we assume that city councilors would prefer to receive transfers instead of providing public goods.⁸

The timeline of the strategic interaction is as follows:

1. The mayor learns how many government $|G|$ and opposition $|O|$ legislators were elected.
2. The mayor proposes a policy vector $(r, g, x)_M$.
3. The city council votes the proposal.
 - If the council accepts the proposal, the policy is implemented and the game ends.

⁷One example of partisan benefits is that, as the mayor shares partisan ties with members of the government coalition, a fraction of the public goods provision can be claimed by councilors as their contribution. We propose an extension in the Online Supplementary Materials, which assumes $p = \phi g$, where ϕ is the fraction of the public goods provision that can be credit claimed by the city councilor aligned with the mayor.

⁸In the Online Supplementary Materials, we consider a version of the model in which public goods provision depends on the party affiliation of the proposer so that it affects choices in any potential history of the game. In equilibrium, the level of public goods provision 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.

- 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 restarts.⁹

The solution concept we use in this model is the subgame perfect Nash equilibrium. This game requires that the strategies follow a Nash equilibrium in each subgame. We find the solution 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 a method to find a proposal that would be accepted at any stage of the game. Hence, we 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. We assume that players have no dominated strategies, even when there is insufficient support for the policy.

For the solution to be of general interest, we solve the 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 does not help us understand the overall relationship between council size and bargaining costs.

2.2 The Mayor's Decision Stage

Solving the game by backward induction requires us to start with the councilors' strategies. To conserve space, assume that we solved the game for the councilors and found the equilibrium bargaining costs $C_G(N)$ when there are N city councilors. We now derive the optimal rents (r) and 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.

⁹In section A.1 of the Supplementary Materials, we solve three reversal mechanisms. We include the two mechanisms we present here, plus a third mechanism with only political concerns.

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

In equilibrium, the budget binds, and the first-order condition for optimal public goods provision indicates that the marginal costs of providing public goods is 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. *Public goods provision increases with legislature size if bargaining costs decrease with legislature size.*

All proofs are in section A.1 of the Supplementary Materials. The proof's intuition involves finding what happens to the mayor's marginal utility when we increase both g and N . As N increases discretely on a complete lattice, we 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 our first empirically testable hypothesis: *if bargaining costs decrease when legislature size increases, then public goods provision increases when legislature size increases*. Now we study each reversal mechanism to determine the condition under which the bargaining costs decrease when legislature size increases.

2.3 Baseline: Non-Partisan Legislative Bargaining

In the non-partisan reversal mechanism, we assume that when the council rejects the mayor's office, a reversal stage starts with the random selection of one councilor. 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:

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

We place the offer on the left-hand side. There are two components on the right-hand side. 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 represents 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, we 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, bargaining costs always increase when legislature size increases.*

The intuition for the results is that every additional councilor demands 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 we demonstrate that partisanship is the key to understand how this relationship works.

2.4 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:

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

We 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 her coalition versus the mayor's proposals for councilors in the opposition. As the ex-ante chance of an opposition member being elected is equal to $1 - \gamma$, after 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 bargaining costs decrease when 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 easier for the mayor 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 government supporter decreases along with the political value of 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.

2.5 Main Hypotheses

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

H1. Bargaining costs decrease with legislature size when the chances of electing a government partisan are sufficiently high.

H2. Public goods provision increases if bargaining costs decrease with legislature size.

3 Background on the Brazilian Case

In 2004, Brazil comprised 5,560 municipalities. According to the Brazilian Constitution, each city must provide health care, primary education, transportation, and infrastructure to its citizens. 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 (Lopez and Almeida 2017; Nichter 2011).

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, allowing cities to determine how many legislators their local chambers should have. This led to

severe imbalances in the representation ratio across the country. For instance, the Nova Russas municipality had 30,009 inhabitants and 21 councilors, or 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 Supreme 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.

Brazil also adopts a unique formula to allocate seats, which combines the Hare quota and the D'Hondt method and strongly favors larger parties (Nicolau 2015). This poses a major obstacle for small parties to reach the electoral quorum, so they often join party coalitions to improve their chances of winning legislative seats (Ames 2001, p. 68). In Brazil, mayors are usually members of the largest coalitions (Poulsen and Varjao 2018), thus there is an incentive for candidates to side with the mayor before and after the election.

These factors make Brazil the ideal testing ground for our 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

We use four groups of city-level variables in our models. The first group includes pre-treatment control variables that were not affected by the 2004 council size resolution. We add them to the estimates 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 Supreme Electoral Court and the 2000 Brazilian census.

Second, we 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 potential political mechanisms.¹⁰ 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 city council that was approved. All variables come from the Supreme Electoral Court, the Senate legislative support Interlegis, and the Brazilian Bureau of Statistics.

Third, we collected 346,553 bills from cities within ten thousand inhabitants from the 2004 population thresholds. We selected 63 out of 202 municipalities whose voting records were available online. We evaluated 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 staff to accommodate an extra child, renovating sewage, and fixing potholes on a given street.¹¹ Oversight bills are accountability and transparency mechanisms meant to keep public

¹⁰We 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 it is partisan without strictly following party lines. Municipal politics is divided into families or powerful groups that belong to different party affiliations. Councilors from other parties gravitate around these groups, hence the opposition and government-aligned logic.

¹¹Our 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.

services provision in check. Other legislation comprises bills that do not fit in the previous categories, such as changes in street names, motions to honor citizens or groups, and legislative and internal city council procedures. We provide further information about the legislation dataset and the city council survey in sections A.13 and A.14 of the Supplementary Materials.

The last set of variables quantifies social welfare. Our focus is on the impact of legislature size on education and health care, which are the two most important public services the municipal government should provide to citizens. According to the Brazilian Constitution, municipalities must spend 25% of their budget on education and 15% on health care. Consequently, the Ministry of Health and the Ministry of Education provide readily available, fine-grained data on health care and education at the municipal level, which we leverage in this study. We measure access to education with the average enrollment in primary (K–4) municipal public schools. We 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 health care, we collect data on infant mortality per thousand children born and on postneonatal infant mortality, which is the death of infants who survived more than 28 days, but died before reaching one year of age. The source of all health care variables is the Brazilian Ministry of Health Data Center (DataSUS).

Together, this evidence provides a clear picture of local-level politics in Brazil, from the political mechanism to the municipal welfare consequences of the council size ruling. Summary statistics and variable descriptions are available in section A.2 of the Supplementary Materials.

5 Empirical Strategy

We employ a regression discontinuity design (RDD) using the population thresholds established by the 2004 Supreme 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.

Our identification strategy relies on three assumptions. First, no municipality should be able to self-select into each side of the discontinuity. Second, as we 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 Federal Court decision, were not affected by the 2004 ruling on council size. Moreover, for all the actual models estimated here, we fitted placebo cutoffs to check whether the estimation technique leads to consistent results. The placebo cutoffs are the dashed lines in Figure 1.

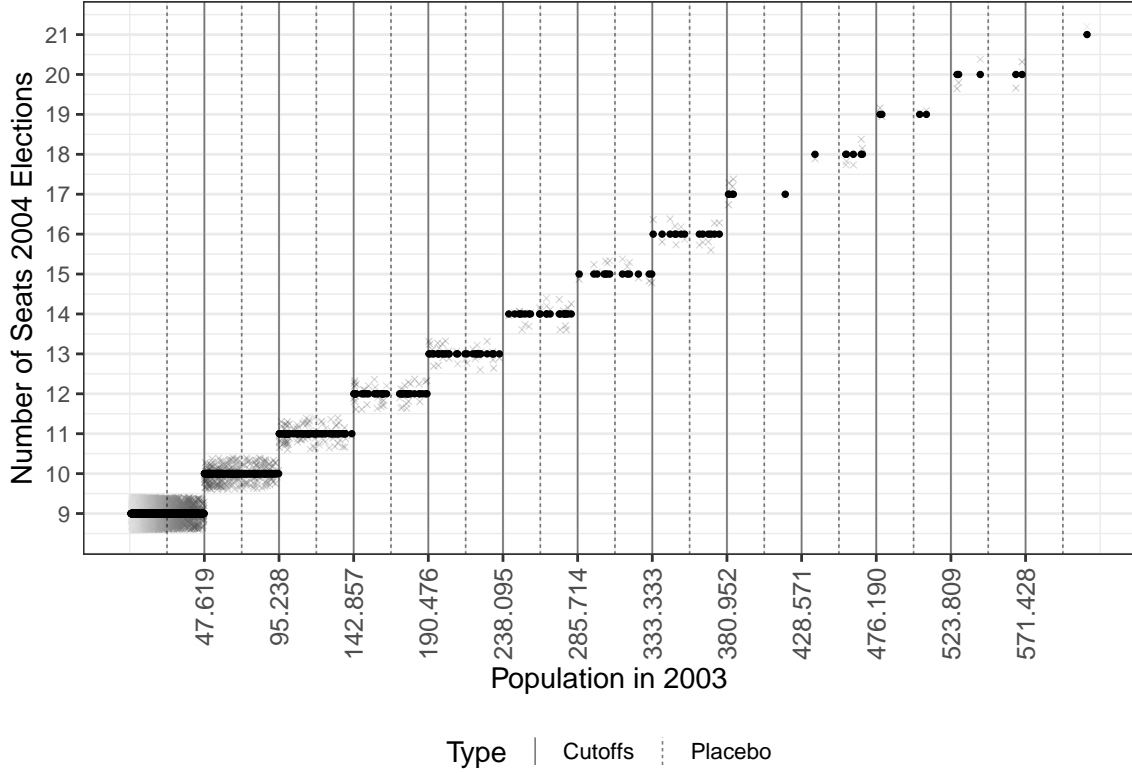


Figure 1: Distribution of Municipalities by Population and City Council Size

For the first assumption, in section A.3 of the online supplemental materials, we assess 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 we pool all the discontinuities together with no correction, we find an increase in council size of 1.63 councilors (see the first estimate in Table 1). This imbalance occurs because when we combine all the discontinuities,

the model implies 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 A.5 of the Supplemental Materials, we show by simulation that adding controls, especially the variables responsible for the multiple threshold assignments (in our case, the population in 2003), improves the consistency and efficiency of the estimates. Relying on this fact, we add five controls to the estimates: population in 2003; GDP per capita; the number of seats in 2000; year; and a dummy for Northeast municipalities. The reason for the first variable is the multiple threshold assignments. We 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 our estimates. The Northeast dummy was added to control for the fact that the Lula administration heavily invested in the region from 2003 until 2010, improving several development indicators (de Macedo and Coelho 2015). The years were added to improve efficiency. Moreover, adding controls improves efficiency in RDD (Calonico et al. 2019) and also enhances the consistency in the multiple thresholds RDD.

For the last assumption, there should be no changes in pre-treatment covariates. These pre-treatment covariates are 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. We present the first-stage regressions at the top of the Table, with and without covariates, for both real and placebo cutoffs. At the bottom, we estimate the pre-treatment covariate balance. Furthermore, in the Supplementary Materials, we run placebo checks for all the models using placebo cutoffs within the real ones. The results are available in sections A.6 to A.12 of the Supplementary Materials.

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 the covariates, the first stage overestimates the change in the primary treatment and underestimates the effect in the placebo regressions. When we add the covariates, the results improve and the point estimates are now one for the primary model and zero for the placebo regressions. These 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 our research design.

6 Empirical Results

To test the predictions from our formal model, we present four sets of empirical results. First, we confirm the bargaining costs hypothesis and find that the additional legislator also promotes more appointments of bureaucrats. This aligns with the councilors' descriptions of the strategies mayors employ to consolidate support from city councilors. Second, we show that municipalities with an extra city councilor approve more legislation about public goods provision in general and about education and health care in particular. Third, we show that all these pieces of evidence result in improvements in infant mortality and elementary school enrollment, two vital services for welfare. Finally, we also show that our results are robust to alternative channels for the influence of legislature size on welfare, demonstrating that representation of women and non-whites, competitiveness, and legislative productivity fail to receive empirical support.

6.1 Council Size, Bargaining Costs, and Job Appointments

The main premise of our model is that larger legislature size produces lower bargaining costs when the chances of electing government-aligned politicians are sufficiently high. Moreover, the main bargaining chip between the executive and the legislative is job appointments, even more so when the city councilors are aligned with the mayor. As job appointments are an important factor for local governance, we analyze the number of politically appointed bureaucrats, career bureaucrats, and councilors' assistants. A higher number of political appointees is associated with better service provision in Brazil, as their tenure in office depends directly on the survival of the politician supporting them (Toral 2019). Career bureaucrats pass through a rigorous examination, limiting their usefulness as bargaining chips between city councilors and mayors. Moreover, career bureaucrats cannot be fired once hired, which considerably constrains politicians' pressure on them. Finally, city councilors who want to influence policy may employ more staff members and assistants to their offices. This could influence policymaking through city councilors putting pressure on the bureaucracy, defying our hypothesized mechanism. Our theoretical expectations for these regressions are that larger council size affects the political alignment of city councilors and the number of politically appointed bureaucrats. It should not affect the number of career bureaucrats or city council assistants, as it is more valuable to have a political appointee that politicians can pressure, working directly with voters. Table 2 tests the first hypothesis about the nexus between city council size and bargaining

costs and explores the consequences of larger legislatures on the municipal bureaucracy.

Table 2: Political Effects of Increasing the Number of Legislators

	(1) Mayoral Coalition Size	(2) Num. Politically Appointed Bureaucrats	(3) Num. Career Bureaucrats	(4) Num. Councilor Assistants
LATE	0.91* (0.50)	104.49* (61.53)	71.57 (218.12)	2.09 (4.37)
N Left	5179	15536	15531	5179
N Right	343	1027	1027	344
Eff N Left	244	372	513	99
Eff N Right	162	343	388	101
BW Loc Poly	10.025	6.242	7.695	5.134
BW Bias	15.889	10.243	11.780	8.902

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.

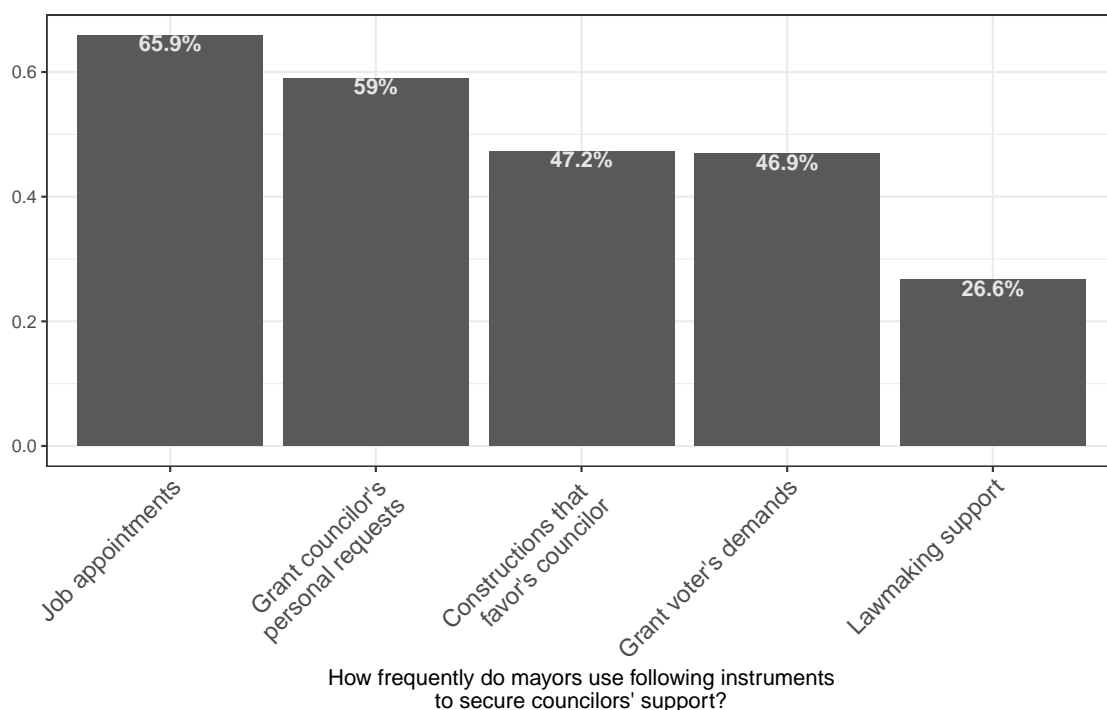
Column (1) shows a 91% chance of the extra legislator belonging to the mayoral coalition. The model hypothesis stated that the probability of electing a city councilor who is aligned with the mayor is sufficiently high. However, sufficiently high can be ambiguous, and it depends on the intensity of the 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 political position of the mayor and diminishes bargaining costs.¹² Column (2) 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 (Toral 2019). As expected, legislature size has a null effect on the number of career bureaucrats (Column 3) and councilors' staff members (Column 4).

¹²The 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.

6.2 Approved Legislation and City Councilor's Survey

We built two novel datasets to provide evidence for our mechanism. First, we ran a survey with former city councilors, asking how mayors consolidate their coalition support within the city council.¹³ Second, we collected 346,553 laws approved in 63 municipalities within ten thousand inhabitants away from the city council size thresholds. We hand-coded 3,466 laws into four categories: public goods, oversight, education and health care-related legislation, and other legislative duties. After hand-coding these laws, we used a Supporting Vector Machine (SVM) algorithm to classify the remainder laws. From all of the algorithms we tested, SVM achieved the highest performance.

Figure 2: Mayoral Instruments for Securing Councilors' Support

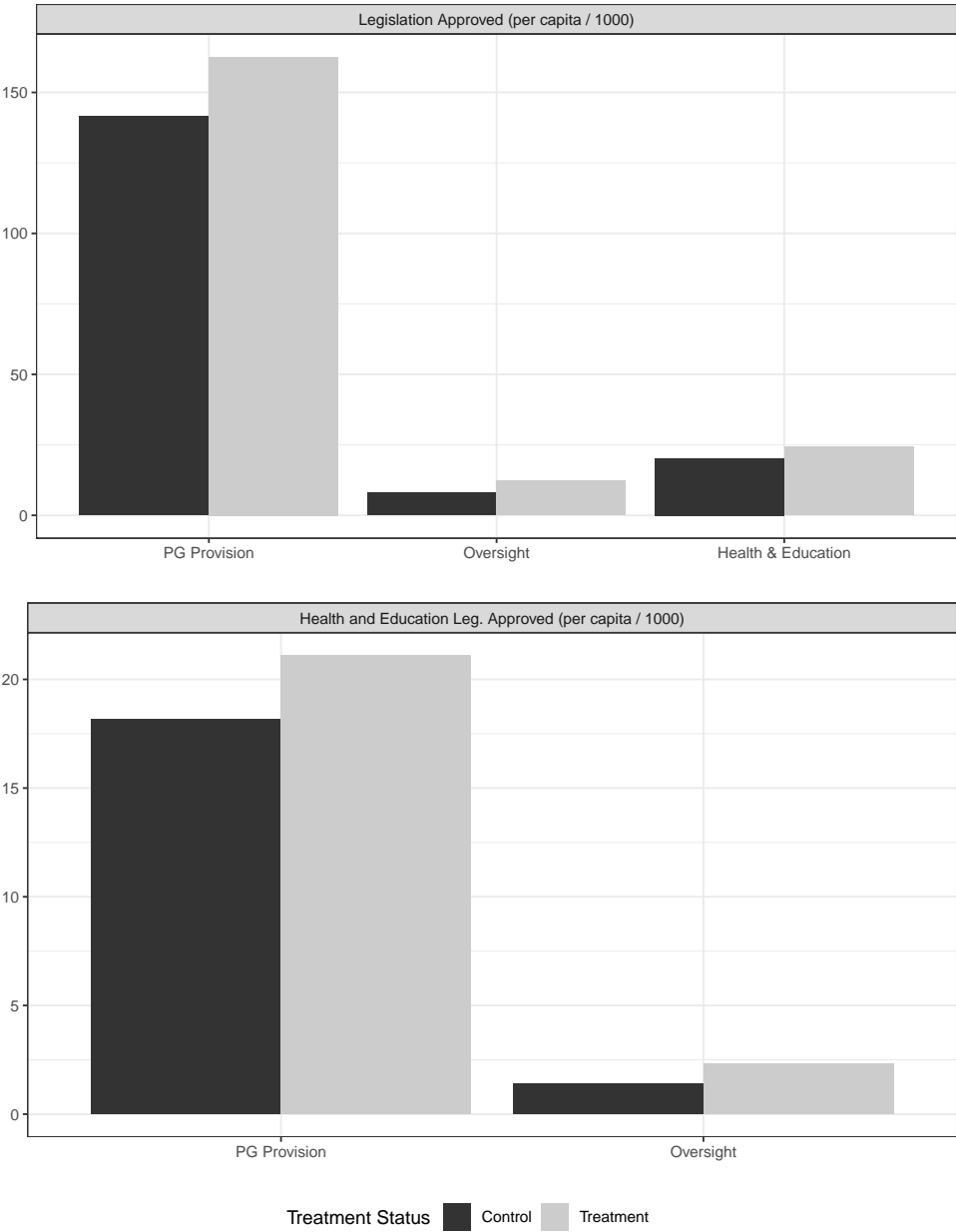


We assume that city councilors want to extract rents and to get reelected. The rents come from continuing in the repeated game, and the partisanship discounts that benefit. Figure 2 shows that 65.9 percent of councilors mentioned that mayors use job appointments to consolidate their coalition support. Moreover, 59.0 percent of the surveyed councilors affirmed that mayors use personal favors, such as shifting resources to places where the councilors have electoral support, to solidify their governing coalition. This provides further evidence that mayors do offer city councilors the benefits

¹³We provide further information about the city council survey in section A.14 of the Supplementary Materials.

they demand. In this regard, 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).

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



In Figure 3, we show that the per capita number of laws related to local public goods provision increases in towns that receive the extra legislator, vis-à-vis baseline cities that did not get an additional councilor. One additional city councilor increased the per capita amount of laws on public goods by 15.0 percent. Also, the number of laws that focus on health care and education increased

by 19.7 percent. Looking specifically into health care and education legislation, the proportion of laws discussing public goods increased by 15.7 percent, showing that policy proposals by both the mayor and the councilors shift toward local and citywide public goods.¹⁴

6.3 The Effect of Legislature Size on Welfare

We now study the impact of legislature size on education and health care. Table 3 shows that increasing the city council by one legislator generates welfare improvement in municipalities. Regarding health care, increasing the 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 large welfare effects. As expected, placebo regressions were statistically insignificant.

Table 3: Legislature Size and Welfare

	(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

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.

¹⁴Public 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, we are still considering these as public goods.

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 welfare of voters. Education quality remains unchanged, but with more students in the classroom, it could potentially decrease. Again, the placebo regressions are insignificant.

6.4 Robustness to Alternative Mechanisms

In this paper, we show that the provision of education and health care in Brazil improves with larger legislatures. This is because the chances of electing a government-aligned candidate are 91 percent thanks to the rule of distributing seats adopted in the country. In the Supplemental Materials, we also run regressions in placebo cutoffs between the actual cutoffs, showing that our estimates are consistently null when we are indeed supposed to find insignificant results.

However, other pathways may also explain the nexus between city council size and welfare. First, improvements in representation could change the provision of 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 (Chattopadhyay and Duflo 2004; Chin and Prakash 2011; Pande 2003). Diversity could also improve governance in municipalities (Rugh and Trounstein 2011). For instance, more women in public offices may shift service provision toward welfare expenditure (Brollo and Troiano 2016; Duflo 2012; Funk and Philips 2019; Hernández-Nicolás et al. 2018). Therefore, an alternative hypothesis to explain the increased service provision is that larger legislatures improve female and minority representation in Brazil.¹⁵

Second, more seats could increase the competitiveness in the election, making politicians provide more services (Besley et al. 2010). In a political system with around thirty parties and a sample average

¹⁵For a description of the barriers faced by non-white politicians in Brazil, see Janusz (2021).

of almost ten parties in the municipalities we study, candidates per seat can increase exponentially. According to the Brazilian electoral law, each party can sponsor 1.5 candidates per seat. If a party forms 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 explanation for better service provision is that a larger council size increases the competitiveness of the election.¹⁶

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 synergistic outputs (Alchian and Demsetz 1972; Holmstrom 1982). A similar argument would posit that the increase in council size increases the capability for municipalities to provide public services. As legislative productivity manifests itself as legislation, an alternative hypothesis to explain the increased service provision is that more legislation is being approved by the city council.

Table 4: Robustness: Effects of Legislature Size Changes on Representation, Competitiveness, and Legislative Productivity

	(1) Num. Female councillors	(2) Num. Non-white councillors	(3) Candidates Per Seat	(4) 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

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 4 tests whether our results could stem from these different mechanisms. Columns (1) and (2) test the hypotheses that better representation of under-served groups could improve welfare. As we can see, larger city councils do not increase the representation of females or non-whites. Column

¹⁶Despite the common assumption that competitiveness improve welfare, Boulding and Brown (2014) and Gottlieb and Kosec (2019) show that more competition can increase budgetary pressure, lower social policy, lead to bargaining inefficiencies.

(3) shows that the competition per seat in municipalities with larger city councils remain statistically equal to zero. Finally, Column (4) shows that the proportion of legislation passed by the city council remains unchanged when council size increases.

7 Discussion

This paper shows that partisanship considerably decreases bargaining costs and improves citizen 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 increase social welfare.

Increasing the council size results in gains in elementary school enrollment and in lower infant mortality. Education quality remains unchanged, but increasing enrollment without affecting quality should be interpreted as a positive outcome. The analysis of the approved legislation shows that the frequency of laws on local public goods increases in municipalities above the council size thresholds. Finally, our survey data demonstrate that councilors and mayors agree about appointing more public servants to the public administration.

Ames (2001) argues that the Brazilian democracy is prone to deadlocks because the executive has its hands tied by legislators that demand consistent 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 since been implemented. For instance, education and health care notably improved during the Cardoso and Lula governments (Acemoglu and Robinson 2012). Presidents who challenged the coalition system did not succeed. For instance, former President Rousseff was impeached in her second term. Bolsonaro can be considered one of the most ineffective presidents in Brazilian history.

Municipalities work 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 Brazil's, with more than thirty-five registered parties, mayors face substantial challenges to the support for their agendas. Having extra help in the council can tilt the bargaining towards cheaper governing costs, thus improving public goods provision.

However, we do not argue that these benefits result from the absence of corruption or clientelism. Both the formal model and empirical evidence provided 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.

Our findings have implications that extend well beyond Brazil. A general form of our argument is that it is easy for a politician to negotiate with members of her in-group (Abbink and Harris 2019; Alt et al. 2018). Specifically, several countries have separate executive and legislative powers, such as the federal level of presidential systems, state governments, and local city councils. As these institutions are influenced by political allegiances, the dynamics we expose here may be generalizable. Depending on legislative support, changing the legislature size could increase the chance of electing politicians that are not aligned with the executive, hence decreasing welfare. Despite the particular effects on political support and welfare, the logic described in this paper would remain relevant for empirically accessing the effect of enlarged legislatures on welfare. Our findings may also help scholars understand why other countries in Latin America and Asia can generate effective governance despite having strong executives and large coalitions (Pereira and Melo 2012).

This paper opens several questions for future analysis. First, if the mechanism we suggest is indeed at work, one may ask what should be the city council's checking prerogatives, as they significantly reduce the provision of public services. The evidence so far is inconclusive, and Poulsen and Varjao (2018) show that checks for the mayors may also improve service provision. Second, future research could evaluate whether additional legislators help mayors gain access to federal or state transfers in countries where resources are centrally provided, such as Japan. As suggested by Catalinac et al. (2020), in these situations the national government can create a tournament between municipalities and provide resources to those which offer more electoral support. Scholars might want to analyze whether this tournament structure interacts with the mechanisms we suggest in this paper. Third, scholars might want to investigate whether our findings remain valid under different conditions. It is possible that the mechanisms we present here are non-linear, with additional legislators having

a positive or negative impact on welfare depending on certain electoral characteristics. Finally, it remains unclear how other legislative features affect citizen well-being. For example, city councils may vary in size, monetary compensation for councilors, committee structure, and internal power structure. Understanding how legislature size interacts with other features would improve our knowledge about how local and national legislatures impact public services. These questions are crucial for institution design and welfare in developing democracies.

Appendix (Print)

Online Supplementary Materials Content

In the online Supplementary Materials 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 Supplementary Materials can be found at (*edited*).

Replication Materials

The replication materials are available at (*edited*).

References

- Abbink, K. and Harris, D. (2019). In-group favouritism and out-group discrimination in naturally occurring groups. *PLOS ONE*, 14(9):1–13.
- 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.scp.i.politicaldata.org/SCPIVIII/Stoll18.pdf>.
- Alt, M., Gallier, C., Schlüter, A., Nelson, K. M., and Anggraini, E. (2018). Giving to versus taking from in-and out-group members. *Games*, 9(3):1–14.
- Ames, B. (2001). *The Deadlock of Democracy in Brazil*. University of Michigan Press, 1 edition.
- 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. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3546433.
- 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.
- Besley, T., Persson, T., and Sturm, D. M. (2010). Political competition, policy and growth: theory and evidence from the us. *The Review of Economic Studies*, 77(4):1329–1352.
- 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.
- Catalinac, A., Bueno de Mesquita, B., and Smith, A. (2020). A tournament theory of pork barrel politics: The case of japan. *Comparative Political Studies*, 53(10-11):1619–1655.
- 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.
- de Macedo, F. C. and Coelho, V. L. P. (2015). A política nacional de desenvolvimento regional–pndr e os fundos constitucionais de financiamento. *Redes. Revista do Desenvolvimento Regional*, 20(3):464–496.

- 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. <https://www.nber.org/papers/w27456>.
- Frederick, B. (2008). The people’s perspective on the size of the people’s house. *PS: Political Science & Politics*, 41(2):329–335.
- Freire, D., Mignozzetti, U., Roman, C., and Alptekin, H. (2021). The Effect of Legislature Size on Public Spending: A Meta-Analysis. <https://doi.org/10.31235/osf.io/xf7wp>.
- Frey, A. (2021). Larger Legislatures and the Cost of Political Brokerage: Evidence from Brazil. <https://www.andersonfrey.com/research.html>.
- 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.
- Gandhi, J. (2019). The institutional roots of democratic backsliding. *The Journal of Politics*, 81(1):e11–e16.
- 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.
- Gerring, J. and Veenendaal, W. (2020). *Population and politics: The impact of scale*. Cambridge University Press.
- Gilligan, T. and Matsusaka, J. (2001). Fiscal policy, legislature size, and political parties: Evidence from the first half of the twentieth century. *National Tax Journal*, 54(1):57–82.
- 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.
- Jacobs, K. and Otjes, S. (2015). Explaining the size of assemblies. a longitudinal analysis of the design and reform of assembly sizes in democracies around the world. *Electoral Studies*, 40:280–292.
- Janusz, A. (2021). Race and resources in brazilian mayoral elections. *Political Research Quarterly*, page 10659129211032279.

- Kirkland, J. H. (2014). Chamber size effects on the collaborative structure of legislatures. *Legislative Studies Quarterly*, 39(2):169–198.
- Koppel, O. (2004). Public good provision in legislatures: The dynamics of enlargements. *Economics Letters*, 83(1):43–47.
- Lewis, B. D. (2019). Legislature size, local government expenditure and taxation, and public service access in indonesia. *Studies in Comparative International Development*, 54(2):274–298.
- Lijphart, A. and Waisman, C. H. (2018). Institutional design and democratization. In *Institutional Design in New Democracies*, pages 1–12. Routledge.
- 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.
- Marland, A. (2019). Fewer politicians and smaller assemblies: how party elites rationalise reducing the number of seats in a legislature—lessons from canada. *The Journal of Legislative Studies*, 25(2):149–168.
- 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. https://www.dropbox.com/s/5rwea4e3z2a8dm8/state_formation_federalism.pdf.
- Milgrom, P. and Shannon, C. (1994). Monotone comparative statics. *Econometrica*, pages 157–180.
- Muzzio, D. and Tompkins, T. (1989). On the size of the city council: Finding the mean. *Proceedings of the Academy of Political science*, 37(3):83–96.
- 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.
- Nicolau, J. (2015). *Sistemas Eleitorais*. Editora FGV.
- 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.
- Pereira, C. and Melo, M. A. (2012). The surprising success of multiparty presidentialism. *Journal of Democracy*, 23(3):156–170.

- Poulsen, A. and Varjao, C. (2018). Political Opposition, Legislative Oversight, and Politician Performance: Evidence From Brazil. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3304209.
- 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.
- Rush, M. (2013). Conclusion: Legislatures—does size matter? In *Legislatures of Small States*, pages 187–199. Routledge.
- 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.
- Stigler, G. J. (1976). The sizes of legislatures. *Journal of Legal Studies*, 5(1):17–34.
- Taagepera, R. (1972). The size of national assemblies. *Social science research*, 1(4):385–401.
- Toral, G. (2019). The benefits of patronage: How the political appointment of bureaucrats can enhance their accountability and effectiveness. <https://translateyar.ir/wp-content/uploads/2019/12/The-benefits-of-patronage-How-the-political-appointment-of-bureaucrats-can-enhance-their-accountability.pdf>.
- 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.