

Legislature Size and Welfare:

Evidence from Brazil*

Umberto Mignozzetti[†] Gabriel Cepaluni[‡]

Abstract

What is the effect of legislature size on public service provision? While the literature relates legislature size to representation and government expenditure, its implications for welfare remain understudied. In this paper, we investigate the effects of legislature size on welfare, exploiting exogenous changes in city-council size in Brazil between 2005 and 2008. We show that adding a legislator improves education and health care. However, the results prove true for the services that are believed to be highly salient to voters and are easiest to claim credit for. In this sense, education quality and preventive health care remain unaffected while primary school enrollment and infant mortality significantly improve. To investigate the mechanism, we surveyed former councilors and analyzed 346,553 bills proposed by municipalities in the period. This analysis largely corroborates our findings, showing that politicians prefer to provide private and local public goods. This paper has implications for the design of legislative institutions.

Keywords: Legislature size; welfare; regression discontinuity design; local public goods; Brazil; education; health care

*We would like to thank Victor Araujo, Eric Arias, Taylor Boas, Natalia Bueno, Guilherme Fasolin, Danilo Freire, Andrea Freitas, Saad Gulzar, Shoaib Jillani, James Mahon, Lucas Mingardi, Lucas Novaes, Ingrid Oliveira, Nelson Ruiz, and Denis Stukal for their valuable comments. We also thank the participants of seminars and conferences at the CEPESP-FGV, CUNY, INSPER, IPSA, IR - FGV, LACEA, LASA, MPSA, Notre Dame, NYU, PUC Chile, SPSA, and Uppsala. Any and all remaining errors are the sole responsibility of the authors. The authors thank FAPESP for the support, grant number 2017/07290-5. The data, replication instructions, and the data's codebook can be found at <https://dx.doi.org/doiREDACTED>.

[†]Ph.D. Candidate, NYU. Corresponding author. Email: umberto.mig@nyu.edu.

[‡]Associate Professor of International Relations, UNESP. Email: gabi.cepali@gmail.com.

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 (North and Weingast 1989). In modern democracies, most countries have legislatures at all levels of government, and these institutions determine the quality of policymaking (Weingast and Marshall 1988; North and Weingast 1989; Auriol and Gary-Bobo 2012), taxation, and government expenditure (Weingast et al. 1981; Primo and Snyder Jr. 2008; Stasavage 2011), improve the information and quality of legislation (Krehbiel 2010), check and veto the other political powers (Tsebelis et al. 2002), and oversee service provision (McCubbins and Schwartz 1984; Poulsen and Varjao 2018).

Legislatures vary in many aspects, but they all have one feature in common: more than one legislator composes them. This fact makes the understanding of the effects of legislature size essential for studying the consequences of legislature on welfare. Legislature size relates to collective action problems (Crain 1979; Rogers 2002), government spending (Weingast et al. 1981; Primo and Snyder Jr. 2008), and representation (Allen and Stoll 2014), but how these features affect welfare remain understudied. On the one hand, government spending and lawmaking can improve some services, especially those that have been under provided. On the other hand, adding a legislator can increase the number of veto players and broaden the collective action problems, paralyzing the government, and hindering service provision. Therefore, it is unclear what we should expect in terms of welfare from larger legislatures.

This paper fills this gap by studying the effects of legislature size on service provision. Assuming that politicians want to further their careers, we argue that two variables determine service provision: the perceived importance of the service by voters and the capacity to claim credit for its provision. Politicians perform a simple cost-benefit analysis: if providing a service results in a high electoral yield and it is easy to claim credit for, politicians will provide this service abundantly. When a service is hard to credit claim for, the service should be highly preferred by voters. Finally,

when services are both hard to claim credit for and of low importance to voters, they are placed at the bottom of the politicians' priorities.

To test this theory, we exploit an exogenous variation in Brazilian city council sizes. In 2004, the judiciary reinterpreted the constitution, unexpectedly changing the number of city councilors in Brazilian municipalities. Before the decision, municipalities could freely choose their council size, but in March 2004, the Superior Electoral Court created population thresholds for council size, adding one councilor for each sets of 47,671 inhabitants. Around the thresholds, this decision represents an exogenous change in city council size, allowing us to investigate the welfare effects of increasing the legislatures in Brazil.

Studying the 2005 to 2008 Brazilian mayoral term, when the ruling was in effect, we find improvements in health care and education. Increasing the council size by one legislator lowers infant mortality by 1.99 per one thousand infants born and increases elementary school enrollment by 2.58 children in kindergarten classrooms. However, we find no influence of city council size on the number of families enrolled in the Family Health Program, the major preventive health care program in Brazil; the proportion of infants born to mothers who accessed more than six prenatal care consultations; and primary and middle school education quality indicators. As predicted by our theoretical argument, as voters place a high electoral premium on health care and as mediating school enrollment is relatively easy to claim credit for, they improve with legislature size. On the other hand, preventive health care is harder to claim credit for and school quality improvements are expensive and payoff only in the long-run. Thus, these services remain unchanged even with larger legislatures.

Finally, as our findings are aggregated at the municipal level, we need to demonstrate that they are consistent with the micro-level representation practices of city councilors. We present three sets of evidence in this direction. First, we show that the new councilor has access to governmental resources and uses public office appointments to mediate service provision. They have a 91% chance of belonging to the mayoral coalition, and they appoint an average of 105 extra bureaucrats for many

positions at the mayor's office.¹ Second, we analyzed 346,553 bills approved by city councilors in municipalities regarding council size thresholds. In line with our theory, we find that councilors prefer to provide local public goods (72.9% of all bills), as they satisfy the populations' needs and are easier to credit claim. Finally, we ran an online survey among the councilors during the period, showing that most councilors believe that voters prefer local public goods (68.8%) to municipal-level public goods and lawmaking (24.6%) and oversight (30%).² We also refute four alternative explanations: increased representation of women and non-white legislators; change in electoral competitiveness; and larger average of approved legislation by each individual councilor.

We structure the paper as follows. Section 1 discusses the current theories on legislature size and proposes a framework to understand how larger legislatures affect welfare. Then, we provide background on the Brazilian context, present the data sources, and the identification strategy used in this paper. Section 5 present the empirical findings, discussing how the political incentives skew the provision of services and section 6 investigates the mechanics behind the results. The paper concludes with a discussion of how our results contribute to the scholarship and with consideration of the implications of our findings for welfare and legislative design.

1 A Theory on Legislature Size and Service Provision

What is the effect of larger legislatures on public service provision? The most striking feature of a legislature is the fact that decisions are undertaken collectively. Legislators have to propose changes in the status-quo, agree upon what they want to decide, appreciate proposals put forward by mayors, discuss and improve the proposals, and decide which changes they will carry on.

¹These results are crucial, as mayors have extensive control over service allocation in Brazilian municipalities: having a loyal official inside the bureaucracy can help with access to resources. In the Online Supplemental Materials, we show that mayoral characteristics remain unchanged around the thresholds, ensuring that the results do not come from the mayors.

²As a bill can belong in multiple categories, the sum is over 100%.

In this sense, legislature size is critical in determining the efficiency of the decision-making process. Upon adding a new city councilor, the most elementary change is the increased production capability. Legislative production, analogous to what happens in firms, may increase when adding an extra legislator (Crain 1979; Crain and Tollison 1982; Rogers 2002). For instance, suppose that working full time, politicians can approve five bills a month. Ten politicians can together approve 50 bills while 11 can approve 55. This increases the number of bills approved, and if bills enact services to constituencies, then we shall witness an increase in service provision.³

However, increasing the size of legislatures also carries considerable costs. Larger legislatures can raise the transaction costs (Weingast and Marshall 1988), increase collective action problems (Crain 1979), and make forming majorities more costly (Crain and Tollison 1982). These negative features, together with the fact that legislators may free-ride on each others' proposals, may decrease legislative productivity. For instance, if decisions need a majority or qualified majority to be approved, more legislators create a perverse incentive, increasing the difficulty of approval. Moreover, legislators are pressured to provide targeted services for their constituencies at the expense of the entire polity (Weingast et al. 1981; Primo and Snyder Jr. 2008), and this can raise inefficiencies in expenditure allocation. Additionally, transaction costs within legislatures may increase the difficulty of passing bills (Weingast and Marshall 1988; Baron and Ferejohn 1989). Therefore, it is unclear whether and how larger legislatures impact lawmaking and service provision.

In our view, to understand the effects of larger legislatures, we need to consider the political motivations behind the legislator's work. While an extra politician may increase the productivity frontier of a legislature, the types of services that will be favored remain unclear. To understand the political motivations, we need a theory

³An alternative explanation relates to the Condorcet Jury Theorem. In these models, there is a binary choice with one of them being ex-ante the best. If legislators access the best choice with a probability higher than 0.5, more legislators will increase the chance of selecting the best choice (Myerson 1998). However, this logic assumes that politicians choose among exogenously provided proposals, which makes sense in the case of a jury, but is somewhat uncommon for legislatures. Auriol and Gary-Bobo (2012) compute the optimal size of legislatures considering that this is the solution to the interplay between specialization costs and citizens' preferences.

that accounts for the cost-benefit calculations performed by politicians.

When deciding which service to prioritize, politicians look into two dimensions of the service provision. First, the competition with other legislators motivates politicians to provide services that they believe voters want, regardless of whether these policies improve long-term welfare. For instance, suppose that there are three services, organized hypothetically based on beliefs about which of these three voters are more likely to reward:⁴ improving a local health clinic (most preferred), building a playground (second most preferred), or increasing the quality of education (least preferred). Politicians seeking recognition will mostly want to improve the health care system, which they believe will most benefit their electoral yields. After getting this done, they will shift efforts toward the playground construction and finally to education quality. Therefore, increasing legislature size will disproportionately increase the provision of services that the politicians believe voters prefer and will reward the most in the polls.

Second, to get reelected, besides providing the services that voters prefer, politicians have to take credit for facilitating provision (Weaver 1986; Fiorina et al. 1987; Gulzar and Pasquale 2017; Nielsen and Moynihan 2017; Silva and Whitten 2017). Typically, the services that are easiest in terms of credit claiming are either providing local public goods, such as improving a neighborhood health clinic, or purely clientelistic and personalistic services (Weingast et al. 1981; Kuschnir 2000; Stokes 2005; Nichter 2011; Stokes et al. 2013; Luna 2014; Vieira 2015; Bertholini et al. 2018). This explains why clientelism and pork-barrel are persistent in democratic polities. Table 1 summarizes the incentives.

These two dimensions provide a simple, yet powerful, guide of the politicians' incentives. When voter places a high premium on the provision of a given service and it is easy to claim credit for the provision, politicians will concentrate their efforts in

⁴Note that there is a difference between *what voters actually want* and *what politicians believe voters want*. Although politicians and brokers mostly access voters beliefs accurately (Finan and Schechter 2012; Stokes et al. 2013), the crucial signal that a politician gets is vote shares, which are aggregated, and it is hard to disentangle which service generated the greatest electoral yield for the politician. Therefore, the politician's beliefs play an important role on the services that they prioritize.

Table 1: *Effects of Legislature Size on Service Provision*

	Hard for Credit Claim	Easy for Credit Claim
Low ranked by voters	No changes or deterioration (Preventive Health)	None or mild improvements (Honors bills)
High ranked by Voters	Mild to low improvement (Infant Mortality)	Mild to strong improvement (School Enrollment)

providing it. The more politicians, the higher the provision of the service. Consider, for instance, constituency service, such as getting a child enrolled at a public school. Service such as this are highly ranked by the voters, and the politicians can broke the school access directly, getting all the credit for the provision. Therefore, these services tend to increase, up to the point of being over provided.

When a service is hard to credit claim, in order to be provided it has to be highly ranked by the voters. Consider services that decrease infant mortality. Although policies in this direction might be harder to be directly associated with one given politician, every politician wants to be know as the ones that diminished infant mortality. The death of a child has devastating effects over a polity, and no politician wants to be associated with it. On the other hand, every parent would be extremely thankful for the politicians that improved health care and saved their child. Moreover, politicians might facilitate access to medication and hospitals, that in turn is easier for credit claiming. Therefore, this services will have anywhere from modest to substantial improvements.

Suppose now that a service is easy to credit claim for, but gives low electoral yield. In this case, although the provision can be unquestionably traced back to the legislator, voters care little about the provision. For instance, honors and appraisal legislation are very common in Brazilian municipalities. However, they are perceived by politicians as low electoral yield, but the legislator that proposed the homage usually gets associated with it. These types of legislation increase with legislature size, but their effect

on welfare is negligible.

Finally, services that are difficult to credit-claim, or that politicians believe that voters care very little about, are expected to receive little invested effort from politicians. For instance, consider preventive health care. Preventive care refers to health measures, such as pre-natal care or vaccination, undertaken to lower the chances or the severity of a disease(s) in the future. However, it is a compounded chance: the voter has to consume the service, but its effectiveness depends on voters getting sick. Nowadays we are witnessing how hard it is to vaccinate children, despite all the scientific evidence demonstrating its effectiveness. Moreover, rational voters may fail to punish politicians for low investments in preventive public policies, such as natural disasters or climate change mitigation (Gailmard and Patty 2019). Hence, voters might also not punish politicians for low investments in preventive health care because they might only observe whether a politician properly invested in preventive public policies in cases of emergency. Therefore, we shall expect little to no improvement in these types of services with larger legislatures.

In sum, these considerations suggest that instead of looking for overall positive or negative effects, the effects of legislature size should manifest diversely, conditional on the type of service studied. The most significant changes should be expected in services that voters want and that are easier to claim credit for. Services with only one of these characteristics will be intermediate in terms of their priority and efforts exerted by politicians in their provision and will improve with less intensity. Services hard to credit claim and low ranked by voters will tend to be unaffected or underprovided by lawmakers.

2 The Brazilian Case: Background

In 2004, Brazil was comprised of 5,560 municipalities. According to the Brazilian Constitution, each municipality has to provide its citizens: health care, primary education, transportation, and necessary infrastructure. Municipalities can have local laws and

collect taxes on housing and services. Even though the tax collection is around 5% of the total revenue, municipalities receive a considerable sum of resources from the state and the central governments.

A mayor and a city council ranging from 9 to 55 councilors govern a municipality. Mayors and councilors are elected by direct vote in the same election. The mayor, who has a more prominent role, may propose laws, tax changes, and organize the provision of goods and services, as well as the bureaucratic organization. The mayor presents these policies as proposals to the city council, which can accept or reject them.

For the city council, the constitution states that councilors have two primary duties. First, they should propose, discuss, and vote on legislation put forward by themselves or by the mayors. Second, they oversee public accounts, the bureaucracy, and the provision of public services. Councilors can also propose laws and requirements, aiming to provide public goods and services to their constituencies.

Councilors also provide an array of public and personal services for their constituents. They help voters access public hospitals, transport patients to hospitals, secure prescription medication, facilitate school enrollment or public employment, and even pay utility bills, or buy food (Nichter 2011). Lopez and Almeida (2017b) conducted interviews in twelve municipalities in the state of Minas Gerais and found that councilors spend their time responding to a vast array of voters' needs. One councilor stated, in one of the interviews, that she receives "... all kinds of requests. Covering everything from LPG gas cylinders to airfare, and everything in between: living staples, medication, utility bills, rent, airfare, fares for ground transportation, aid, fifty reais in spending money, grocery bills... (Councilor M. M.) (Lopez and Almeida 2017b).

Regarding organization of city councils, the most critical component is size. From 1988 to 2004, the constitution loosely set rules regarding the number of seats, and some places ended up with either a very large or a minimal number of councilors. As an illustration, Nova Russas in Ceará used to have 21 city councilors with only 30 thousand inhabitants (around one legislator per 1,429 citizens). On the other extreme, Sorocaba in São Paulo had only 15 councilors with more than 500 thousand inhabitants

(one legislator per 35,249 citizens). In 2003, the council-size problem gained visibility as Mira Estrela, a small municipality in the state of São Paulo with only 2,651 residents, reduced their city council from 11 to 9 seats. The change motivated a legal dispute that reached the Supreme Court. The Court favored the municipality's decision and ruled that the size of any city council should correspond with precise population thresholds.

In March 2004, the Superior Electoral Court (TSE) issued resolution 21,702/2004, establishing a series of population thresholds for all municipal legislatures.⁵ The change regulated the city council's size for the 2004 election and used the 2003 population projections by the Brazilian Institute of Geography and Statistics (IBGE). The resolution presented the following reasoning. First, municipalities must have at least nine councilors. For populations falling in the range of zero to a million inhabitants, the maximum is 21 councilors. Therefore, the Electoral Court Judges divided a million by 21, getting a threshold of 47,619 inhabitants. They started with nine legislators, increasing one by one until they reached 21. Then the council size remained constant from 571,428 ($12 \times 47,619$) to one million inhabitants. After that, the cutoff jumps to 33 and increases one by one up to the maximum number of legislators allowed (55). We are not using cutoffs above one million inhabitants because there are only a few municipalities with such large populations.

This decision makes Brazil the ideal testing ground for our theory. Although an endogenous choice motivated the change that municipalities made, the rule was utterly unpredictable. As a consequence, around the thresholds, the cities that lied in the right-hand side are comparable to the cities that lied in the left-hand side of the discontinuity, with the exception that on the right they gained a new councilor. This change in council size happened seven months before the election, making it impossible for candidates to change their service provision strategies for the 2004 election. Therefore, during the 2005 to 2008 term, the changes in council size allow us to study the increase in the legislature size, holding other characteristics constant. Around each threshold,

⁵In Brazil, there is a distinction between the Superior Electoral Court and the Supreme Court. The Supreme Court rules on constitutional cases while the Superior Electoral Court implements electoral rules.

we have an exogenous shock on the council size that allows us to quasi-experimentally estimate the causal effect of legislature size on service provision and welfare.

3 Variables and Data Sources

In this paper, we use three groups of variables. First, we study variables on municipalities' characteristics that should remain constant around the thresholds (pre-treatment variables). Second, we use indicators of education and health care in Brazilian cities. Third, we employ variables to uncover the mechanism driving the results. We also included data from an online survey conducted to explore the mechanism and collected data on bills approved by city councils in municipalities around the population thresholds. The summary statistics follow in the online supplemental materials.

As pre-treatment variables, we collected the number of city council seats in the 2000 election, the population in 2000, the municipal GDP in 2000, and the proportion of low-income families in 2000. These variables come from the Superior Electoral Court (Tribunal Superior Eleitoral–TSE) and 2000 Brazilian Census by the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística–IBGE). As these variables refer to a period before the council size resolution, the thresholds should have a null effect on them. Moreover, the main treatment variable, the TSE 2004 city council sizes, varies sharply with the thresholds decided by law.

To measure welfare, we collect variables on education and health care provision. For education, we included the average enrollment in primary (K–4) and secondary (5–8) school. To measure quality of education, we used the Education Development Index (Índice de Desenvolvimento da Educação Básica–IDEB). The Ministry of Education issues this indicator every other year since 2005. The Education Development Index is a weighted mean of Portuguese, Math, and age-grade compatibility.

To measure general health care, we collect data on infant mortality and postnatal infant mortality. To measure preventive health care, we collected the coverage of the Family Health Program⁶ and the proportion of pregnant women that attended at least

⁶The Family Health Program focuses on primary care of families, providing an array of non-hospital

seven prenatal care consultations. All variables are from the Brazilian Ministry of Health data center (DataSUS).

To investigate the micro-level mechanisms, we look into municipal-level data, city councilors' characteristics, approved legislation data, and former legislator survey data. The municipal-level data is comprised of: the number of councilors belonging to the mayoral pre-electoral coalition; the councilor's gender and race; the number of politically appointed employees at the mayor's office; the number of career employees; and finally, the number of appointed employees in the councilors' cabinets—all variables come from the Superior Electoral Court and the Brazilian Institute of Geography and Statistics.

We also collected 346,553 bills for the municipalities within 10 thousand inhabitants of the legislature size thresholds. We collected the information regarding the types of proposals, discriminating between local public goods, municipal-level public goods, oversight, and other types of legislation (mostly honors). This information allowed us to investigate what types of services legislators attempt to provide via city council.

Lastly, we ran an online survey with 174 former city councilors, asking them what types of policies were more electorally attractive from the voters' perspectives. Together, all this evidence provides a clear picture of the pattern of representation in Brazil, from macro-level municipal welfare consequences to their micro-level mechanisms.

4 Empirical Strategy

Here, we use a regression discontinuity design (RDD), exploiting the population thresholds established by the Superior Electoral Court resolution. These thresholds represent a source of exogenous variation in the municipalities' city-council size. As these cutoffs were implemented in the 2004 elections, politicians could not foresee the

care to low-income families. The program is funded by the Federal Government, but the implementation is local. [Copque and Trad \(2005\)](#), analyzing the municipalities in the state of Bahia, show that the implementation varies considerably from one municipality to another.

changes and optimally adapt to them. Consequently, around each cutoff, the municipalities are arbitrarily similar, with the only difference being their city-council sizes.

Figure 1 displays the distribution of municipalities within each city-council size bin. These population thresholds remained in effect till 2009, when the Congress amended the Brazilian Constitution.⁷ The period of this study is between 2005 and 2008, which comprises a full mayoral and city-council term in the Brazilian municipalities following the 2004 elections.

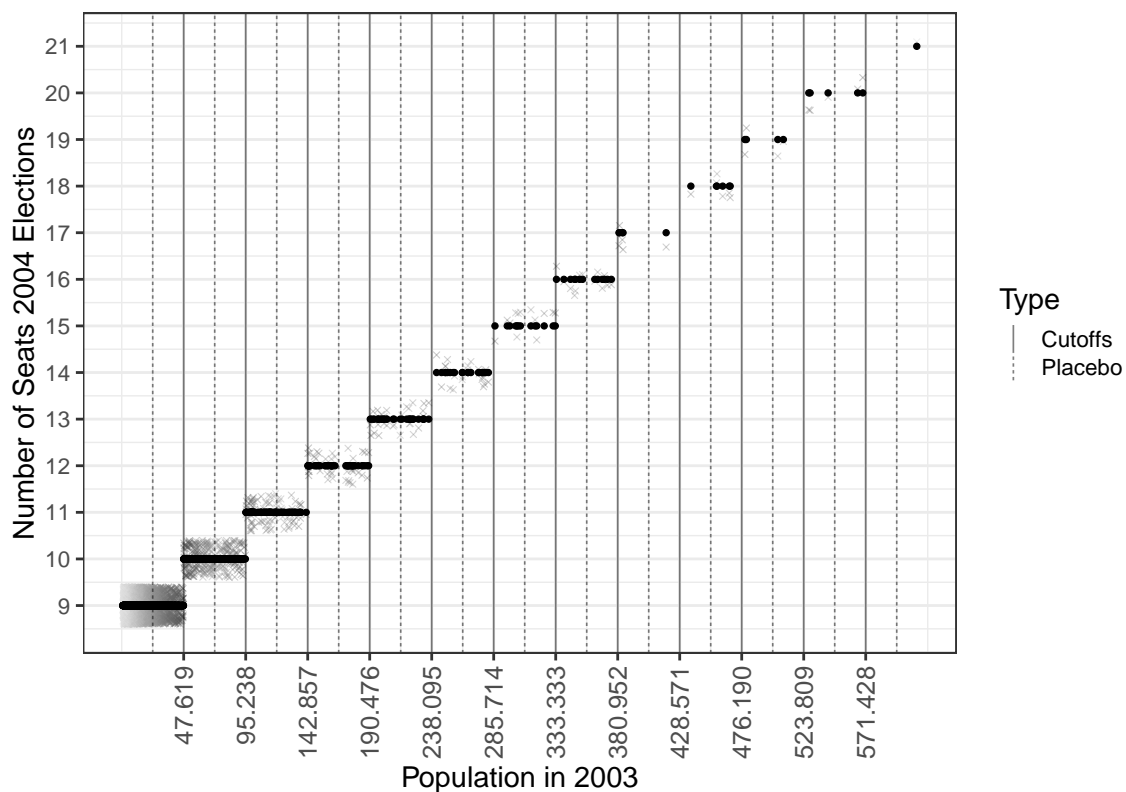


Figure 1: *Distribution of Municipalities by Population and City-Council Size*

The credibility of the causal claim relies on three main assumptions. First, we need to show that no municipality could select on which side of the discontinuity it would lie. Second, as this is a sharp regression discontinuity, the council size should increase precisely as the law mandates. Finally, pre-treatment variables, collected before the 2003 Supreme Court decision, should not be affected by the 2004 ruling on council

⁷In 2009, the Brazilian Congress amended the constitution changing the number of legislators and their salary caps, making it impossible to study only the effects of legislature size after 2008. We provide more details on these changes in the Online Supplemental Materials.

size.

For the first assumption, [McCrary \(2008\)](#) proposes a measure of the distributional imbalance around the discontinuity, testing whether cases are more abundant in the left or the right of the cutoff. For our research, the McCrary statistic is 0.391 (SE = 0.299), showing no evidence of manipulation. In the Online Supplemental Materials, we run the [Cattaneo et al. \(2019\)](#) test of distribution imbalance, that also confirm the non-sorting hypothesis.

For the second assumption, we know that running RDD in multiple thresholds may lead to inconsistent estimates when there is an imbalance in the running variable's distribution around the cutoffs ([Bertanha 2017](#); [Cattaneo et al. 2016](#); [Eggers et al. 2018](#)). For example, in our dataset, we have twelve discontinuities, and at each threshold we have a sharp increase of one councilor, from 9 to 21. When running an RDD on these discontinuities, a consistent estimator should fit an 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. This is because when we pool together all the discontinuities, we are implying that changes in municipalities right below the 47,619 cutoffs (9 to 10 councilors) are comparable to changes in municipalities right above the 571,428 cutoffs (20 to 21 council members). That is incorrect, not only because we could be comparing a municipality with nine councilors with one with 21 councilors, but also because these municipalities diverge in many other aspects, such as population to GDP per capita.

To avoid this problem, 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 our estimates: population in 2003; GDP per capita; number of seats in 2000; year; and a dummy for the northeast municipalities. The reason for the first variable is the multiple threshold assignments. We add GDP per capita because richer municipalities tend to be more productive and have better public services. The number of seats in 2000 intends to control for the fact that some municipalities

could experience a change provoked by the previous council size, confounding our estimates. The year and the northeast dummies serve to improve efficiency. Adding controls improves efficiency in RDD (Calonico et al. 2019) and also improves the consistency in the multiple thresholds RDD. See the Online Supplemental Materials for further tests and simulations.

For the last assumption, we should have 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.

Additionally, we propose a placebo test consisting of running the same models but with “fake cutoffs.” We build these placebo cutoffs by creating a new cutoff between each pair of real cutoffs. For example, as the first real cutoff is in 47,619 inhabitants, then the first “fake cutoff” is at $47,619/2 = 23,809.5$, and so on until the last cut added in the main model. We run placebo tests for all the municipal-level variables studied in this paper.

Table 2 displays the results of the validity checks. At the top of the table, we run the first-stage regressions, both using and not using the controlling covariates strategy proposed, for both real and the placebo cutoffs. At the bottom, we estimate the pre-treatment covariate balance.

Notice that without controls, the first stage overestimates the change in the primary treatment and underestimates the change 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 2 show that the pre-treatment covariates remain unchanged around the thresholds. These tests reinforce the validity of our research designs.

Table 2: Research Design Validity Check

Panel A: Validity Check — First Stage				
	(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.

5 Legislature Size and Welfare: Empirical Analysis

We study the impact of legislatures on two essential groups of services for welfare: education and health care. We collect eight indicators of welfare in these services, four in education, and four in health care. Each of the outcomes is further divided into two groups.

In the first group, we include services that are easier to provide, attractive to credit claiming, or both. These types of services increase the electoral profile of councilors, as they are considered as preferred by the electorate and have an intensive advertising effect. In this category, we have school enrollment and infant mortality.

In the second group, we place services that are either considered less critical by voters or that are harder to credit claim. These services do not translate into votes easily or are harder to target and advertise. In our models, we use preventive health care and quality of education as examples of such services.

According to our theory, we should expect that increasing legislature size will have a positive effect on services that voters want and that they can easily target. Whereas, if our theory is incorrect, services that are both hard to credit claim and hard to provide, and considered as unimportant by voters should also improve. Table 3 presents the results for education and health care outcomes.

The results for education largely corroborate our expectations. Table 3 shows that enrollment in elementary schools increased by 2.58 children on average per school with the addition of an extra city councilor. This result represents a change of around 0.20 standard deviations. For grades 5 to 8, council size has no influence. At this point, the dropout rates makes spots on grades 5 to 8 to be oversupplied, meaning that we have more spots than students. For the quality indicators, the results are insignificant, showing no changes in school quality with larger city councils.⁸ As expected, the placebo regressions are also insignificant.

Enrolling a child in a public school in Brazil is particularly difficult in the early years. Although Brazil achieved universal elementary school enrollment, there are still very few spots for schooling until the first grade. Finding public pre-kindergartens and nursery schools is hard, and enrolling is even more difficult, but taking care of a small child puts a considerable burden on parents in poor households. This is a strategic time to contact a councilor, who can facilitate, in this case, enrollment. From

⁸As education quality takes longer to improve, we look into the 2015 education quality index in the Online Supplemental Materials. There are null effects, showing that no long-term investments were taken by councilors.

Table 3: Public Service Outcomes

Education Outcomes				Health Care Outcomes			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Average	Average	Elem. School	Middle School	Infant	Post-Natal	Cov. Family	Pr. Born w. 6+
Enroll. K-4	Enroll. 5-8	Quality Index	Quality Index	Mortality	Mort. Rate	Health Program	Pre-Natal Consult.
LATE	2.58*** (0.81)	-0.01 (1.07)	-0.11 (0.11)	-1.99** (0.78)	-0.90* (0.48)	-1.67 (2.09)	-4.23 (4.01)
N Left	10156	7306	5037	12299	5441	19280	15548
N Right	686	581	529	1030	672	1297	1030
Eff N Left	196	475	279	513	314	281	615
Eff N Right	202	312	195	390	242	301	438
BW Loc Poly	5.132	11.208	7.824	7.183	4.185	8.891	
BW Bias	10.615	16.694	13.714	10.726	8.310	15.007	
Education Outcomes – Placebo Cutoffs				Health Care Outcomes – Placebo Cutoffs			
(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Average	Average	Elem. School	Middle School	Infant	Post-Natal	Cov. Family	Pr. Born w. 6+
Enroll. K-4	Enroll. 5-8	Quality Index	Quality Index	Mortality	Mort. Rate	Health Program	Pre-Natal Consult.
LATE	0.45 (0.61)	0.97 (0.98)	-0.12 (0.09)	-1.14 (1.05)	-0.25 (0.65)	1.85 (1.25)	-2.22 (2.92)
N Left	9040	6350	4243	10614	4449	17198	13861
N Right	1802	1537	1323	2715	1664	3379	2717
Eff N Left	1186	1138	931	1213	775	2575	1575
Eff N Right	724	672	580	890	557	1483	1004
BW Loc Poly	6.325	6.975	7.198	4.840	5.360	6.999	5.796
BW Bias	9.860	12.598	11.004	7.268	7.943	11.213	9.559

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 a dummy for the 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.

the councilor's perspective, the classroom is there and the politician only needs to pressure the school's bureaucracy to accommodate an extra child. Such an effort comes at virtually no cost to the politicians, who benefit handsomely from this proposal, as the credit claiming is unquestionable.

The effects on infant mortality rates are also substantial. First, an extra legislator lowers the infant mortality by 1.99 deaths per 1,000 children born. This impact is significant in absolute terms, but in standard deviations, this represents an effect of 0.14, which is reasonable. Second, it decreases post-natal mortality by 0.90 casualties per 1,000 children born. This result also represents a standard deviation of 0.14 in terms of improving these health care outcomes. However, neither the coverage by the Brazilian Family Health Program nor the proportion of newborns that had more than six prenatal consultations change significantly, and even the coefficient signs would be inconsistent with welfare improvements. As expected, the same changes in the placebo regressions were statistically insignificant.

Infant mortality is hard to improve, but it is great for credit claiming and it is highly electorally sensitive, as it can provide substantial rewards for the councilor.⁹ Decreasing infant mortality—by improving services, monitoring the health care bureaucracy, mediating hospitalization, or even by pushing the creation of a health clinic in an under-served neighborhood—is considerably easier for councilors to mediate. Improving health care is good for campaigning and also has an intense emotional impact on voters, triggering a strong reciprocity behavior in voters who in turn support the politician (Finan and Schechter 2012).

Conversely, the Family Health Program and improved prenatal care are great services to prevent future diseases; however, they are either harder to claim credit for or expensive to provide. Preventive health care focuses on lowering the future incidences of becoming ill. If voters do not perceive these chances as real possibilities, they are unlikely to reward politicians who focus on providing those services. Moreover, even

⁹Survey findings provide further evidence for the fact that Brazilians rank health care higher than every other public service. Moisés and Meneguello (2006) run a survey in 2006 asking which are the essential services for citizenship. Brazilian citizens mentioned health care 23.8% of the time; fulltime employment had 16.6% mentions and education 12.0% mentions.

if the voter were fully rational, there are instances when the provision of the service might be outside her control (Gailmard and Patty 2019). In the case of the Family Health Program, the municipality has leeway, but the funding is federal, and the central government mandates the requirements and standards of most of the procedures. From the council-member perspective, these services fall short in their cost-benefit calculations, and therefore, politicians will place low priority on and dedicate little effort to improving them.

Hence, there are considerable welfare improvements resulting from a larger city council. Along with other services, most scholars agree that improvements in infant mortality and school enrollment are extraordinary welfare achievements. However, the improvements are skewed toward services that agree with the councilor's interests. When councilors believe that they can use the services instrumentally to get more votes, they improve. Otherwise, the service receives little to no attention by the councilor.

In any case, our results on health care and education by themselves are insufficient to understand what drives changes in welfare. First, it is unrealistic to think that all politicians have free rein over services and can target and change these services at will. Mayors and bureaucrats mediate most of the access to these services, and they may filter the councilor's demands in ways that could hinder their credit-claiming capability. Second, councilors may not perceive the provision of such services as electorally attractive, or the improvements in these services may be caused by policy and legislation, instead of councilors direct efforts. Therefore, the micro-level mechanics of the results remain unclear: we need to show that politicians have access to resources and that they perceive the services they are providing as generating high electoral yields. The next section discusses the mechanism, investigating how council size leads to improvements in certain services.

6 From Council Size to Welfare: Mechanism

City council size causes an improvement in specific welfare indicators, but how? City councilors in Brazil are the lowest-level representatives and are the closest politicians to the population. However, the literature presents them as very inefficient and clientelistic (Castro et al. 2009; Lopez and Almeida 2017b; Leal 2012). Thus, the mechanism that takes us from council size to welfare requires further clarification.

In this section, we discuss the possible channels for the council size and welfare nexus: changes in the representation of women and racial minorities; improved law-making capabilities; increased electoral competition; and greater provision of private and local public goods.

We study three evidential sources: municipal level outcomes on representation and access to municipal services; the content of bills voted by a city council; and an online survey of former city councilors during 2005–2008.¹⁰

Municipal-level aggregated outcomes

Table 4 presents the results for the municipal-level outcome data. We divide the results into two panels: in Panel A, we present the alternative explanations for our claimed mechanism. In Panel B, we present evidence that corroborates our arguments.

First, improvements in representation could cause changes in health care and education (Pande 2003; Chattopadhyay and Duflo 2004; Chin and Prakash 2011; Duflo 2012). More councilors from specific groups could shift public-service provisions toward these groups. In columns (1) and (2), we show that neither gender nor representation of non-white legislators significantly improves. These estimates illustrate that our results are not driven by improved representation. We also tested whether competition (3) or the approval of legislation by the mayor (4) increased with council size.

¹⁰We also had access to 108 structured interviews conducted by Almeida and Felix at the Brazilian Economics Planning Institute (IPEA) in 2009. These interviews asked councilors about their daily jobs and their representation practices. The interviews reinforced that councilors see private and local public goods as electorally profitable and better in terms of electoral yields than legislating or overseeing executive policies (Lopez and Almeida 2017a).

Table 4: Mechanism Regressions – Aggregated Municipal Level Outcomes

Panel A: Representation, Competition, and Legislation Approval				
	(1)	(2)	(3)	(4)
	Num. Female Councilors	Num. Non-white Councilors	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	270
Eff N Left	194	47	179	227
Eff N Right	144	47	132	142
BW Loc Poly	8.564	2.954	8.126	11.080
BW Bias	13.569	4.917	12.049	16.921
Panel B: Access to Resources and Patronage				
	(5)	(6)	(7)	(8)
	Mayoral Coalition Size	Num. Politically Appointed Empl.	Num. Career Bureaucrats	Num. Councilor Assistants
LATE	0.91* (0.50)	105.09* (62.12)	71.57 (218.12)	2.09 (4.37)
N Left	5168	15536	15531	5179
N Right	343	1028	1027	344
Eff N Left	240	351	513	99
Eff N Right	161	334	388	101
BW Loc Poly	9.906	6.019	7.695	5.134
BW Bias	15.846	10.170	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.

Both variables were statistically insignificant.

Panel B in Table 4 shows the results for our claimed mechanism. First, councilors need access to resources in order to want to provide them: a councilor can only provide services the provision of which they can control or influence. In a Brazilian municipality, mayors have direct control of health care and education provision, by funding and staffing hospitals and schools. Consequently, councilors need ties with the mayor to access these services. In Brazil, these ties start around a year before the election, in the pre-electoral coalition period. Belonging to the mayoral pre-electoral coalition is an excellent indicator of ties to the mayor and provides access to resources after the election. Column (5) in Panel B shows that the extra legislator has a 91% chance of belonging to the mayoral coalition.¹¹ As the extra legislator is a mayor's ally, she tends to have more access to public resources.¹²

Second, city councilors need to staff the municipal bureaucracy in order to influence service provision. Patronage, defined as the appointment of selected bureaucrats to public service jobs, is a powerful way to solve the commitment problems between politicians and bureaucrats: to keep their jobs, politically appointed employees have to help the appointing councilor get reelected (Robinson and Verdier 2013). Column (6) of Panel B shows that adding one councilor increases the number of appointed employees in the municipality by 105. This represents a standard deviation of over 0.30, showing that councilors have strong ties with the administration. This facilitates the councilors' mediation of service provision.

Additionally, the councilors could be affecting the overall administration, which may, in turn, improve state capacity and welfare. In order to rule out this possibil-

¹¹The Electoral Justice allocates seats for parties and coalitions according to their vote shares using the D'Hondt method. Pre-electoral coalitions have advantages, as they pool all parties votes together. These laws make pre-electoral coalitions crucial for the mayor's strategy to govern after the election.

¹²It could also be that the new coalition councilor has facilitated the lawmaking process by the mayors. Indeed, mayors are the most important politicians in the municipality, and it could be that we are actually estimating the effects of mayors on policymaking. Moreover, Bueno (2018) shows that mayors and their ties to the central government are crucial for municipal service provision. In the Online Supplemental Materials, we investigate whether municipalities vary according to their mayoral party composition and municipal city council party composition. We show that the composition of municipal political parties remains unchanged around the thresholds.

ity, we consider the number of career bureaucrats in the municipality.¹³ The result in Column (7) Panel B rules out this possibility. Finally, city councilors could be hiring employees to work on their staff, which would increase the number of appointed officials without a connection to the municipal service-provision machinery. However, we find a null effect of council size on an average number of council cabinet employees.

Disaggregated data: approved legislation and city councilor's survey

We need fine-grained evidence that our mechanism operates among the city councilors in their representation practices. To demonstrate the micro-level mechanism at work, we analyzed two datasets. First, we collected and analyzed 346,553 bills proposed in 64 of the 202 municipalities that are within 10 thousand voters from the population thresholds. We selected these 64 municipalities, which keep their voting records available online.

We separate the legislation presented into four categories: local public goods, municipal-level public goods, oversight, and other types of legislation. Local public goods consist of services that are targeted at the personal, group, or neighborhood levels.¹⁴ Examples are fixing potholes, improving a given health clinic, requesting school bureaucracy to accommodate an extra child, or proposing sewage improvements on a given street. Municipal-level public goods comprise proposals of laws and policies that cover the entire municipality. For instance, a proposal to improve the standards of health care across the entire municipality or to provide training for all the school teachers to meet the requirements for a municipal-level public good. Oversight bills

¹³Career bureaucrats have to undergo rigorous public selection that afterward prevents them from being fired for political reasons. These jobs have higher pay and better pension schemes than comparable jobs in the private sector.

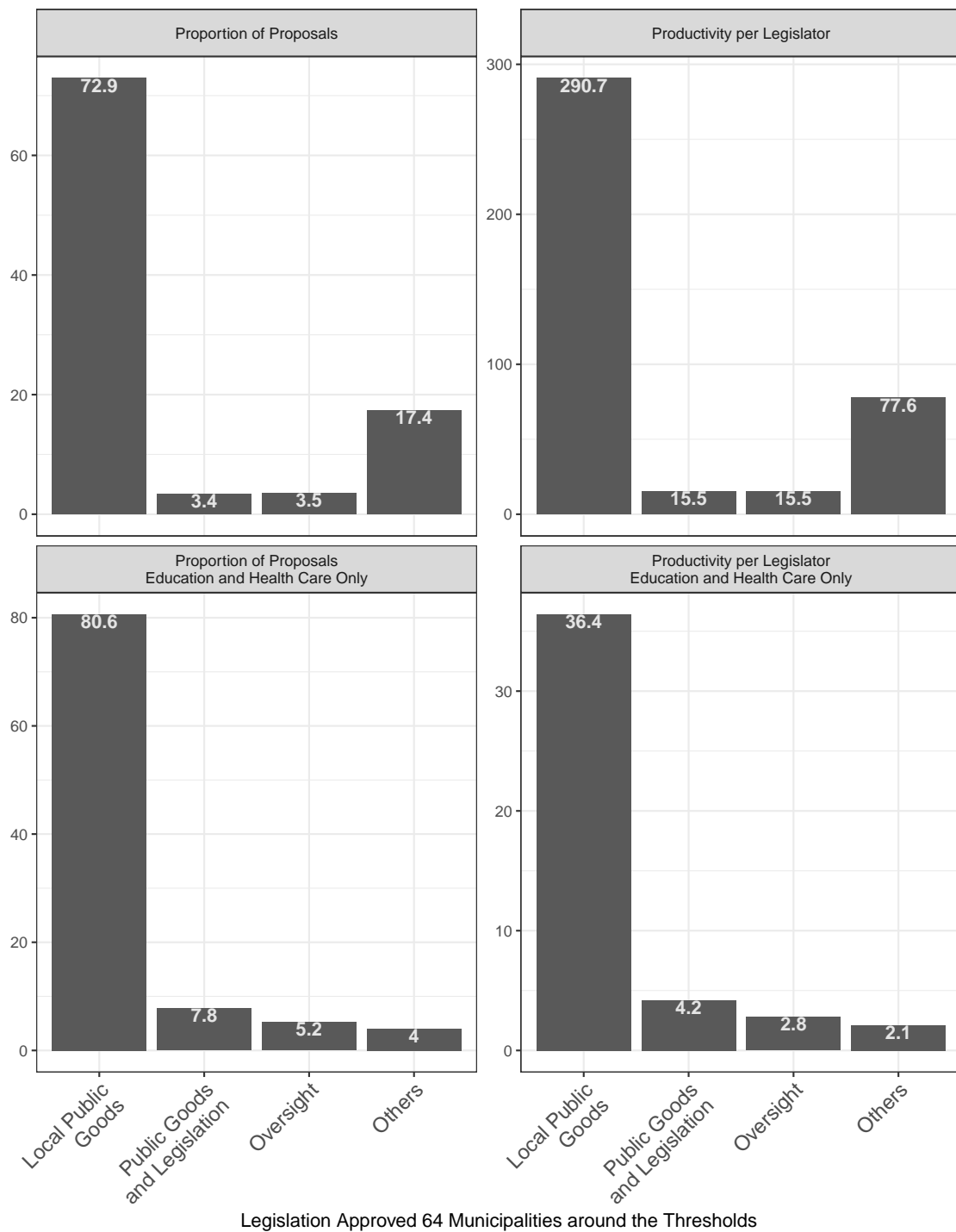
¹⁴Note that our theory does not differentiate between pure clientelism and local public goods, as it is hard to disentangle these intentions from a legislator's service provision. On the one hand, fixing a pothole may be motivated by a request from one particular vote, but it is still a local public good, with non-excludable benefits in the areas in which the construction is performed. On the other hand, a politician could adopt the strategy of helping any person be admitted to a hospital regardless of their previous electoral commitment. This breaks with the clientelistic logic, but it is still considered private service provision. This strategy seems odd, but as [Kuschnir \(2000\)](#) shows in her qualitative work, the Silveira Family in Rio de Janeiro did exactly that: they helped anyone that asked for help in the community they represented. As a result, one of the family members was elected with the highest vote share seen in the Rio de Janeiro elections in 2000.

are requests for explanations about public services undertaken by the bureaucracy. Other legislation comprises bills that do not fit in the previous categories. Examples are changing street names, motions to honor citizens or groups, and legislative and internal city council procedures. To classify the legislation, we use a supporting vector machines classifier on the legislation' descriptions. We trained a classifier on 3,466 manually-coded laws (1% of the bills), achieving an out-of-sample prediction of 94.5%, on average. Then we classify the remaining 99% of laws. The words associated with each category are in line with our expectations. Figure 2 displays the frequencies of proposals in absolute and relative terms, and the averages with error bars discriminating by municipalities below and above the threshold.

The first panel of Figure 2 presents the frequency of legislation approved by type. The overwhelming majority of proposals refers to local public goods (72.9%), followed by other types (17.4%), oversight (3.5%), and municipal-level public goods (3.4%).¹⁵ Education and health care bills comprised 11.1% of the total approved bills. The proportions agree with our model, as the local public goods solve voters' immediate problem(s) and are easier for credit claiming. The second panel of Figure 2 presents the average number of bills per legislator. Bills related to the provision of local public goods reach, again, the highest amount at 290.7 (s.e. 56.95), followed by other legislation at 77.6 (s.e. 15.50), then bills related to oversight at 15.5 (s.e. 15.51), and lastly bills related to municipal-level public goods at 15.5 (s.e. 2.10). Education and health care represented 44.3 bills (s.e. 8.99). Additionally, when we consider only the legislation related to health care and education, local public goods represent 80.6% of the proposed legislation, followed by public goods and lawmaking with 7.8%, oversight with 5.2%, and other types of legislation representing 4.0% of the approved laws. In terms of productivity, the pattern is similar to the education and health care proposal proportions, with most of the legislation being related to local public goods (36.4 per legislator), followed by public goods (4.2), oversight (2.8), and others (2.1). Therefore,

¹⁵Note that the sum is below 100%. This is because the supporting vector machine algorithm classifies around 3.5% of laws as belonging to none of the categories above. For more information see [Collingwood et al. \(2013\)](#).

Figure 2: Legislation Approved in Municipalities Closer to the City Council



increasing the city council size has a considerable effect on the production of local public goods, even when considering only education and health care bills.

We also conducted an online survey with 174 former city councilors who served between 2005 and 2008, asking questions about the common jobs they perform as coun-

cilors, how many votes these jobs yielded, and the mayoral strategies in negotiating with the city council. While most results are in the Online Supplemental Materials, Figure 3 displays the services that councilors believe generate the highest electoral yield.¹⁶

Figure 3: *Electoral Attractiveness of Councilor's Jobs*

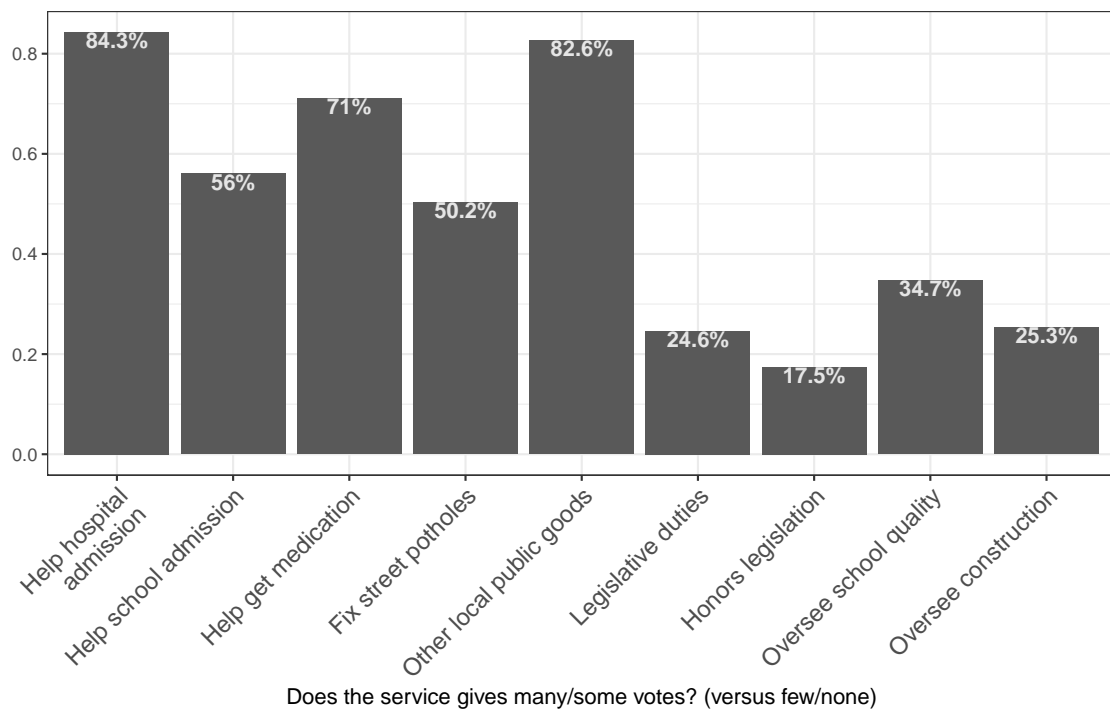


Figure 3 shows that 84.3% indicated getting a voter a hospital bed; 56.0% indicated school admission; and 71.0% reported helping acquire medication as the services that best secure votes. When asked specifically about local public goods, 50.2% indicated that fixing potholes on public roads results in many, or at least some, votes while 82.6% answered that local public goods give high electoral yields. As for the electoral attractiveness of lawmaking and oversight services, 24.6% of voters answered discussing and implementing legislation; 17.5% mentioned that legislation related to recognition and honors legislation generates votes; lastly, 25.3% reported overseeing a public construction project and 34.7% overseeing the quality of teaching at a public school, as

¹⁶In the online appendix, we put two additional questions on the councilors' practice. First, information on which types of services councilors refer to as prevalent in their representational practice. Second, information on the types of services the provision of which mayors facilitate for councilors, in an effort to build a governing coalition.

securing some or more votes.

In summary, local public goods that are believed to satisfy an immediate voter's need and that councilors can claim credit for the provision are also the ones preferred by politicians in their representation practices. In the previous section, we showed that school enrollment, infant mortality, and post-neonatal mortality improve. School enrollment matches our logic perfectly: voters want their children to go to school and politicians can target the placement. In the legislation analyzed, many councilors proposed bills that asked specific municipalities to give specific children spots at the school. Some bills even had the children's full names in the descriptions. Infant mortality, on the other hand, is hard to improve. However, if the electorate places a high value on it, politicians will find ways to improve it, usually concentrating on methods that take little effort and for which they can claim credit. Preventive care, such as neonatal consultations and the Family Health Program, remain insignificant.

Conclusion

In this paper, we argue that changes in city council size should improve services that politicians are interested in providing: services that councilors believe voters want and the provision of which they can claim credit for. Empirically, increases in city-council size decrease infant mortality and increase educational enrollment. However, these changes are not accompanied by improvements in education quality and preventive health care. In exploring the mechanism, we find that councilors have access to services via their attachment to mayors, and they also tend to prefer improvements in local public goods.

We witness improvements in welfare, but the political logic behind service provision skews these effects. This has a stimulating effect on Brazilian democracy. According to the Brazilian Institute of Geography and Statistics, during the 1980s the level of enrollment in primary school was 81% for students aged between seven and fourteen years, and infant mortality was nearly 64 children for every thousand born. By 2010,

school enrollment was closer to 99%, and infant mortality dropped to 23.74 casualties per 1,000 infants born.

However, in the same period, policies that were outside this politically rewarding scheme witnessed only modest improvements. For instance, Brazil scored consistently in the bottom decile in the OECD's *Programme for International Student Assessment* (PISA). Between 2006 and 2015, there were no improvements in reading and science scores and only a mild improvement in math. In 2000, among the 32 countries that participated in the PISA test, Brazil ranked last. In 2015, Brazil ranked 63rd among the 70 participant countries. Therefore, the achievements in infant mortality and education enrollment become less impressive when we consider that preventive care could safely avoid most of the hospital care or that poor Brazilians are enrolling their children in substandard schools.

Perhaps the solution for these problems is to improve the quality of Brazilian legislators (Ferraz and Finan 2011). Reelection incentives will still drive politicians, but motivated politicians can focus on services that generate long-term welfare, such as education quality and preventive health care. A more capable politician can devise a strategy to make these services rewarding, branding themselves outside the logic of exchanging small goods for votes, and still be viable electorally (Weitz-Shapiro 2012; Driscoll et al. 2018).

This paper contributes to two strands of the literature on legislature size and its welfare effects. First, it draws heavily from Weingast et al. (1981), who explain that reelection seeking legislators have incentives to over-provide local public goods for their constituencies at the expense of the entire country. This dynamic generates a free-riding incentive that results in an overall pressure for increased taxation and in inefficient service provision. This result is known as the *law of 1/n*.¹⁷ Our theory relates

¹⁷Most of the papers testing this theory find mixed results. Bradbury and Crain (2001), Gilligan and Matsusaka (2001), Chen and Malhotra (2007) and Aidt and Shvets (2012) show a positive impact of legislature size on expenditure in US states. Chen and Malhotra (2007) find that bicameralism helps to balance the effect of legislature size (*law of k/n*). Egger and Koethenbuerger (2010) and Pettersson-Lidbom (2012) find a negative effect in the cases of Germany, Sweden, and Finland. Fiorino and Ricciuti (2007) show a positive effect in the Italian case. Although the results seem sparse, most European countries are PR or Mixed electoral systems. When Weingast et al. (1981) designed the theory, the objective was to describe the incentives in majoritarian elections. Primo and Snyder Jr. (2008) show that

to the *law of 1/n* as we posit that politicians tend to prefer local public goods. However, the reason is different from free-riding on the tax pool: private and local public goods are preferred because they are easier in terms of targeting and credit claiming.

We draw from the legislative organization and literature on the representation of interest groups. This literature argues that more legislators have an ambiguous effect. On the one hand, it may increase the quantity of lawmaking, as more legislators drive down the costs of lobbying (Stigler 1976; Crain and Tollison 1977; Crain 1979; Rogers 2002; McCormick and Tollison 2012). On the other hand, it may increase ‘bottom neck’ pressure (Cox 2006), the transaction costs among legislators (Weingast and Marshall 1988), and the informational effect of larger decision bodies (Wit 1998). In our paper, we use the principle of team productivity (Alchian and Demsetz 1972), but the reason for service provision goes beyond fulfilling the demands of the lobbying industry: legislators want to provide services in the hopes of getting reelected. Politicians may favor lobbyists only when the benefits in terms of campaign resources outweigh the costs of diverting resources away from voters (Grossman and Helpman 1996).

the law of 1/n only works under some restrictive assumptions and could fail to hold when there are costs to raising revenues or shared costs with the central government. In a recent test, De Benedetto (2018) shows that increasing legislature size may also increase the efficiency of the public sector in Italian municipalities.

References

- Aidt, T. S. and J. Shvets (2012). Distributive politics and electoral incentives: Evidence from seven us state legislatures. *American Economic Journal: Economic Policy* 4(3), 1–29.
- Alchian, A. A. and H. Demsetz (1972). Production, information costs, and economic organization. *American Economic Review* 62(5), 777–795.
- Allen, G. and H. Stoll (2014). Representation as a numbers game: The link between legislative size and the representation of minorities and women. Retrieved from <http://www.scpipoliticaldata.org/SCPIVIII/Stoll18.pdf>.
- Auriol, E. and R. J. Gary-Bobo (2012). On the optimal number of representatives. *Public Choice* 153(3-4), 419–445.
- Baron, D. and J. Ferejohn (1989). Bargaining in legislatures. *American Political Science Review* 83(4), 1181–1206.
- Bertanha, M. (2017, Mar). Regression discontinuity design with many thresholds. Working Paper. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2712957.
- Bertholini, F., C. Pereira, and L. Renno (2018). Pork is policy: Dissipative inclusion at the local level. *Governance* 31(4), 701–720.
- Bradbury, J. C. and W. M. Crain (2001). Legislative organization and government spending: Cross-country evidence. *Journal of Public Economics* 82(3), 309–325.
- Bueno, N. S. (2018). Bypassing the enemy: Distributive politics, credit claiming, and nonstate organizations in Brazil. *Comparative Political Studies* 51(3), 304–340.
- Calonico, S., M. D. Cattaneo, M. H. Farrell, and R. Titiunik (2019). Regression discontinuity designs using covariates. *Review of Economics and Statistics* 101(3), 442–451.
- Calonico, S., M. D. Cattaneo, and R. Titiunik (2014). Robust nonparametric confidence intervals for regression-discontinuity designs. *Econometrica* 82(6), 2295–2326.
- Castro, M., F. Anastasia, and F. Nunes (2009). Determinantes do comportamento particularista de legisladores estaduais brasileiros. *Dados* 52(4), 961–1001.
- Cattaneo, M. D., M. Jansson, and X. Ma (2019). Simple local polynomial density estimators. *Journal of the American Statistical Association* 0(0), 1–11.
- Cattaneo, M. D., R. Titiunik, G. Vazquez-Bare, and L. Keele (2016). Interpreting regression discontinuity designs with multiple cutoffs. *The Journal of Politics* 78(3), 1229–1248.
- Chattopadhyay, R. and E. Duflo (2004). Women as policy makers: Evidence from a randomized policy experiment in India. *Econometrica* 72(5), 1409–1443.
- Chen, J. and N. Malhotra (2007). The law of k/n: The effect of chamber size of government spending in bicameral legislature. *American Political Science Review* 101(4), 657–676.
- Chin, A. and N. Prakash (2011). The redistributive effects of political reservation for minorities: Evidence from India. *Journal of Development Economics* 96(2), 265–277.
- Collingwood, L., T. Jurka, A. E. Boydston, E. Grossman, W. van Atteveldt, et al. (2013). Rtexttools: A supervised learning package for text classification. *The R Journal* 5(1), 6–12.
- Copque, H. L. F. and L. A. B. Trad (2005). Programa saúde da família: A experiência de implantação em dois municípios da bahia. *Epidemiologia e serviços de saúde* 14(4), 223–233.
- Cox, G. W. (2006). The organization of democratic legislatures. In *The Oxford Handbook of Political Economy*, pp. 141–61. Oxford University Press Oxford.

- Crain, W. M. (1979). Cost and output in the legislative firm. *The Journal of Legal Studies* 8(3), 607–621.
- Crain, W. M. and R. D. Tollison (1977). Legislative size and voting rules. *The Journal of Legal Studies* 6(1), 235–240.
- Crain, W. M. and R. D. Tollison (1982). Team production in political majorities. *Micropolitics* 2(1), 111–121.
- De Benedetto, M. A. (2018). Council size, government spending and efficiency: Evidence from a quasi-experimental design for Italian municipalities. *Politica economica* XXXIV(3), 297–326.
- Driscoll, A., G. Cepaluni, F. d. S. Guimarães, and P. Spada (2018). Prejudice, strategic discrimination, and the electoral connection: Evidence from a pair of field experiments in Brazil. *American Journal of Political Science* 62(4), 781–795.
- Duflo, E. (2012). Women empowerment and economic development. *Journal of Economic Literature* 50(4), 1051–79.
- Egger, P. and M. Koethenbueger (2010). Government spending and legislative organization: Quasi-experimental evidence from Germany. *American Economic Journal: Applied Economics* 2(4), 200–212.
- Eggers, A. C., R. Freier, V. Grembi, and T. Nannicini (2018). Regression discontinuity designs based on population thresholds: Pitfalls and solutions. *American Journal of Political Science* 62(1), 210–229.
- Ferraz, C. and F. Finan (2011). Motivating politicians: The impacts of monetary incentives on quality and performance. NBER Working Papers. Retrieved from <https://www.nber.org/papers/w14906>.
- Finan, F. and L. Schechter (2012). Vote-buying and reciprocity. *Econometrica* 80(2), 863–881.
- Fiorina, M., B. Cain, and J. Ferejohn (1987). *The personal vote: Constituency service and electoral independence*. Harvard University Press.
- Fiorino, N. and R. Ricciuti (2007). Legislature size and government spending in Italian regions: Forecasting the effects of a reform. *Public Choice* 131(1-2), 117–125.
- Gailmard, S. and J. W. Patty (2019). Preventing prevention. *American Journal of Political Science* 63(2), 342–352.
- Gilligan, T. and J. Matsusaka (2001). Fiscal policy, legislature size, and political parties: Evidence from the first half of the twentieth century. *National Tax Journal* 54(1), 57–82.
- Grossman, G. M. and E. Helpman (1996). Electoral competition and special interest politics. *The Review of Economic Studies* 63(2), 265–286.
- Gulzar, S. and B. J. Pasquale (2017). Politicians, bureaucrats, and development: Evidence from India. *American Political Science Review* 111(1), 162–183.
- Krehbiel, K. (2010). *Information and legislative organization*. University of Michigan Press.
- Kuschnir, K. (2000). *O cotidiano da política*. Zahar.
- Leal, V. N. (2012). *Coronelismo, enxada e voto: o município e o regime representativo no Brasil*. Editora Companhia das Letras.
- Lopez, F. and A. Almeida (2017a). Legisladores, captadores e assistencialistas: A representação política no nível local. *Revista de Sociologia e Política* 25(62), 157–181.
- Lopez, F. and A. Almeida (2017b). Legislators, fundseekers, and paternalists: Political representation at the local level. *Revista de Sociologia e Política* 25(62), 157–181.
- Luna, J. P. (2014). *Segmented representation: Political party strategies in unequal democracies*. OUP Oxford.

- McCormick, R. E. and R. D. Tollison (2012). *Politicians, legislation, and the economy: An inquiry into the interest-group theory of government*, Volume 3. Springer Science & Business Media.
- McCrary, J. (2008). Manipulation of the running variable in the regression discontinuity design: A density test. *Journal of Econometrics* 142(2), 698–714.
- McCubbins, M. D. and T. Schwartz (1984). Congressional oversight overlooked: Police patrols versus fire alarms. *American Journal of Political Science* 28(1), 165–179.
- Moisés, J. Á. and R. Meneguello (2006). A desconfiança dos cidadãos nas instituições democráticas. https://www.cesop.unicamp.br/por/banco_de_dados/v/2320. Accessed: 2019-02-17.
- Myerson, R. B. (1998). Extended poisson games and the condorcet jury theorem. *Games and Economic Behavior* 25(1), 111–131.
- 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.
- Nielsen, P. A. and D. P. Moynihan (2017). How do politicians attribute bureaucratic responsibility for performance? Negativity bias and interest group advocacy. *Journal of Public Administration Research and Theory* 27(2), 269–283.
- North, D. C. and B. R. Weingast (1989). Constitutions and commitment: the evolution of institutions governing public choice in seventeenth-century England. *Journal of Economic History* 49(4), 803–832.
- 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.
- Pettersson-Lidbom, P. (2012). Does the size of the legislature affect the size of government? Evidence from two natural experiments. *Journal of Public Economics* 96(3), 269–278.
- Poulsen, A. and C. Varjao (2018). Political opposition, legislative oversight, and politician performance: Evidence from Brazil. Technical report, Working Paper. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3304209.
- Primo, D. and J. M. Snyder Jr. (2008). Distributive politics and the law of 1/n. *The Journal of Politics* 70(2), 477–486.
- Robinson, J. A. and T. Verdier (2013). The political economy of clientelism. *The Scandinavian Journal of Economics* 115(2), 260–291.
- Rogers, J. R. (2002). Free riding in state legislatures. *Public Choice* 113(1-2), 59–76.
- Silva, T. and G. D. Whitten (2017). Clarity of responsibility and vote choice. *The SAGE Handbook of Electoral Behaviour* 1, 80–91.
- 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.
- Stokes, S. (2005). A formal model of machine politics with evidence from Argentina. *American Political Science Review* 99(5), 315–325.
- Stokes, S., T. Dunning, M. Nazareno, and V. Brusco (2013). *Brokers, Voters, and Clientelism*. Cambridge Studies in Comparative Politics. Cambridge University Press.
- Tsebelis, G. et al. (2002). *Veto players: How political institutions work*. Princeton University Press.
- Vieira, A. C. (2015). Clientelismo e serviços de saúde. *Revista Políticas Públicas* 6(1), 9–40.

- Weaver, R. K. (1986). The politics of blame avoidance. *Journal of Public Policy* 6(4), 371–398.
- Weingast, B., K. Shepsle, and C. Johnsen (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 W. J. Marshall (1988). The industrial organization of congress; or, why legislatures, like firms, are not organized as markets. *Journal of Political Economy* 96(1), 132–163.
- Weitz-Shapiro, R. (2012). What wins votes: Why some politicians opt out of clientelism. *American Journal of Political Science* 56(3), 568–583.
- Wit, J. (1998). Rational choice and the condorcet jury theorem. *Games and Economic Behavior* 22(2), 364–376.

Appendix (print)

Online Supplemental Materials Content

In the online appendix we present the following complementary information:

1. A formal model to explain the dynamics of service provision in enlarged legislatures.
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 corrections.
6. The placebo regressions for the mechanism outcomes.
7. The sensitivity analysis for the bandwidth selection.
8. The sensitivity to the polynomial degree, varying from local linear to quartic.
9. The sensitivity to covariates used in the estimation.
10. The sensitivity to the heterogeneous effects of different Brazilian states.
11. The sensitivity to eliminate one or more cutoffs from the estimation.
12. Further analysis on the role of mayors, mayoral parties, and parties in the city council.
13. A description of the bills dataset collected for the 64 municipalities that had this information online.
14. A description of the 2016 city councilors' survey.

The URL to access the Appendix is REDACTED FOR PEER REVIEW.

Replication Materials

The replication materials are REDACTED FOR PEER REVIEW.

Online Supplemental Materials

Legislature Size and Welfare: Evidence from Brazil

Contents

B.1	Guide to the Data Replication Materials	3
B.2	A Model of Legislature Size and Service Provision	3
B.3	Variable Sources and Descriptive Statistics	7
B.4	Threshold Manipulation and Sorting Tests	12
B.5	Population Thresholds in Brazil Before and After the 2003 Supreme Court Decision	14
B.6	Identification Strategy in Multiple Thresholds Regression Discontinuity Design	18
B.7	Placebo Regressions for the Aggregated Mechanism Outcomes	22
B.8	Sensitivity Analysis for Bandwidth Selection	23
B.9	Sensitivity to Different States in the Analysis	25
B.10	Sensitivity to the Functional Form Analysis	30
B.11	Sensitivity to Covariates	33
B.12	Sensitivity to Additional Cutoffs	38
B.13	Further analysis on the role of mayors, mayoral parties, and parties in the city council.	43
B.13.1	Mayoral parties	43
B.13.2	Mayoral characteristics	43
B.13.3	Transfers and revenue	44
B.13.4	City councilors party composition	45

B.14 Legislation Dataset 47

B.15 City Councilors Survey 49

B.1 Guide to the Data Replication Materials

The replication materials can be found at http://REDACTED_FOR_PEER_REVIEW. There are two files in the Github: `analyzing.R` and `dfsLegSizeWelfare2019.RData`. The first file has all the coding necessary to rerun the analysis. The second file has the four datasets required in the analysis. In order to replicate analysis, you need to change the following lines:

- Line 42: put the folder where you located the data.
- Line 56: put the location you want to save the tables.
- Line 57: put the location you want to save the graphs.

In this appendix, we place only the main results. The entire appendix, with all the analysis, follows in the http://REDACTED_FOR_PEER_REVIEW.

B.2 A Model of Legislature Size and Service Provision

Consider a set of n politicians and a representative voter. The politicians have two choice variables: the amount of effort they will invest in providing services that give high electoral yield and are easier for claim credit ($e_L \in \mathbb{R}_+$), and the amount of effort they will invest in providing low electorally-rewarding services ($e_G \in \mathbb{R}_+$).¹ The voters decide whether to retain or dismiss the legislature. If the legislators are reelected, they get B in office perks, the game ends, and the payoffs are realized. The game has the following timeline:

1. Politicians choose the effort to provide services (e_L) and (e_G).
2. The voter decides whether to retain (R) or dismiss D the current legislature.
3. Payoffs are realized.

¹Services vary in two dimensions, so technically we should provide examples for four types of goods. However, there are services amenable for credit claiming but low in terms of electoral reward are intermediate goods, and we could illustrate their behavior as linear combinations of the extremes.

In terms of welfare, the voter has the following utility function:

$$U_V(\mathbf{e}_L, \mathbf{e}_G) = \ln\left(\sum_{j=1}^n e_{Lj}\right) + \delta \ln\left(\sum_{j=1}^n e_{Gj}\right)$$

$\delta \in [0, 1]$ is the salience of the less preferred service. We use the log function to capture the decreasing marginal gains from these services. Moreover, from a social welfare standpoint, δ should be equal to 1, as both services are equally important for welfare. Variations in δ represent salience variation. The payoff for politicians is the following:

$$U_{Pi} = B\mathbb{1}(Reselection) - c(e_{Li} + e_{Gi})$$

For simplicity, we assume that all politicians derive the same benefit B from remaining in office. Also, notice that the linear cost for providing public services is $c > 0$, but any convex function would work.

The politician's incentive compatibility constraint requires that:

$$B\mathbb{1}(Reselection) - c(e_{Li} + e_{Gi}) \geq 0$$

The politicians are indifferent between getting or not getting the benefit from the office if the cost of providing the service is equal to the benefit garnered from the office. Solving for equality, concerning e_{Gi} , we have:

$$e_{Gi} = \frac{B\mathbb{1}(Reselection)}{c} - e_{Li}$$

As the politician's payoff functions are the same, we solve for the symmetric Nash equilibrium, which allows us to drop the i index from our calculations. Notice that the politicians are indifferent as regards providing or not providing the services. We are assuming that they do provide them, and the voters reelect them, conditional on the successful provision of said services ($\mathbb{1}(Reselection) = 1$). Thus, the problem from the perspective of voters is determining the required amount of service provision from the politicians:

$$\max\{\ln(n) [\ln(e_L) + \delta \ln(e_G)]\}$$

And applying the value for e_G into this equation, we have a single variable optimization problem:

$$\max_{e_L} \left\{ \ln(n) \left[\ln(e_L) + \delta \ln \left(\frac{B}{c} - e_L \right) \right] \right\}$$

The first order condition for this problem is:

$$\ln(n) \left[\frac{1}{e_L} - \frac{\delta}{\frac{B}{c} - e_L} \right] = 0$$

Solving for e_L , we have:

$$e_L^* = \frac{B}{c(1 + \delta)}$$

Notice that the optimal amount of service L increases with the benefit from office (B) and decreases with both the cost of service provision (c) and the salience of the less salient service (δ). The optimal amount of service G is:

$$e_G^* = \frac{B\delta}{c(1 + \delta)}$$

The total amount of services received by the voter is:

$$\ln(n) \left[(1 + \delta) \ln \left(\frac{B}{c(1 + \delta)} \right) + \delta \ln(\delta) \right]$$

Proposition 1. *Let $B > 2c$. When the salience of service G increases, the following statements are true:*

1. *The optimal amount of effort to provide service L (G) decreases (increases).*
2. *The total amount of public services increases (decreases) when $\delta \in \left(\frac{c}{B - c}, 1 \right)$ ($\delta \in \left(0, \frac{c}{B - c} \right)$).*

3. *The amount of provided services increases with the number of politicians.*

Proof. The first part is straightforward: it suffices to take the derivatives of e_L^* and e_G^* w.r.t. δ . For the second part:

$$\frac{\partial}{\partial \delta} \left\{ \ln(n) \left[(1 + \delta) \ln \left(\frac{B}{c(1 + \delta)} \right) + \delta \ln(\delta) \right] \right\}$$

And after the computations, we have:

$$\ln(n) \left(\ln \left(\frac{B}{c(1 + \delta)} \right) + \ln(\delta) \right)$$

Also, we present results solving for a given inequality. For the last result, it suffices to take the derivative w.r.t. n . This result is straightforward and therefore not derived here. □

In summary, the results w.r.t. δ are non-linear, but the amount of services increase with the number of politicians. In an environment plagued by low salience of the G service (low δ), increasing the number of politicians disproportionately increases the provision of L service. Note also that when $\delta = 1$, the provision of both services is the same, and the welfare achieves its maximum.

B.3 Variable Sources and Descriptive Statistics

We use three information sources, either from Brazilian governmental agencies or available online. Table 1 displays the primary sources and their respective URLs.

Now let us define each variable.

Outcomes Aggregated at the Municipal Level:

- **Number of Seats 2000:** Number of councilors in the municipality by the 2000 elections (source: TSE).
- **Population 2000:** Municipal population according to the 2000 Brazilian Census (source: IBGE).
- **Per-Capita GDP Census 2000 (in millions):** Municipal per-capita GDP computed by the IBGE Census (source: IPEA).
- **Proportion of Poverty Census 2000:** Proportion of poverty in the municipality defined as people living on less than R\$ 70.00 a day (source: MDS).
- **Number of Seats 2004:** Number of city-councilors in a municipality according to the Electoral Justice decision (source: TSE).
- **Infant Mortality 2005–2008:** Infant mortality computed as the number of children born alive that died before reaching one year of age divided by the number of children born alive, multiplied by 1,000 (source: DataSUS)
- **Post-Natal Mortality Rate 2005–2008:** Infant mortality computed as the number of children born alive that successfully lived 28 days, but died before reaching one year of age, divided by the number of children born alive, multiplied by 1,000 (source: DataSUS)
- **Coverage Family Health Program 2005–2008:** Number of families covered by the Family Health Program (source: DataSUS).
- **Prop. Born w. 7+ Pre-Natal 2005–2008:** Proportion of children born who went to seven or more prenatal care consultations (source: DataSUS)

Table 1: *Data Sources*

Source Code	Source Name	Description	URL
DataSUS	Brazilian Health Ministry Data Service	Collects data on Health Care	http://www.datasus.gov.br
IBGE	Brazilian Institute of Geography and Statistics	Collects data Geography, Economics and Demography	http://www.ibge.gov.br
INEP	Data Service of Ministry of Education	Collects data on performance of Education	http://www.inep.gov.br
InterLegis	Senate Legislative Data Service	Collect Data on Legislative in Brazil	http://www.interlegis.leg.br
IPEA	Brazilian Institute of Applied Economics	Collects data on the Economy	http://www.ipeadata.gov.br
MDS	Social Security Ministry	Collect data on Social Coverage and Effectiveness of Social Programs	http://www.mds.gov.br
TSE	Superior Electoral Tribunal	Collects data on elections results	http://www.tse.jus.br

- **Enrollment Elementary School 2005–2008:** Number of children enrolled in elementary schools, averaged by classroom size (K–4) (source: INEP).
- **Enrollment Middle School 2005–2008:** Number of children enrolled in middle schools, averaged by classroom size (5–9) (source: INEP)
- **Quality of Elementary School Index 2005–2008:** IDEB score averaged by schools in the municipality. IDEB scores are composed by the student's grades in math and language, multiplied by an indicator of the distortion between the year the child is supposed to be and the year the child is. The estimators are cleaned to avoid influences of schools and classroom specific effects (source: INEP, years: 2005, 2007).
- **Quality of Middle School Index 2005–2008:** IDEB score averaged by schools in the municipality. IDEB scores are composed by the student's grade in math and language, multiplied by a score capturing the distortion between the year the child is supposed to be in, and the year the child is studying. The estimators are cleaned to avoid the influence of schools and classrooms specific effects. (source: INEP, years: 2005, 2007).
- **Mayoral Pre-Electoral Coalition Size 2004:** Number of elected councilors in the mayoral pre-electoral coalition (source: TSE)
- **Number of Appointed Bureaucrats 2005–2008:** Number of bureaucrats of the direct administration that were appointed to jobs in the municipality (source: IBGE, years: 2005, 2006, and 2008)
- **Number of Career Bureaucrats 2005–2008:** Number of career bureaucrats in the municipality. Career bureaucrats cannot be fired by politicians and earn considerably better pensions after retirement (source: IBGE, years: 2005, 2006, and 2008)
- **Number of Councilor's Appointed Assistants 2005:** Number of assistants appointed for the councilor cabinet (source: InterLegis)
- **Number of Females Elected 2004:** Number of females elected to city council (source: TSE)

- **Number of Non-Whites Elected 2004:** Number of non-whites elected to city council. We collected this data for municipalities less than 10,000 inhabitants away from the cutoffs (source: our compilation based on the TSE candidate pictures).
- **Competition per Seat 2004:** Number of people running for city-councilor divided by the number of city councilors in the municipality (source: TSE)
- **Proportion Approved Legislation 2005:** Number of approved legislation in 2005 divided by the number of proposed legislation (source: InterLegis)

Legislation Dataset:

We coded the legislation approved by the councilors in 64 municipalities that are 10 thousand inhabitants away from the council size thresholds. We classified the legislation in five categories:

- **Local Public Goods:** Legislation that provides a service targeted at the individual, group, or geographical level.
- **Public Goods or General Legislation:** Legislation that provides a service for the entire municipality, or approves a law that does not discriminate among citizens.
- **Oversight:** Legislation that requests information to the mayor's office or the bureaucracy about the provision of services.
- **Others:** Legislation that is not classified as Local Public Goods, Public Goods, or Oversight. Usually honors or procedures.
- **Education and Health Care:** Legislation about Education or Health Care provision.

Online 2016 Former City Councilors Survey:

We run an online survey asking 174 councilors whether helping with [...service...] gives [none, few, some, or many] votes. The services were:

- **Help Hospital Admission:** We asked former councilors whether helping with hospital admission gives [none, few, some, many] votes (source: survey).

- **Help School Admission:** We asked former councilors whether helping with school admission gives [none, few, some, many] votes (source: survey).
- **Help Getting Medication:** We asked former councilors whether helping voters get medication gives [none, few, some, many] votes (source: survey).
- **Fix Street Potholes:** We asked former councilors whether pressing the bureaucracy to fix street potholes gives [none, few, some, many] votes (source: survey).
- **Other Local Public Goods:** We asked former councilors whether helping voters with local public goods and services such as traffic rules, sewage constructions, potable water, and others, gives [none, few, some, many] votes (source: survey).
- **Legislative Duties:** We asked former councilors whether the act to discuss, propose, and vote on legislation gives [none, few, some, many] votes (source: survey).
- **Honors Legislation:** We asked former councilors whether proposing bills to praise local celebrities gives [none, few, some, many] votes (source: survey).
- **Oversee School Quality:** We asked former councilors whether overseeing school quality gives [none, few, some, many] votes (source: survey).
- **Oversee Construction:** We asked former councilors whether overseeing public construction gives [none, few, some, many] votes (source: survey)

In this Appendix, we present other questions we asked in the survey. They are meant to improve the knowledge we have about the city councilors perceptions about their representation. We have not added these to the main paper because they were more complimentary and not of general interest. The descriptive statistics of the variables used in the main paper follow in Table 2.

Table 2: Summary Statistics

Statistic	N	Mean	St. Dev.	Min	Max
Municipal Characteristics					
Number of Seats 2000	5,521	10.76	2.70	9	21
Population 2000	5,474	22,341.96	44,573.67	697	567,728
Per-Capita GDP Census 2000 (in thousands)	5,474	0.13	0.46	0.00	13.57
Proportion of Poverty Census 2000	5,474	46.58	22.82	2.89	93.02
Number of Seats 2004	5,527	9.22	0.94	9	21
Health Care Outcomes					
Infant Mortality 2005-2008	13,329	20.64	13.45	1.28	209.30
Post-Natal Mortality Rate 2005-2008	6,113	9.29	8.64	0.59	200.00
Coverage Family Health Program 2005-2008	20,577	76.97	27.39	0.00	100.00
Prop. Born w. 6+ Pre-Natal 2005-2008	16,578	54.02	24.30	0.57	100.00
Education Outcomes					
Enrollment Elementary School 2005-2008	10,842	20.62	5.32	1.00	57.80
Enrollment Middle School 2005-2008	7,887	25.18	7.25	1.00	92.50
Quality of Elementary School Index 2005-2008	9,267	3.73	0.94	0.70	8.10
Quality of Middle School Index 2005-2008	5,566	3.21	0.76	0.30	6.60
Resources and Patronage					
Mayoral Coalition Size 2004	5,522	4.86	1.71	0.00	17.00
Number of Appointed Bureaucrats 2005-2008	16,564	67.78	126.68	0	2,894
Number of Career Bureaucrats 2005-2008	16,558	436.13	698.17	0	11,633
Number Councilor Assistants 2005	5,523	4.63	8.55	0	213
Representation and Competition					
Proportion Female Elected 2004	5,526	1.12	1.20	0.00	8.00
Proportion Non-White Elected 2004	397	2.23	1.87	0.00	9.00
Competition per Seat 2004	5,527	6.27	3.82	1.00	25.83
Proportion Approved Legislation 2005	3,694	0.83	0.28	0.00	1.00
Legislation Approved Data					
Legislation – Local Public Goods	346,553	0.73	0.44	0	1
Legislation – Public Goods	346,553	0.03	0.18	0	1
Legislation – Oversight	346,553	0.03	0.18	0	1
Legislation – Others	346,553	0.17	0.38	0	1
Legislation – Education and Health	346,553	0.11	0.31	0	1
Survey – Electoral Attractiveness of Services					
Votes – Help Hospital Admission	174	0.82	0.38	0	1
Votes – Help School Admission	174	0.59	0.49	0	1
Votes – Help get Medication	174	0.71	0.46	0	1
Votes – Fix Street Potholes	174	0.49	0.50	0	1
Votes – Local Public Goods	174	0.81	0.39	0	1
Votes – Legislive Duties	174	0.22	0.42	0	1
Votes – Honors Legislation	174	0.18	0.38	0	1
Votes – Oversee School Quality	174	0.29	0.45	0	1
Votes – Oversee Construction	174	0.24	0.43	0	1

Notes: The legislation approved dataset has data on 64 of the 202 municipalities 10 thousand inhabitants from the council size thresholds. The survey summary statistics here are unweighted. Numbers of cases vary due to missingness.

B.4 Threshold Manipulation and Sorting Tests

The validity of our causal claim relies on the impossibility of municipalities to manipulate the placement at the left or right-hand side of the thresholds. We ran two tests to check whether we satisfy this assumption.

We run the [Cattaneo, Jansson and Ma \(2019\)](#) manipulation test, which is based on the

density of the local polynomial estimator. We use local polynomial orders from one to four. As the null hypothesis is no manipulation, the p-values for each polynomial order are: local linear (p-value = 0.442); quadratic (p-value = 0.740); cubic (p-value = 0.998); and quartic (p-value = 0.620). Therefore, there is no manipulation according to [Calonico et al. \(2019\)](#).

We also graph the [McCrary \(2008\)](#) test, pooling all the discontinuities. The results follow in Figure 1 and show no signs of manipulation.

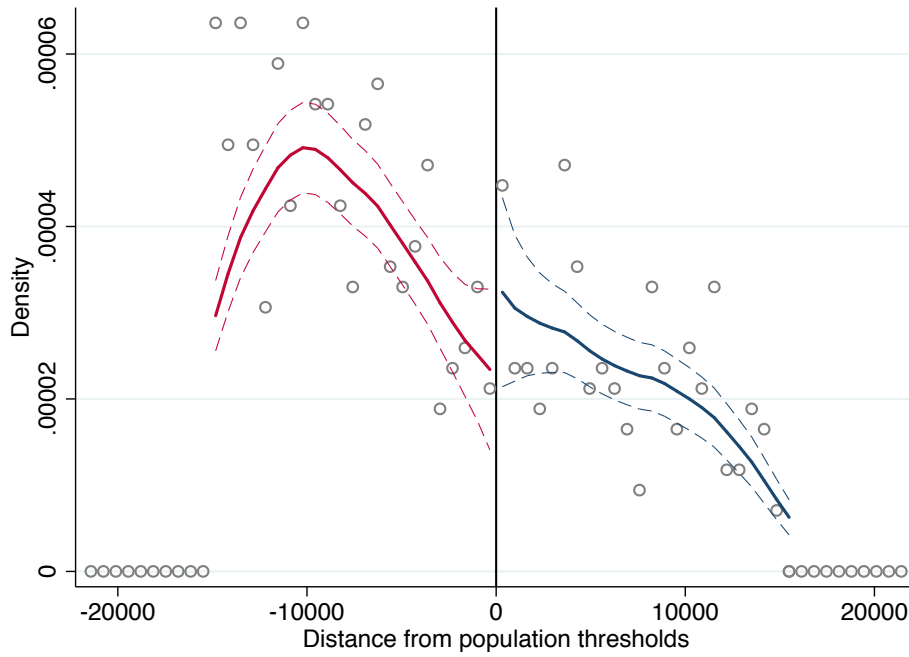


Figure 1: [McCrary \(2008\)](#) manipulation test

B.5 Population Thresholds in Brazil Before and After the 2003 Supreme Court Decision

The identification strategy requires exogenous changes in the city council size thresholds. Previous to the changes we exploit here, the 1988 Brazilian Constitution states the following distribution of seats per population size, presented in Table 3.

Table 3: *City council size from the 1988 Constitution*

	Min. Leg.	Max. Leg.	Min. Pop.	Max. Pop.	Num. Mun. Bin (2001-2004)
1	9	21	0	1,000,000	5,537
2	33	41	1,000,001	5,000,000	11
3	42	55	5,000,001	∞	2

These cutoffs were in place until 2003, when the municipality of Mira Estrela decided to decrease the council size from eleven to nine councilors. The two losing councilors started a judicial contestation that made it to the Supreme Court. The court ruled that the Constitution meant that council size should vary proportionally with population, starting with nine legislators, until the maximum number of councilors, 55. Following this decision, the Superior Electoral Tribunal (TSE) decided the thresholds that should be followed in the 2004 election (Resolution 21,702/2004). According to their decision, the legislature should increase as displayed in Table 4.

As there are few municipalities above one million inhabitants, we decided to restrict our attention to municipalities with less than $571,429 + 47,619 = 619,048$ inhabitants. Table 5 displays the frequency of municipality by thresholds used in our paper.

The Supreme Court ruled that the electoral courts should use the 2003 population projection to assign municipalities to cutoffs. In Brazil, the Brazilian Institute of Geography and Statistics (IBGE) propose the official population projections. Sorting is not an issue for our identification strategy, as IBGE is an insulated bureaucracy, insulated from local influences (see also the McCrary test above).

To provide an overview of the data dispersion, Figure 2 plots the municipalities by their proximity from the cutoffs. In the map we provide the contour of every Brazilian municipality, coloring it by the proximity to the council size thresholds. The darker the color, the closer

Table 4: *City council size thresholds according to TSE resolution 21,702/2004*

	Num. Leg.	Min. Pop.	Max. Pop.	Num. Mun. Bin (2003 pop. proj.)
1	9	0	47,619	5,029
2	10	47,620	95,238	317
3	11	95,239	142,857	89
4	12	142,858	190,476	43
5	13	190,477	238,095	30
6	14	238,096	285,714	21
7	15	285,715	333,333	13
8	16	333,334	380,952	13
9	17	380,953	428,571	6
10	18	428,572	476,190	6
11	19	476,191	523,809	4
12	20	523,810	571,428	5
13	21	571,429	1,000,000	13
14	33	1,000,001	1,121,952	1
15	34	1,121,953	1,243,903	2
16	35	1,243,904	1,365,854	1
17	36	1,365,855	1,487,805	2
18	37	1,487,806	1,609,756	1
19	38	1,609,757	1,731,707	1
20	39	1,731,708	1,853,658	0
21	40	1,853,659	1,975,609	0
22	41	1,975,610	4,999,999	4
23	42	5,000,000	5,119,047	0
24	43	5,119,048	5,238,094	0
25	44	5,238,095	5,357,141	0
26	45	5,357,142	5,476,188	0
27	46	5,476,189	5,595,235	0
28	47	5,595,236	5,714,282	0
29	48	5,714,283	5,833,329	0
30	49	5,833,330	5,952,376	0
31	50	5,952,377	6,071,423	1
32	51	6,071,424	6,190,470	0
33	52	6,190,471	6,309,517	0
34	53	6,309,518	6,428,564	0
35	54	6,428,565	6,547,611	1
36	55	6,547,612	∞	0

Table 5: *City council thresholds used in the paper*

	Legislature Size	Min. Population	Max. Population	Num. Mun. Bin (2003 pop.)
1	9	0	47,619	5,029
2	10	47,620	95,238	317
3	11	95,239	142,857	89
4	12	142,858	190,476	43
5	13	190,477	238,095	30
6	14	238,096	285,714	21
7	15	285,715	333,333	13
8	16	333,334	380,952	13
9	17	380,953	428,571	6
10	18	428,572	476,190	6
11	19	476,191	523,809	4
12	20	523,810	571,428	5
13	21	571,429	1,000,000	13

to the population thresholds. In regression discontinuity, the closer a municipality is to the cutoff, the more influential it is in the estimation. Figure 2 also shows that our municipalities are reasonably distributed around the whole country.

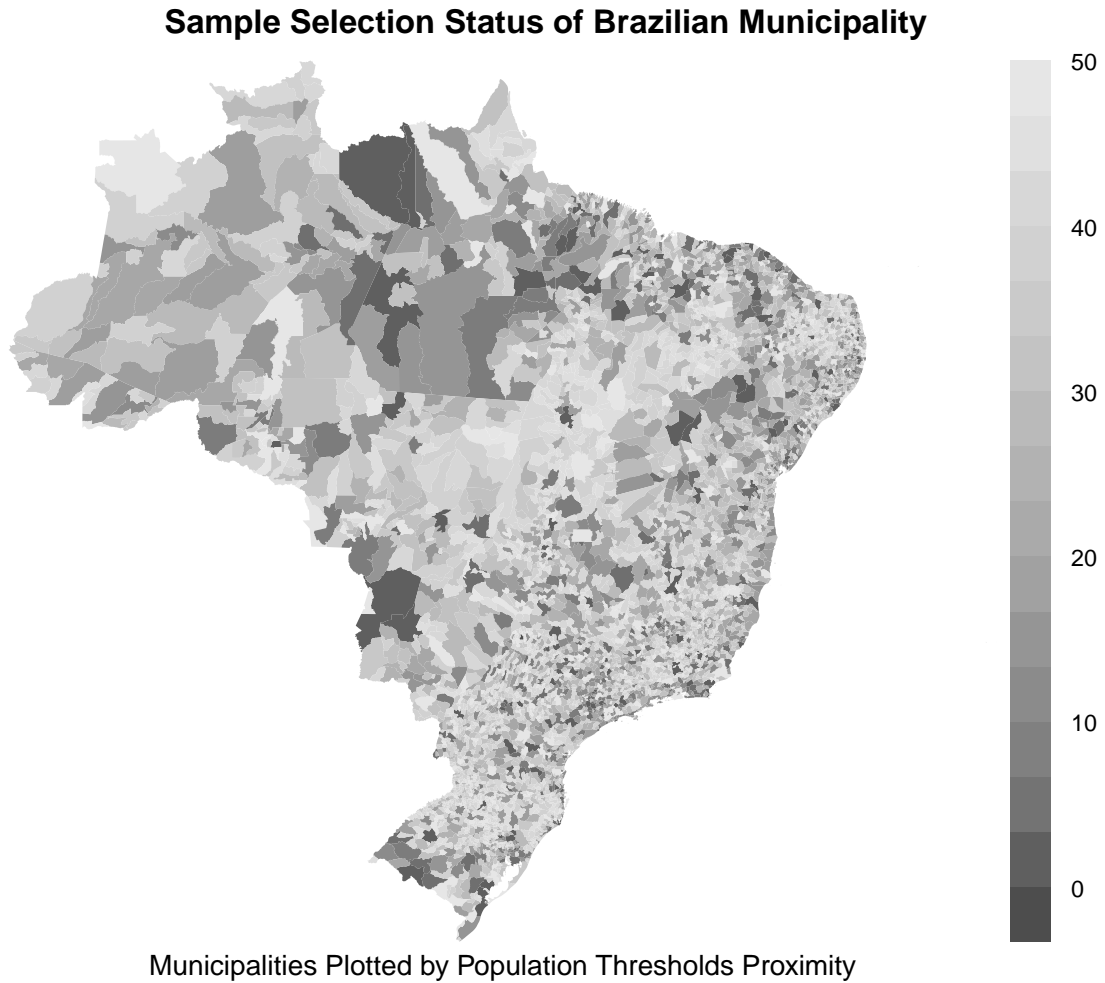


Figure 2: *Municipalities by their Selection Status*

Moreover, we could question whether the discontinuities studied here are sharp or fuzzy. In order to be fuzzy, the laws passed by the Supreme Court had to be contested or not be perfectly enforced. For instance, [Cavalcanti \(2017\)](#) shows in his second chapter that there has been a misuse of these discontinuities. However, this problem was absent in our RDD, as the problem identified by Cavalcanti was based on the use of thresholds approved in 2009. In our case, we use the thresholds approved in 2003, and until a period before 2009 (in our case, 2008).

B.6 Identification Strategy in Multiple Thresholds Regression Discontinuity Design

Usually when carrying out regression discontinuity with multiple cutoffs, authors pool all the discontinuities together and estimate the effect of council size on outcomes. Let $C = \{c_0, c_1, \dots, c_n, c_{n+1}\}$ be the set of cutoffs thresholds associated with the running variable X . The outcome variable is assumed to be Y . In the pooled model, the Local Average Treatment Effect is:

$$LATE_{nocontrols} = \mathbb{E} \left[\lim_{x \downarrow c_i} \mathbb{E}[Y_i | X_i] - \lim_{x \uparrow c_i} \mathbb{E}[Y_i | X_i] | \forall c_i \in C \right]$$

Nevertheless, this may be problematic as the municipal characteristics in each cutoff may vary from cutoff to cutoff. The population imbalance certainly carries out heterogeneity, in the way shown by [Cattaneo et al. \(2016\)](#). To ensure we have comparability, and that we estimate the average LATE for all cutoffs, avoiding most of the heterogeneity, we propose to add a set of controls denoted by Z_i that vary between cutoffs. For instance, the population that determines the change from one threshold to another also determines all the cutoffs. As the population varies smoothly around each cutoff, it makes it a perfect control to add. The new estimator is:

$$LATE_{controls} = \mathbb{E} \left[\lim_{x \downarrow c_i} \mathbb{E}[Y_i | X_i] - \lim_{x \uparrow c_i} \mathbb{E}[Y_i | X_i] | \forall c_i \in C, Z_i \right]$$

We control for Population, GDP, a dummy for the Northeast States, seats before the 2003 decision, and year. All these control variables are smooth in each cutoff, but are significantly different from cutoff to cutoff, making them adequate control variables for our case ([Calonico et al., 2019](#)). To perform the estimations, we use a triangular kernel, which places more weight on the municipalities that are closer to each cutoff. To compute the optimal bandwidth, we use the [Calonico, Cattaneo and Titiunik \(2014\)](#) method. To study the sensitivity to the bandwidth choice, we vary the bandwidth from 50% to 200% of the optimal bandwidth size. We also use cluster-robust standard errors at the municipal level.

However, as it is uncommon for a regression discontinuity to use control variables, some

readers may ask why in this case is it advisable? To answer this question, we run a series of simulations to show that controlling for the variable that determines the assignment not only helps improve the consistency of our estimates but also improves their efficiency.

Consider the data distributed in one of the four forms depicted by Figure 3. We add nine thresholds, at 0.1, 0.2, and so on until 0.9, and we create six types of outcomes. The first three outcomes are sharp changes. In the first, we add variation from one to 10, with one step for each change. In the second, we add 1 in the first cut, zero in the second cut, and -1 in the third cut, repeating this pattern for the remaining cutoffs. The estimated change should be equal to zero. In the third model, we add one in the first cut, $1 + 0.9$ in the second cut, $1 + 0.9 + 0.8$ in the third cut, and so on until the last cutoff. This is intended to simulate a diminishing effect from one cutoff to the other. The last three outcomes are the same as depicted here, added by a Normal random disturbance, mean zero, and variance 0.01. We then run a thousand Monte Carlo simulation for each combination, $4 \times 6 \times 2 = 48$ in total, fitting a regression with and without the running variable as a control.

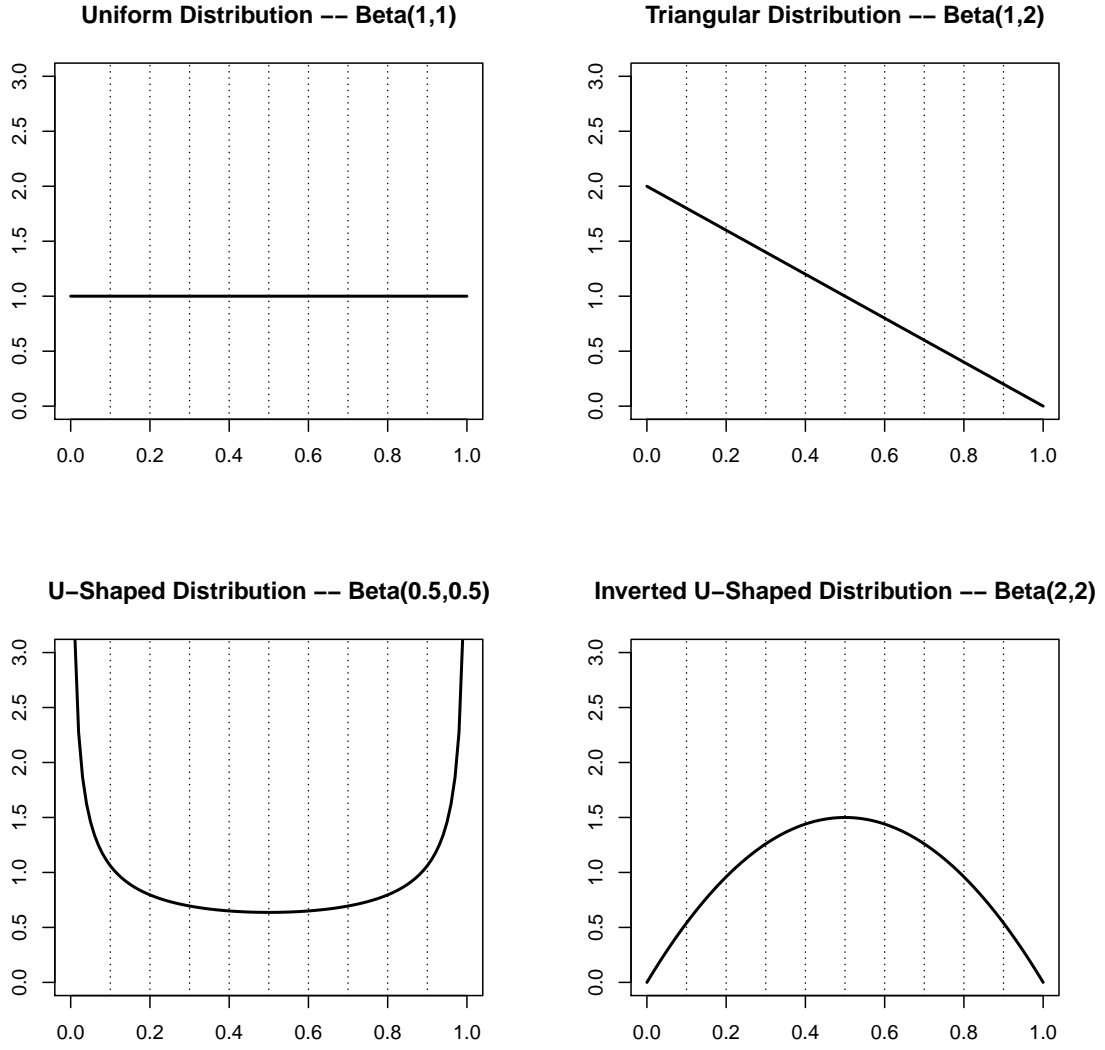


Figure 3: *Simulation RD with Multiple Thresholds – Data Distribution*

A consistent estimator should fit one in the first and fourth data distribution. In the second and fifth, the change should be of $(1, 0, -1, 1, 0, -1, 1, 0, -1)$, and the average change here is equal to zero. In the third and sixth models the change should be equal to $(0.9, 0.8, 0.7, 0.6, 0.5, 0.4, 0.3, 0.2, 0.1)$, and the average change should be equal to 0.5. The first three models should present a more efficient estimation than the last three models. We display the results in Figure 4, showing that the controlled models are more consistent and efficient.

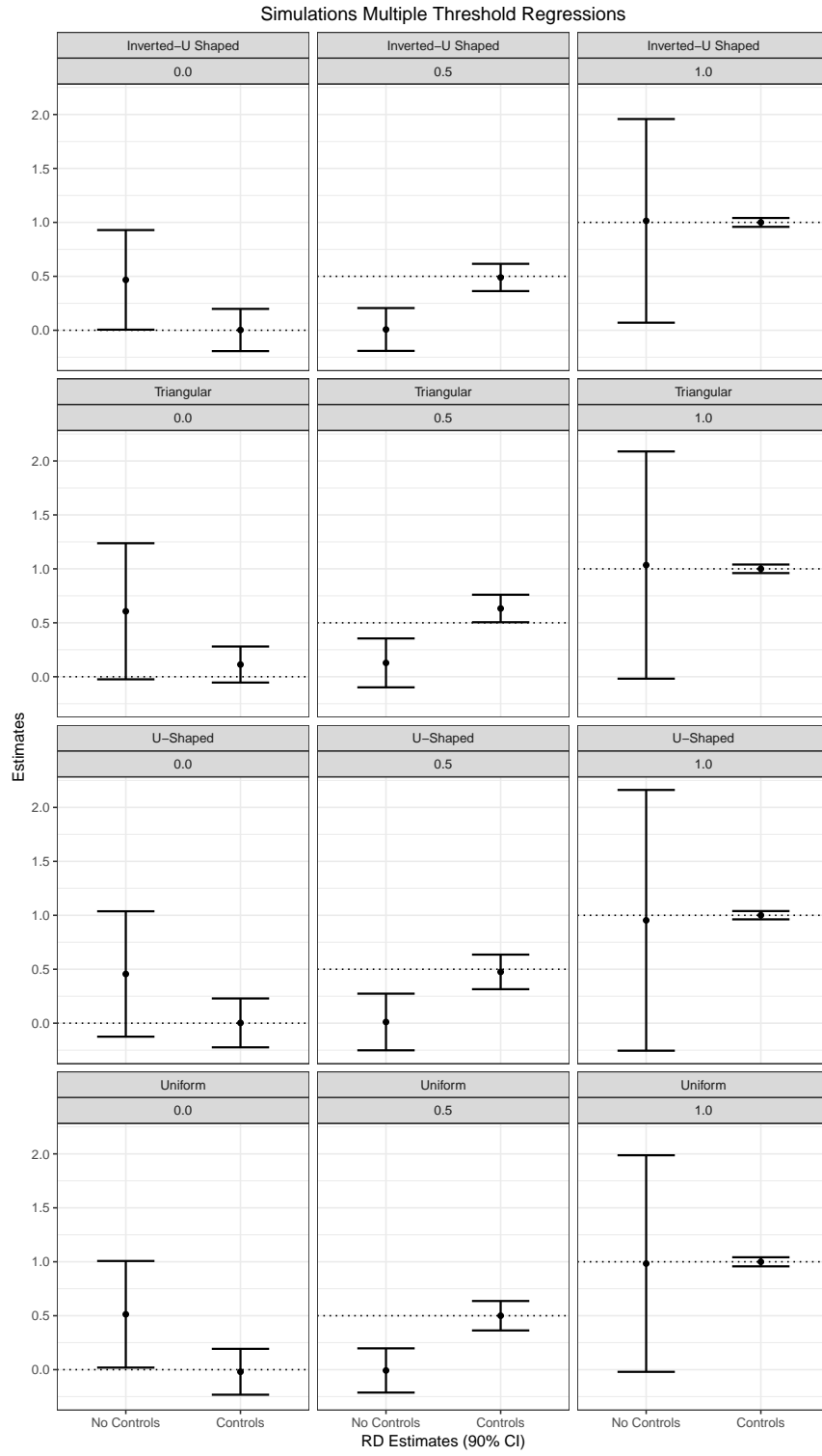


Figure 4: Estimations for the Different Data Generating Processes

B.7 Placebo Regressions for the Aggregated Mechanism Outcomes

Here we present the placebo regressions for the mechanism-aggregated outcomes. In Panel A of the main paper, we run the regression on alternative explanations. As we can see, the only female changed significantly, but the change is statistically expected in at least 10% of cases. For non-white, we have not collected data on non-white legislators in the placebo cutoffs; therefore, we leave it blank. In Panel B, we have the placebo regressions for the primary mechanism: resource access and patronage. As expected, the placebo regressions were not statistically significant.

Table 6: *Mechanism – Aggregate Municipal Level Regressions*

Panel A: Representation and Elections – Placebo Cutoffs				
	Representation		Elections & Leg. Productivity	
	Num. Female Councilors	Num. Non-white Councilors	Candidates Per Seat	Prop. Laws Approved Council
LATE	0.65** (0.27)		-0.72 (0.48)	-0.001 (0.06)
N Left	4620		4621	2991
N Right	906		906	703
Eff N Left	412		567	356
Eff N Right	297		347	229
BW Loc Poly	4.861		6.113	5.58
BW Bias	8.775		10.345	8.896
Panel B: Resource Access and Patronage – Placebo Cutoffs				
	Mayoral Coalition Size	Num. Politically Appointed Empl.	Num. Career Bureaucrats	Num. Councilor Assistants
LATE	0.12 (0.34)	3.77 (17.20)	115.67 (79.96)	-2.17 (1.81)
N Left	4618	13855	13850	4618
N Right	904	2709	2708	905
Eff N Left	644	1123	1464	592
Eff N Right	388	825	957	361
BW Loc Poly	6.730	4.475	5.461	6.279
BW Bias	10.421	7.600	9.999	10.944

Note: *** $p < .01$; ** $p < .05$; * $p < .1$. RD estimates using Calonico, Cattaneo and Titiunik (2014) optimal bandwidth selection and triangular kernel. Robust standard errors, clustered at the municipal level, in parenthesis. Controls: population, GDP per capita, number of seats in 2000, year, and dummy for northeast region.

B.8 Sensitivity Analysis for Bandwidth Selection

We present here the sensitivity to the bandwidth selection. Following the suggestions of [Bueno and Tuñón \(2015\)](#), we vary the bandwidth from 50% to 200% of the [Calonico, Cattaneo and Titiunik \(2014\)](#) estimate.

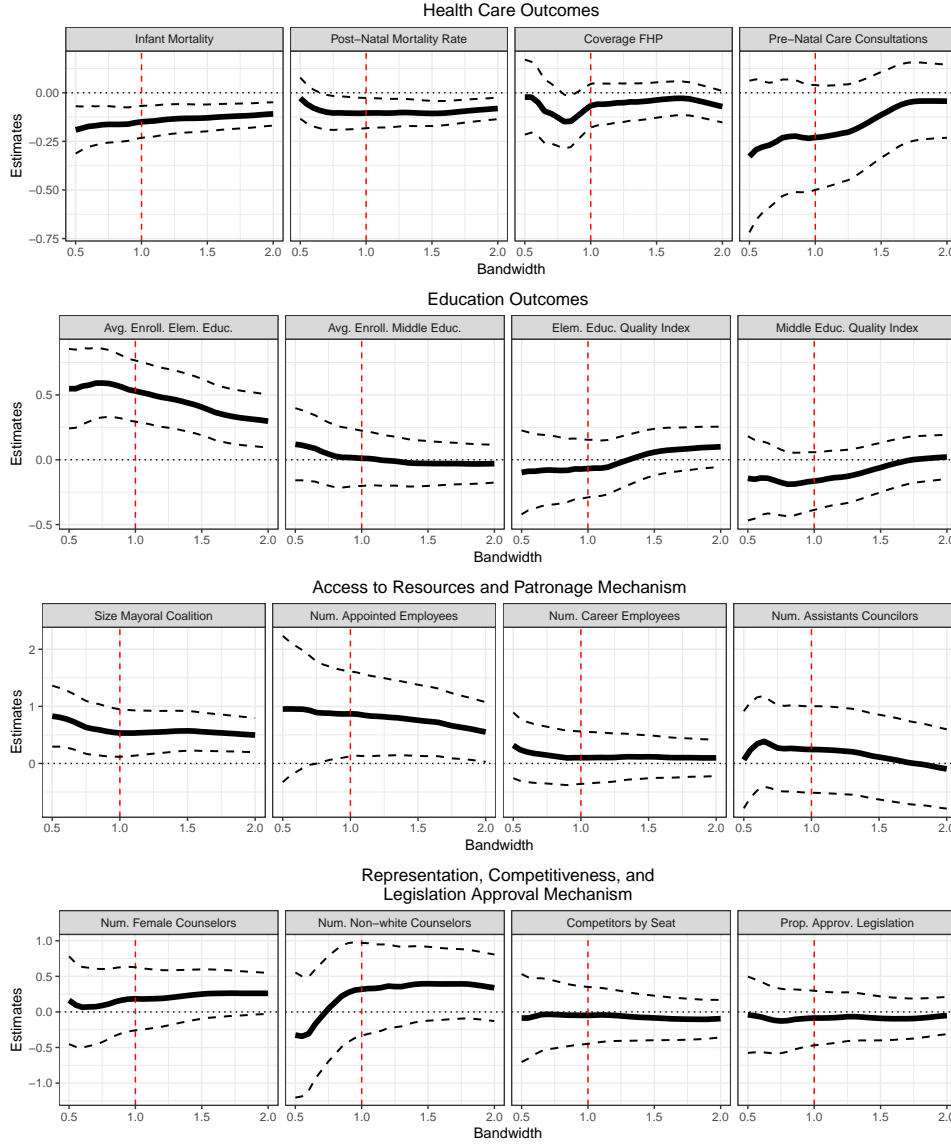


Figure 5: *Bandwidth Sensitivity – Main Models*

In Figure 6, we run the same bandwidth analysis for the placebo outcomes. The results, as expected, show mostly insignificant results.

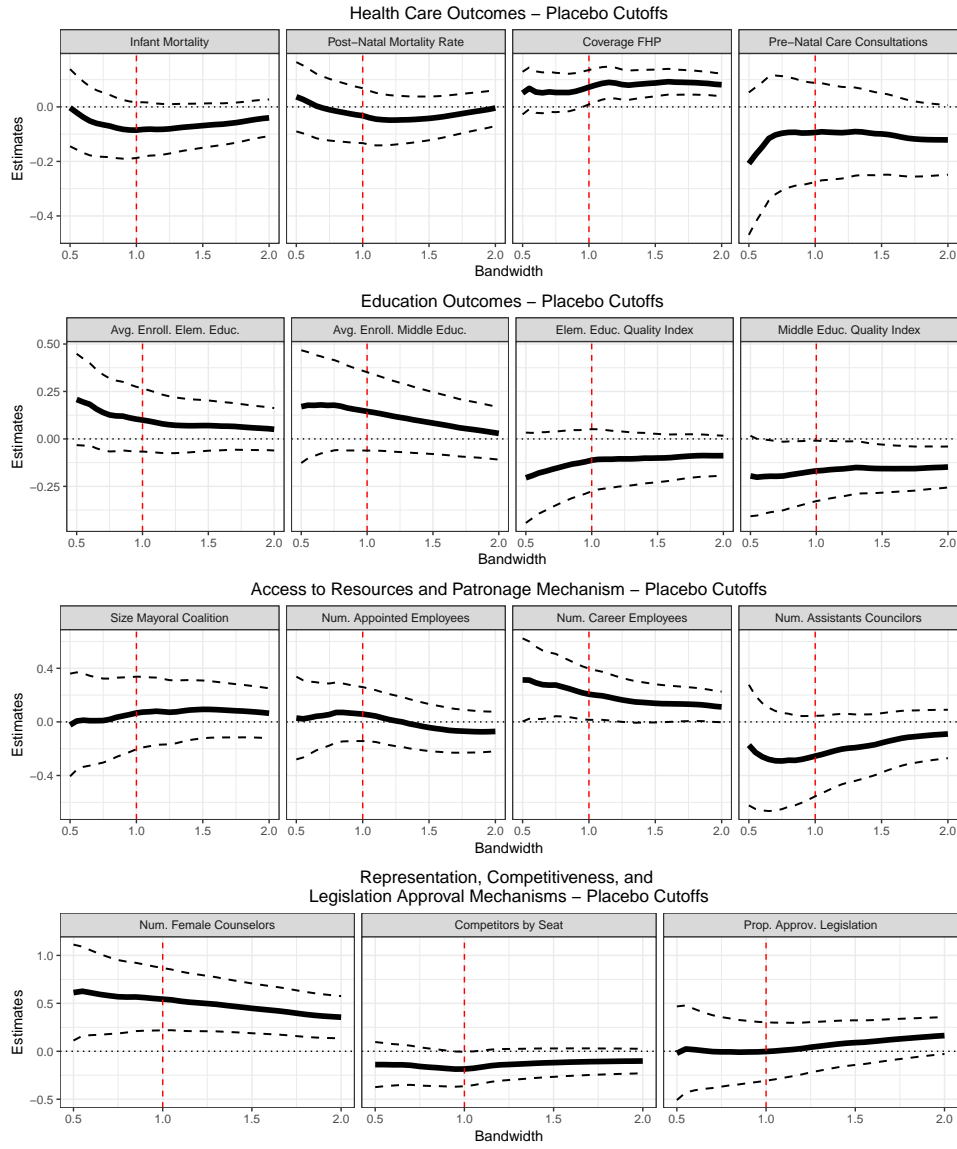


Figure 6: Placebo Regressions – Bandwidth Sensitivity

B.9 Sensitivity to Different States in the Analysis

The literature considers that some states are more prone to inefficiencies than the rest of the country. Moreover, some states had such poor Health Care and Education systems that they could be driving the results by themselves. As a consequence, our results could be a byproduct of structural changes in crucial states, instead of in council size. We run the analysis dropping one state at a time, to investigate this statewide heterogeneity. The results are in Figures 7, 8, 9, and 10.

To interpret the results, first, note that most coefficients remain around the same value as before the robustness checks. The exceptions are with the Family Health Program, which improves without Paraíba but decreases significantly without Bahia, both northeastern states. In the placebo, the FHP coverage increases when we remove Bahia and decrease when we add São Paulo. Otherwise, note that all the other variables remain unchanged, except for gender. Gender changes because there were laws during this period mandating a minimum amount of female candidates. It is expected that one variable changes as a response to randomness.

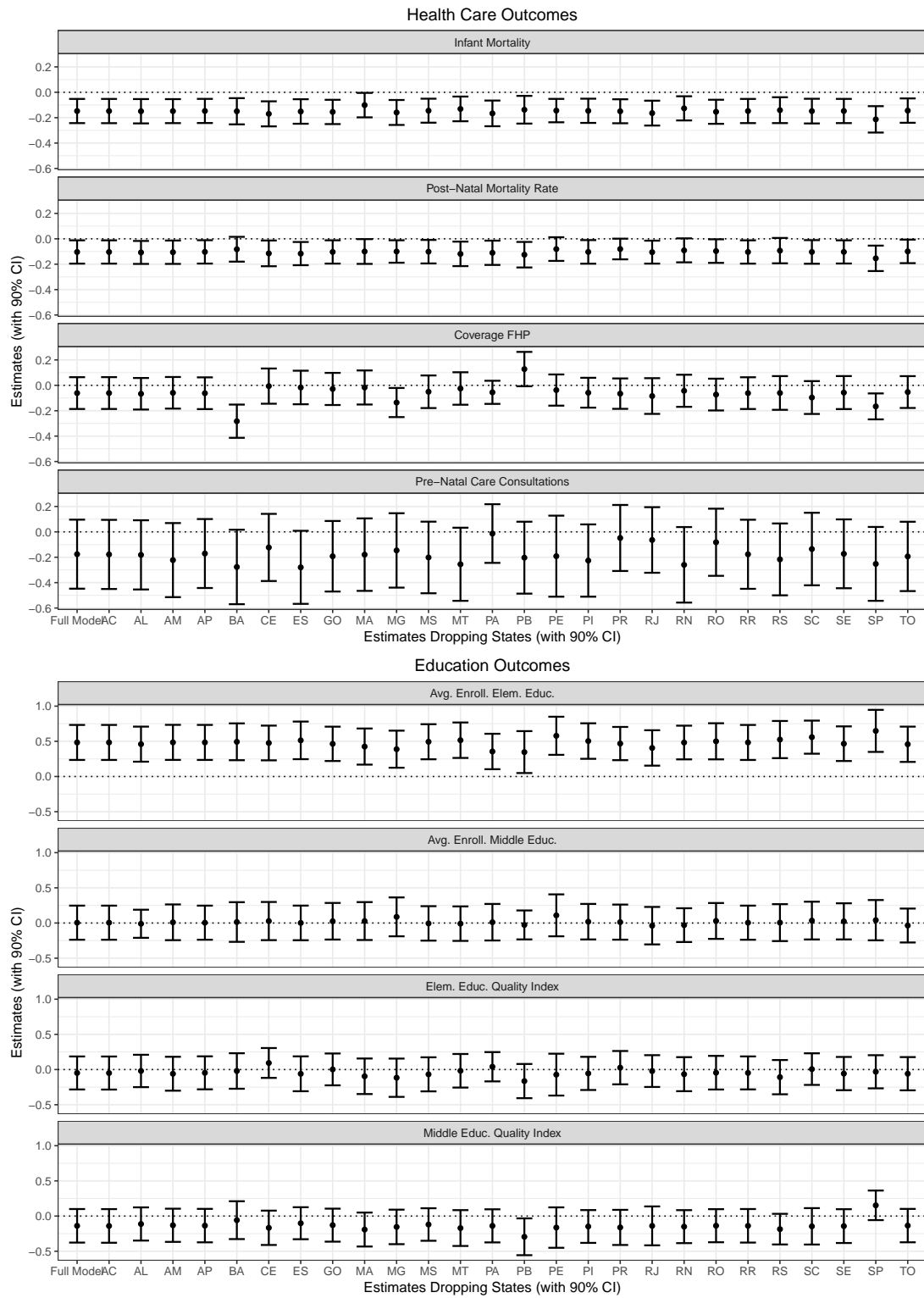


Figure 7: Sensitivity Analysis for the States in the Sample – Welfare Outcomes

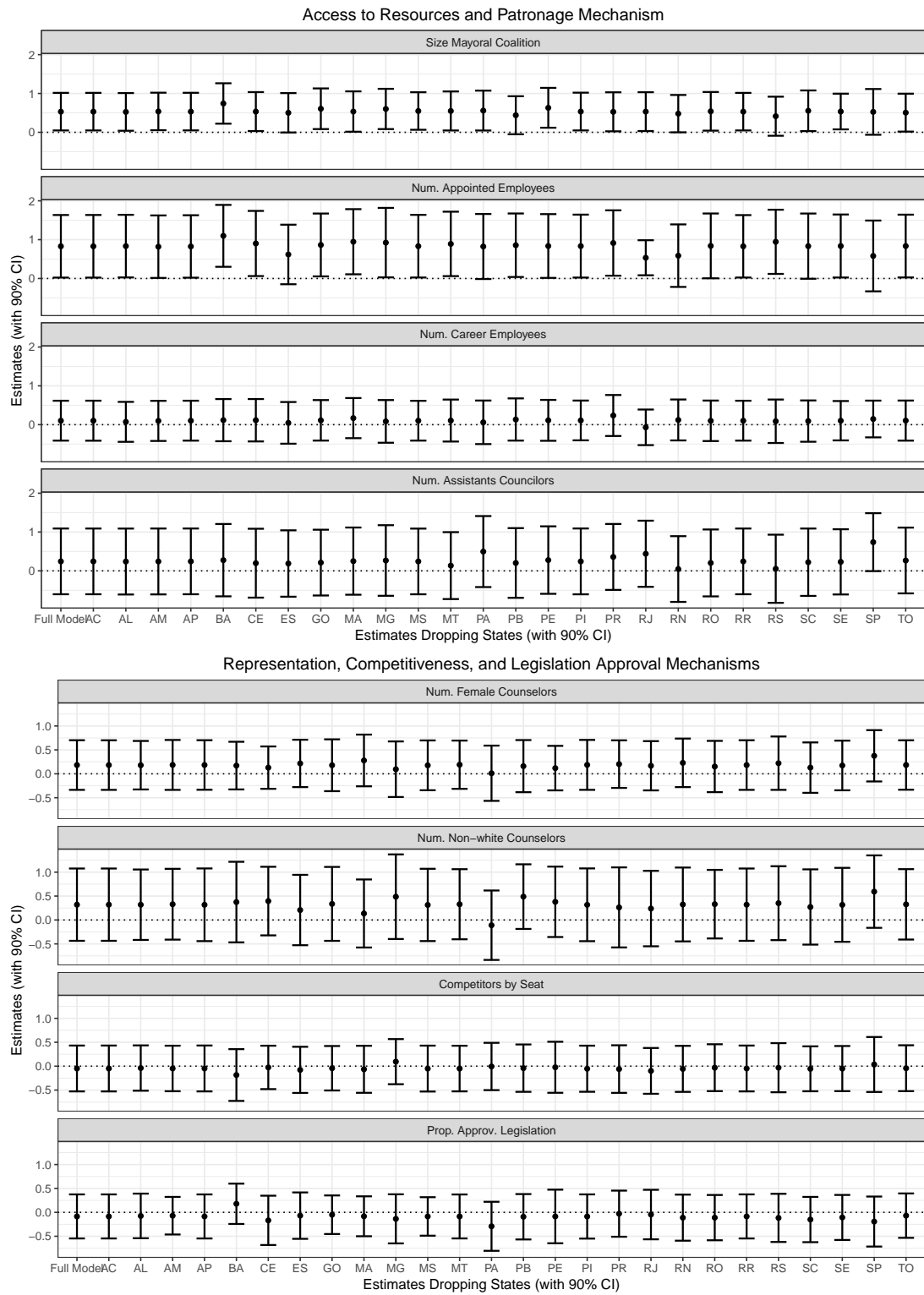


Figure 8: Sensitivity Analysis for the States in the Sample – Mechanism Outcomes

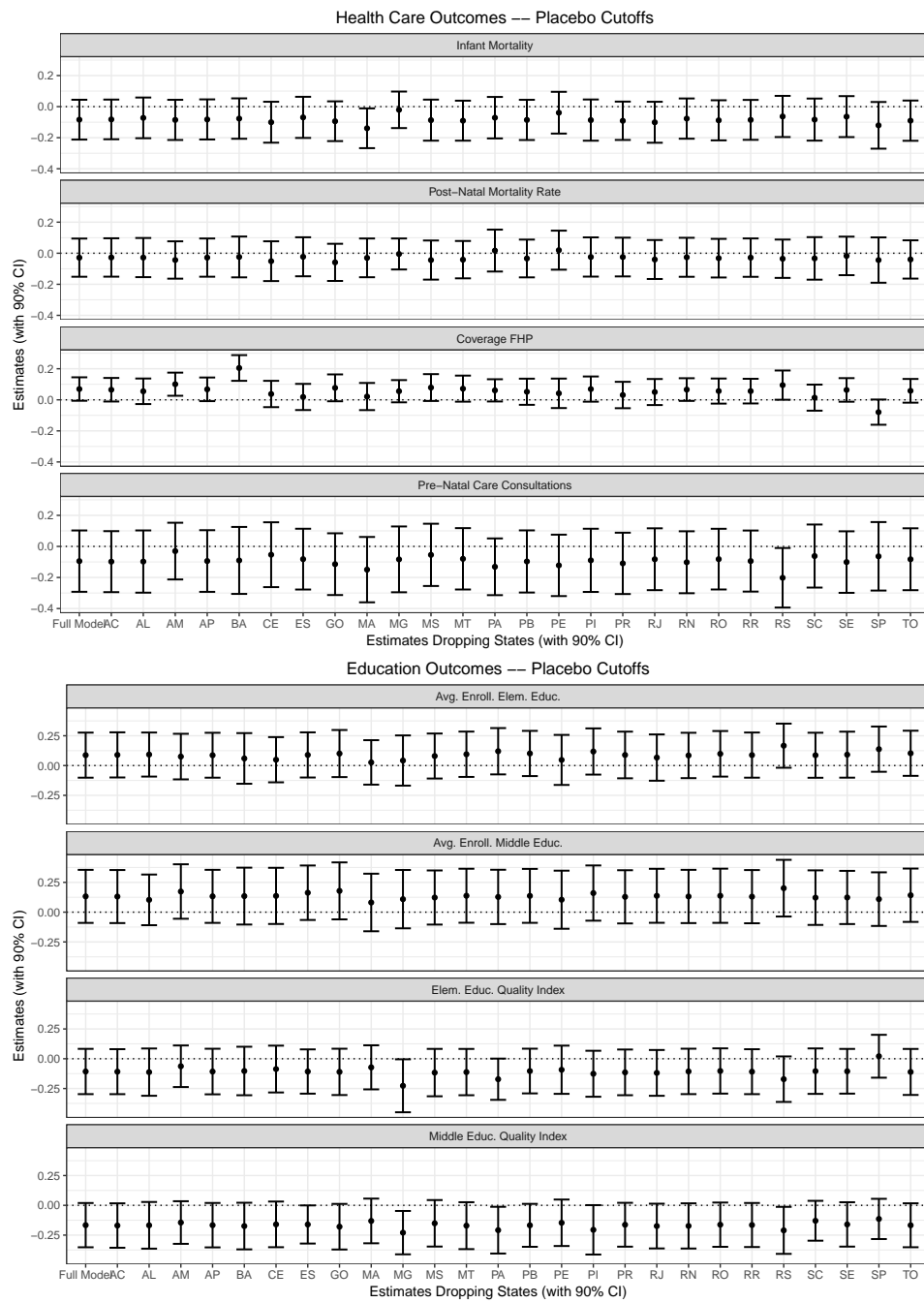
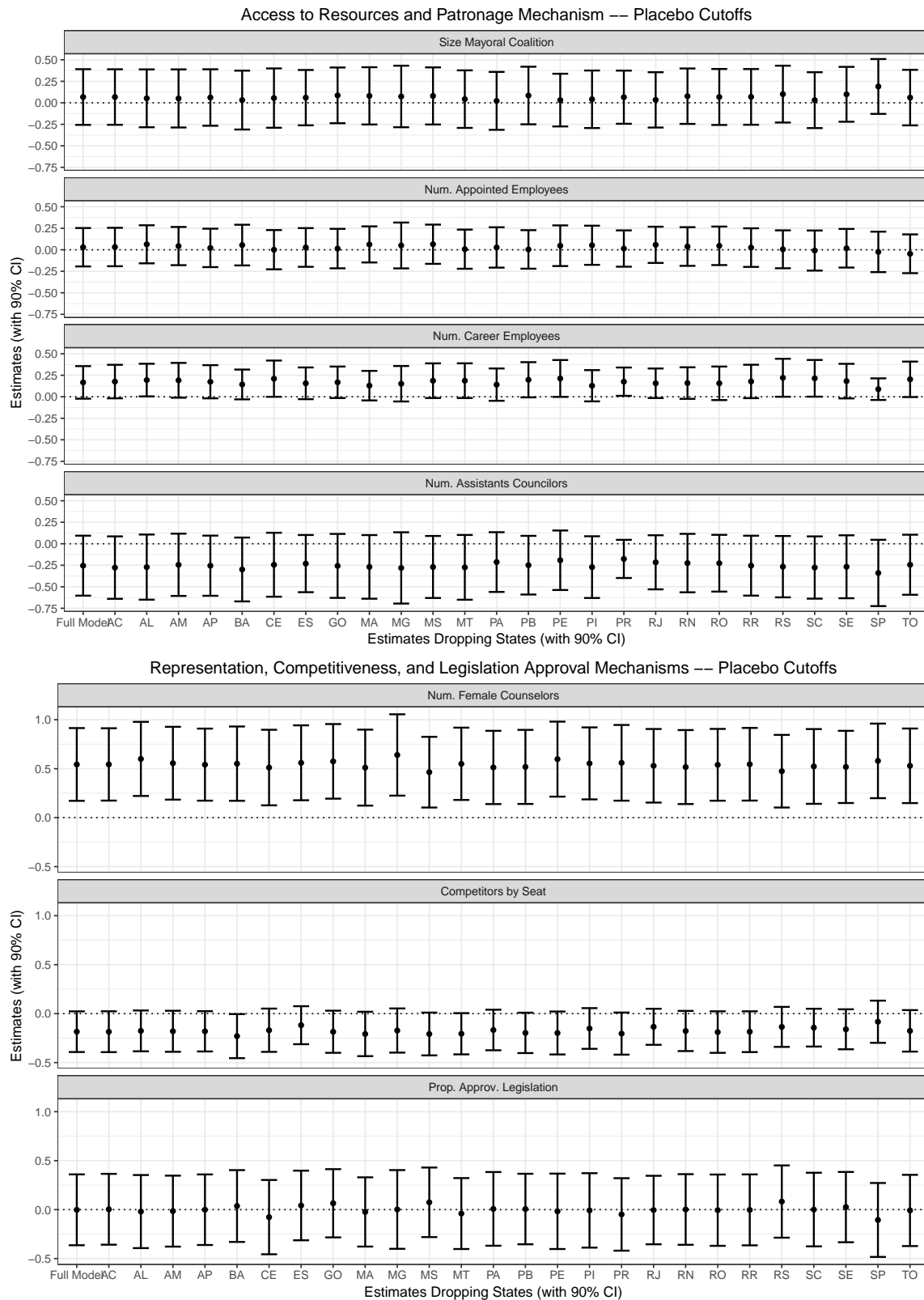


Figure 9: Sensitivity Analysis for the States in the Placebo Cutoffs – Welfare Outcomes



B.10 Sensitivity to the Functional Form Analysis

In the paper, we run all the regressions using local linear polynomials. [Gelman and Imbens \(2014\)](#) show that local linear and quadratic polynomials are better in terms of consistency than cubic and quartic.

However, we run here all the models using polynomials from local linear to a quartic, showing that our results are robust to different regression functional forms. With two exceptions, the results are mostly consistent. First, quadratic and cubic polynomials make the significance go away in some models. Second, quartic polynomials seem to make the Family Health Program (FHP) significant and negative, which goes in line with our theoretical predictions. Figures [11](#) and [12](#) present the results for the real and the placebo cutoffs.

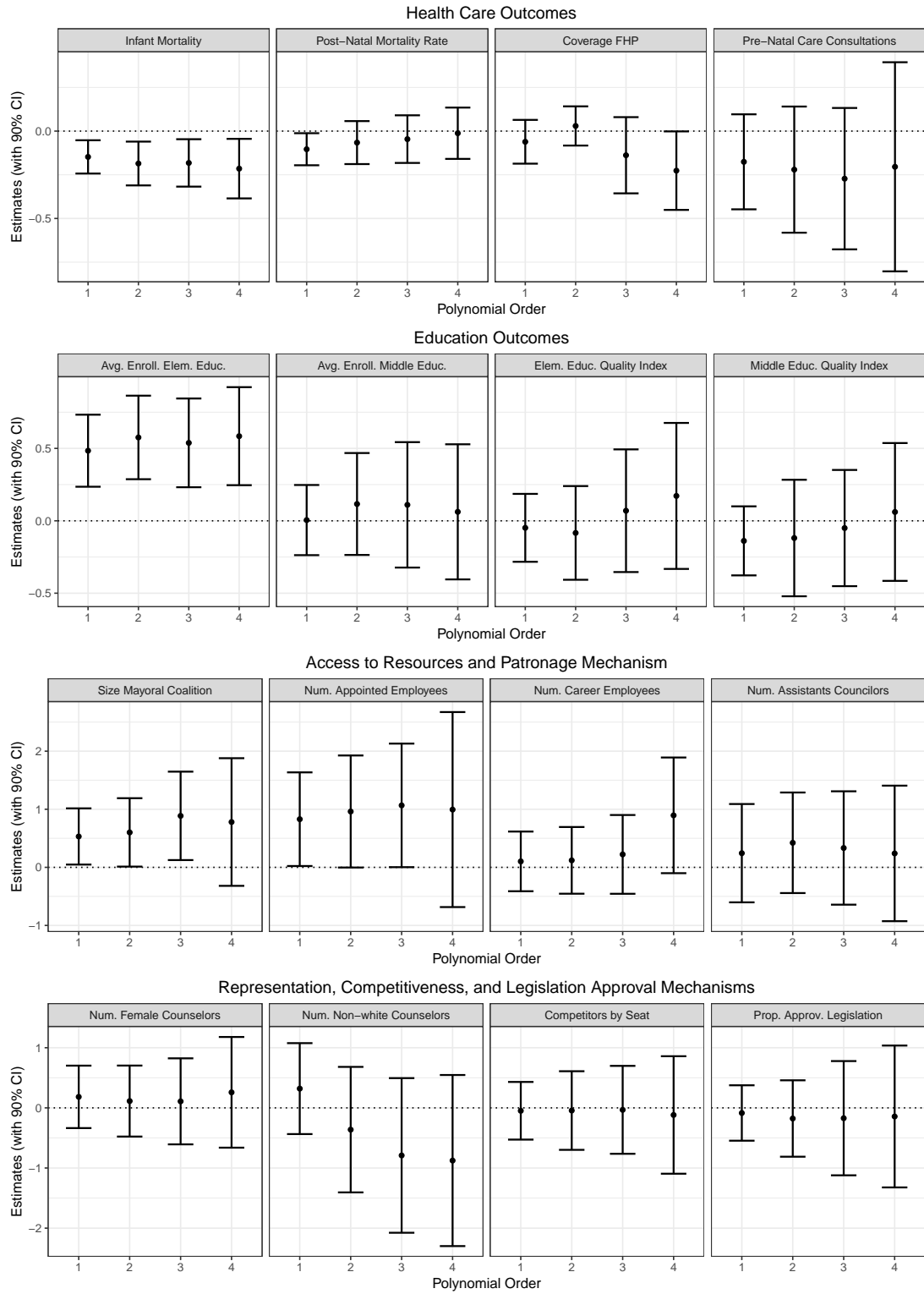


Figure 11: *Sensitivity Analysis for the Functional Form*

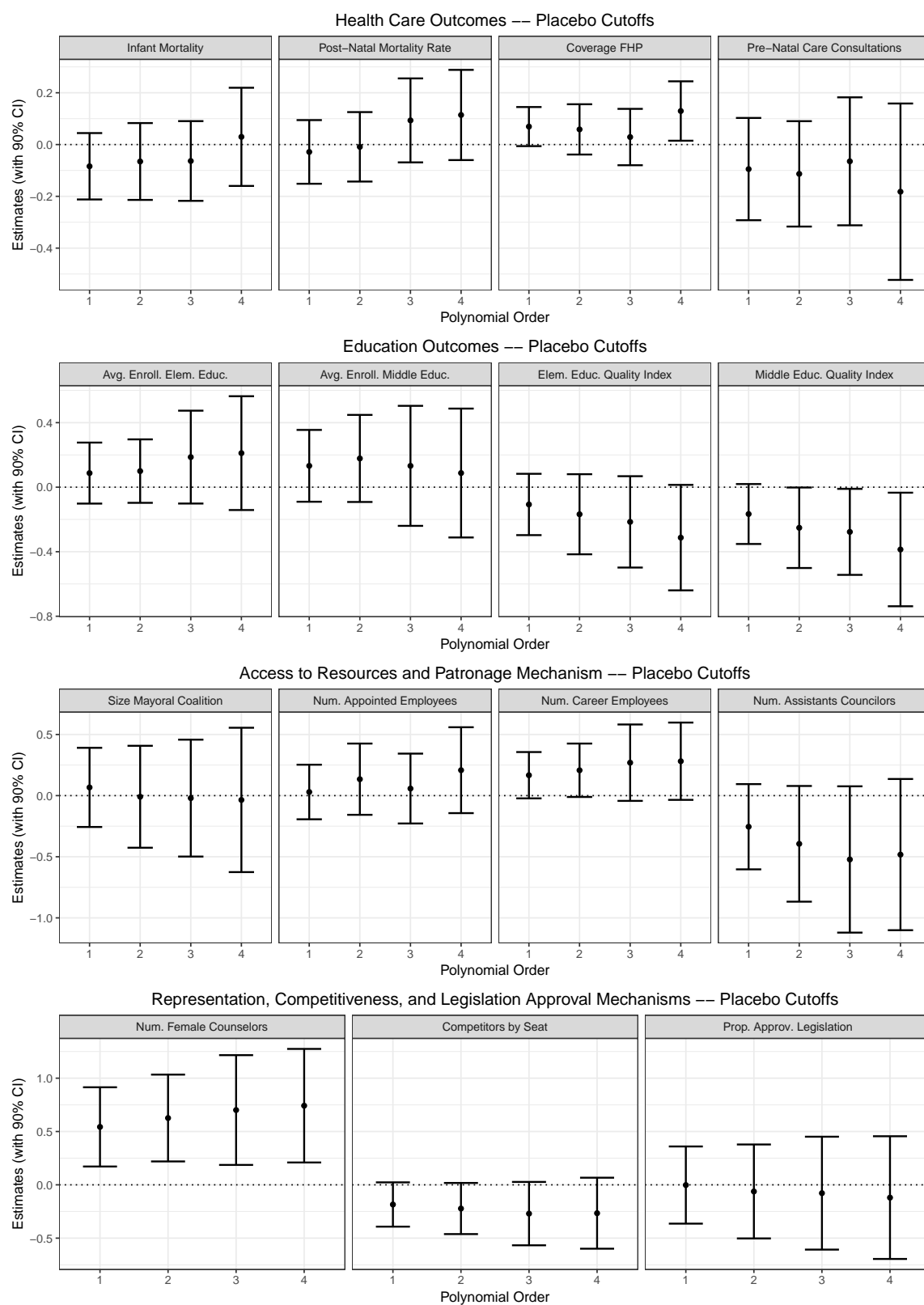


Figure 12: Sensitivity Analysis for the Functional Form – Placebo Cutoffs

B.11 Sensitivity to Covariates

The control variables play an essential role in our model. As we argued before, without controls, the first stage is inconsistent, and we may be capturing differences *between* cutoffs, instead of *within* cutoffs.

However, if the selection of controls makes the models overestimate quantities in the directions our narrative emphasizes, this would pose a considerable credibility issue for our analysis. To study the sensitivity to controls, we run the same regressions for all possible control combinations. Figure 13 displays the results for this sensitivity test.²

²In the Figure, *NC* stands for No Controls. The controls used are *gdp*, the municipal GDP in a given year; *nseats2000*, the number of seats before the 2003 Supreme Court decision; *northeast*, a dummy variable for Northeast Brazil; *pop2003_2*, population in 2003 (underscore 2 means that is population by thousands); and *year*.

RD Outcomes

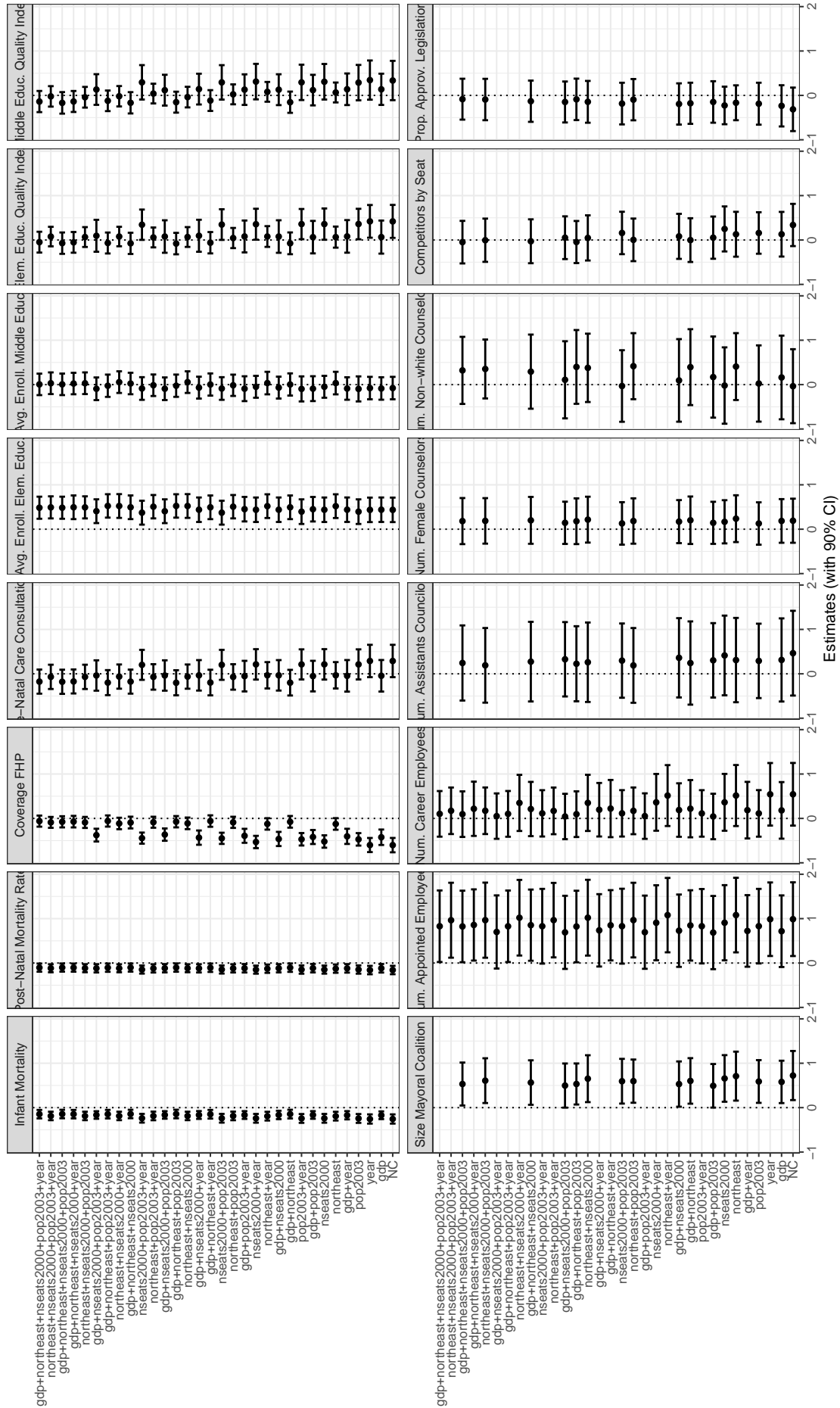


Figure 13: Sensitivity Analysis for the Control Variable's Choices

For instance, changes in controls have a substantial effect on the detected differences in the Family Health Program coverage, as well as in Elementary Education Quality.

In our view, our choice was the most conservative, as the Full Model is significant when most of the combinations also are significant. Otherwise, our model is not significant when most combinations are also insignificant. Regarding the point estimates, our analysis chooses the smaller coefficient sizes systematically for the significant variables.

We also plot sensitivity tests to covariates in the placebo regressions in Figures 14 and 15. The theoretical expectations here are that most of these outcomes would fail, and the graphs indeed confirm these expectations.

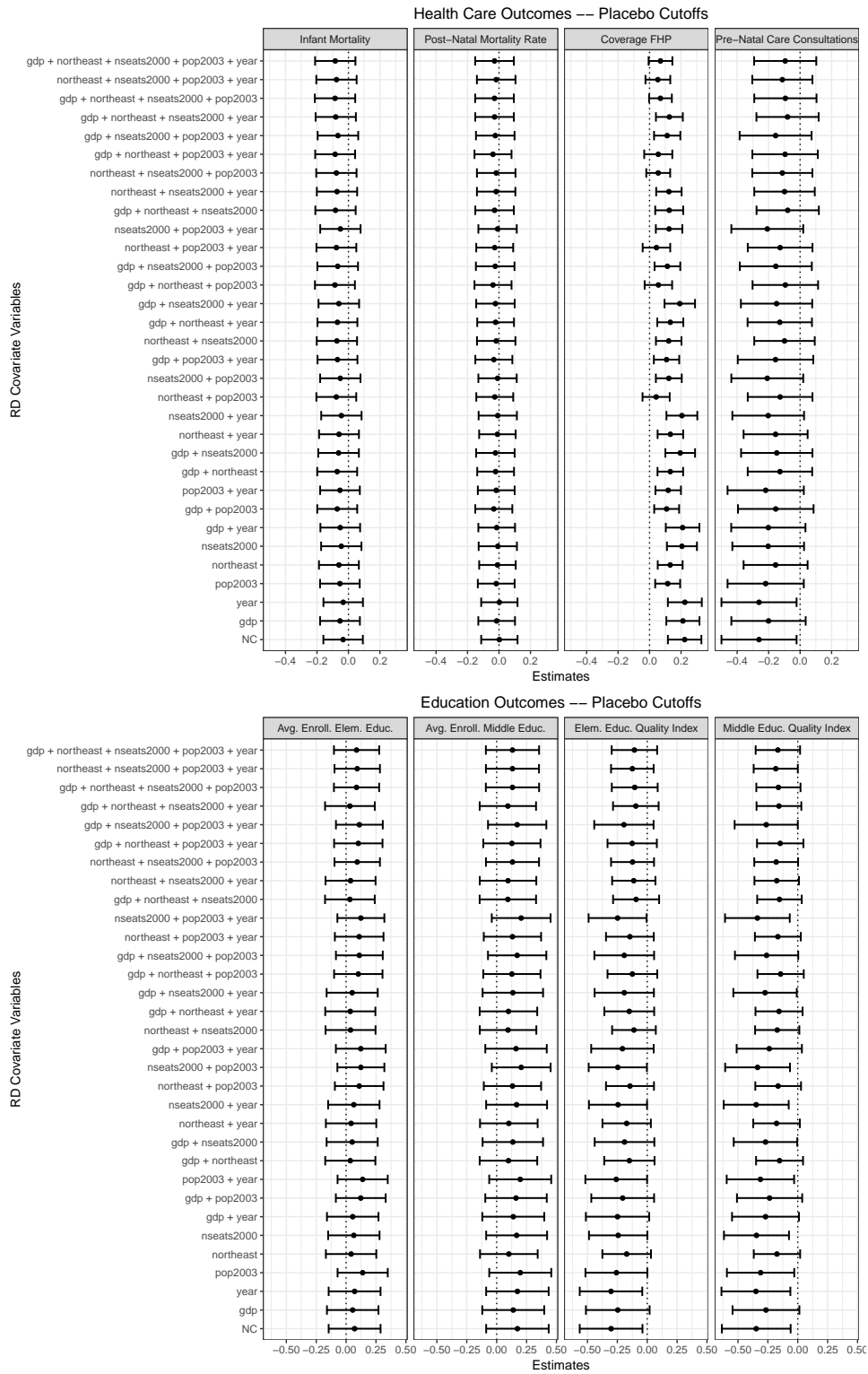


Figure 14: Placebo Regressions Outcomes – Sensitivity to Covariates

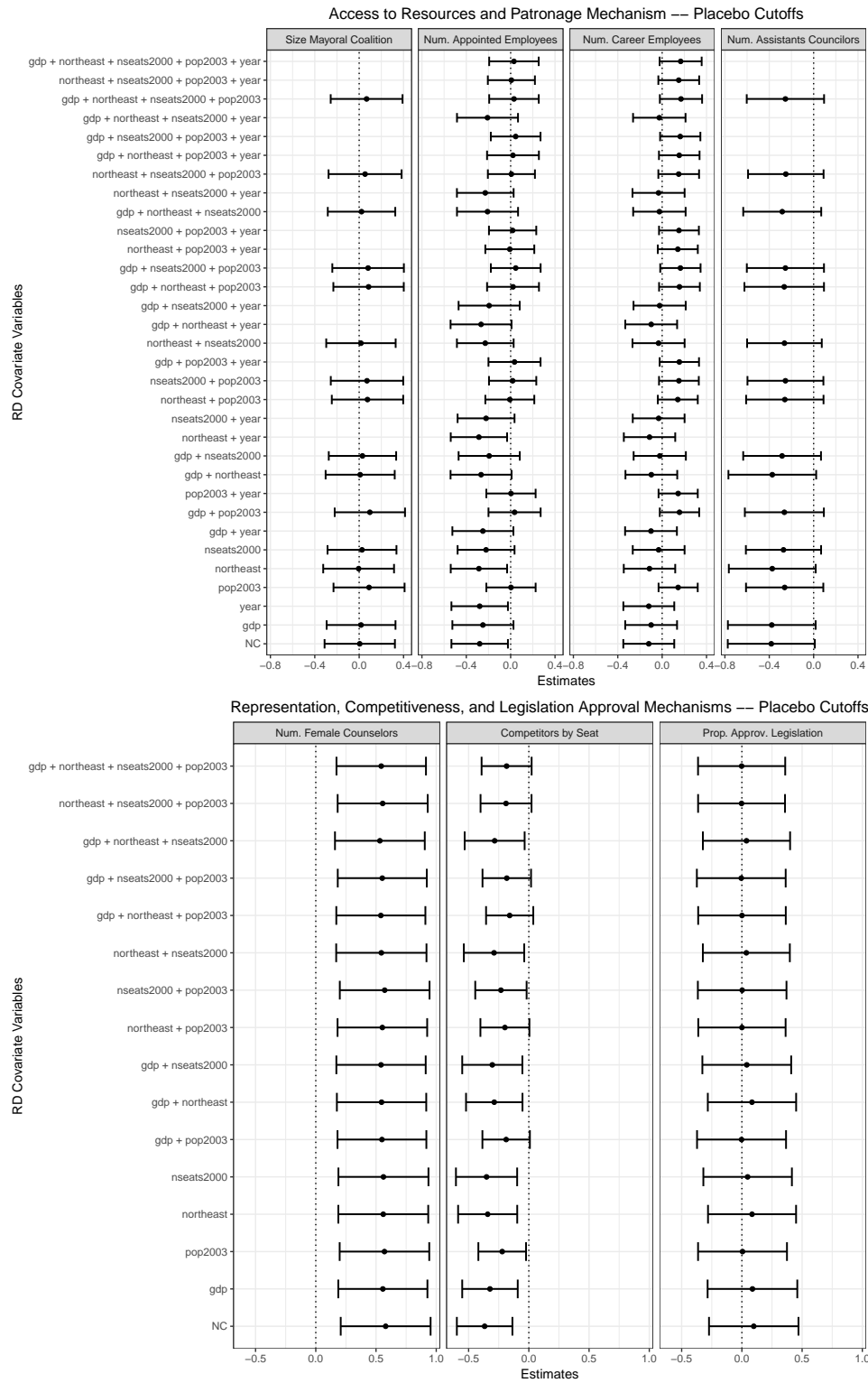


Figure 15: Placebo Regressions Mechanisms – Sensitivity to Covariates

B.12 Sensitivity to Additional Cutoffs

To study the sensitivity to the number of cutoffs, as well as a possibility of diminishing returns from the additional legislator, we run regressions limiting the population sizes to half the cutoffs, from the second cutoff to the last. This strategy is similar to adding one cutoff at a time. The results are stable and do not change our main conclusions. Moreover, there is no increasing or decreasing pattern, which would indicate that differential returns are occurring. Figures 16 and 17 display the results for the main cutoffs, while Figures 18 and 19 present the same results for the placebo cutoffs.

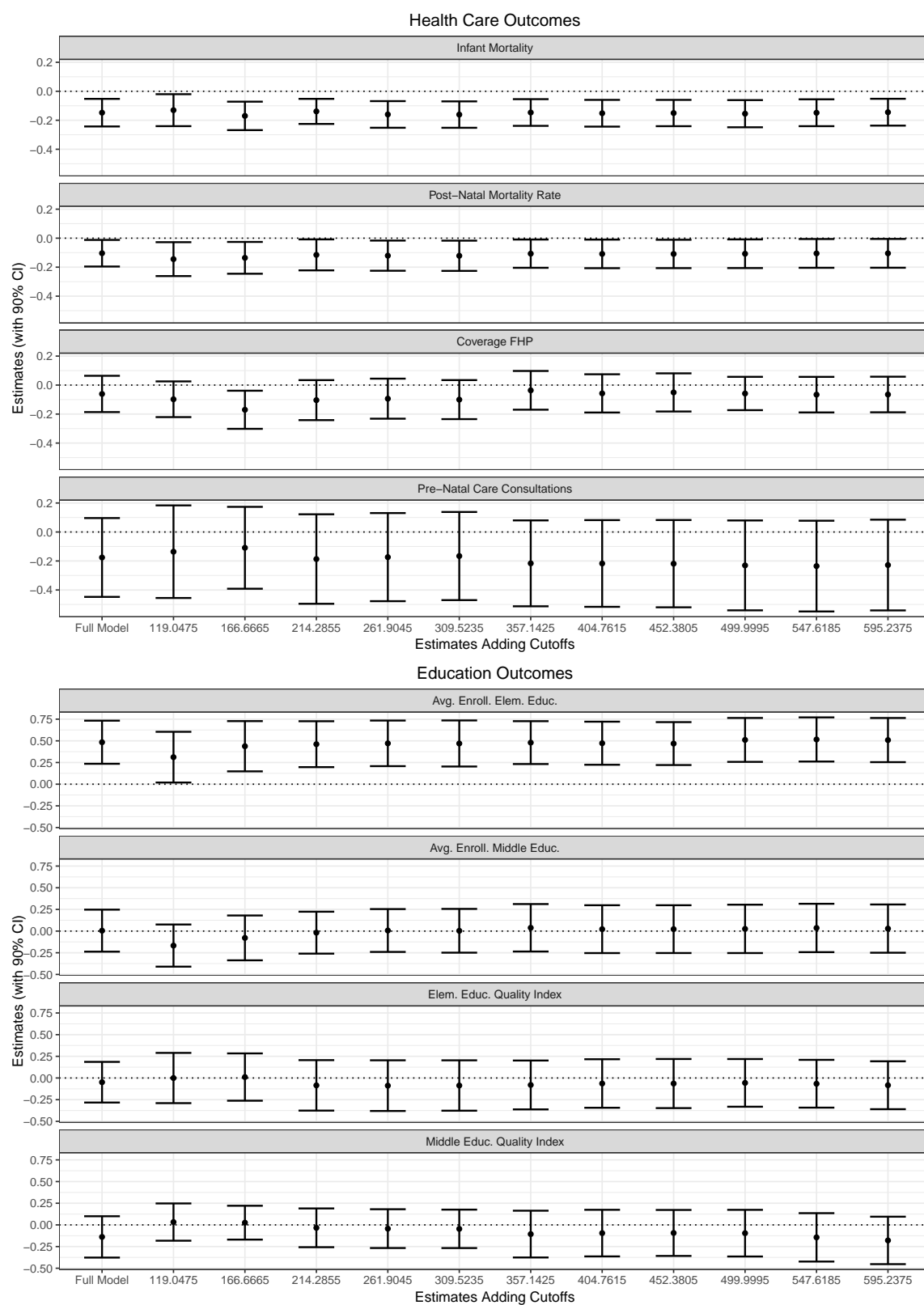


Figure 16: *Sensitivity to Addition of Cutoffs – Welfare Outcomes*

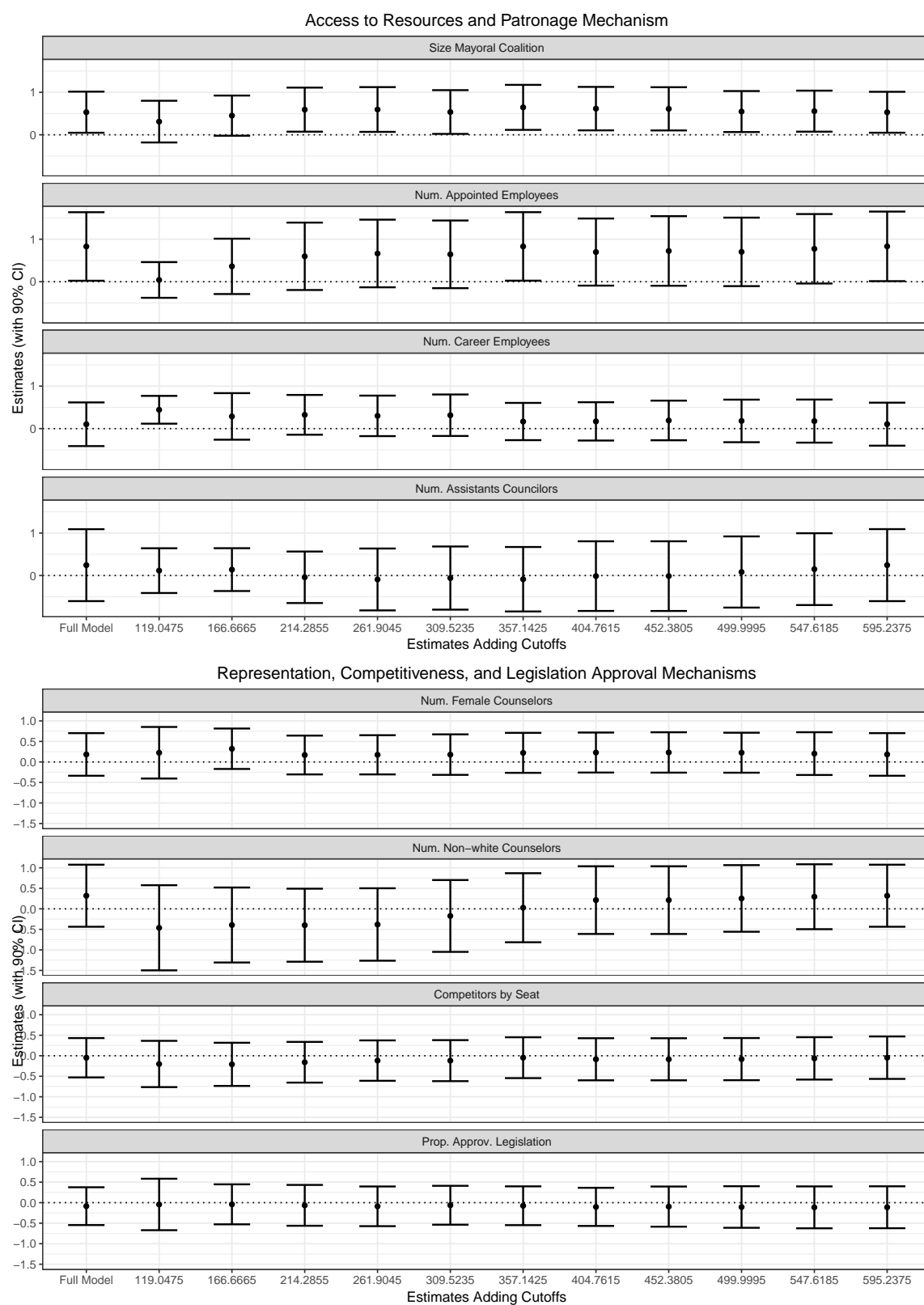


Figure 17: Sensitivity to Addition of Cutoffs – Mechanism Outcomes

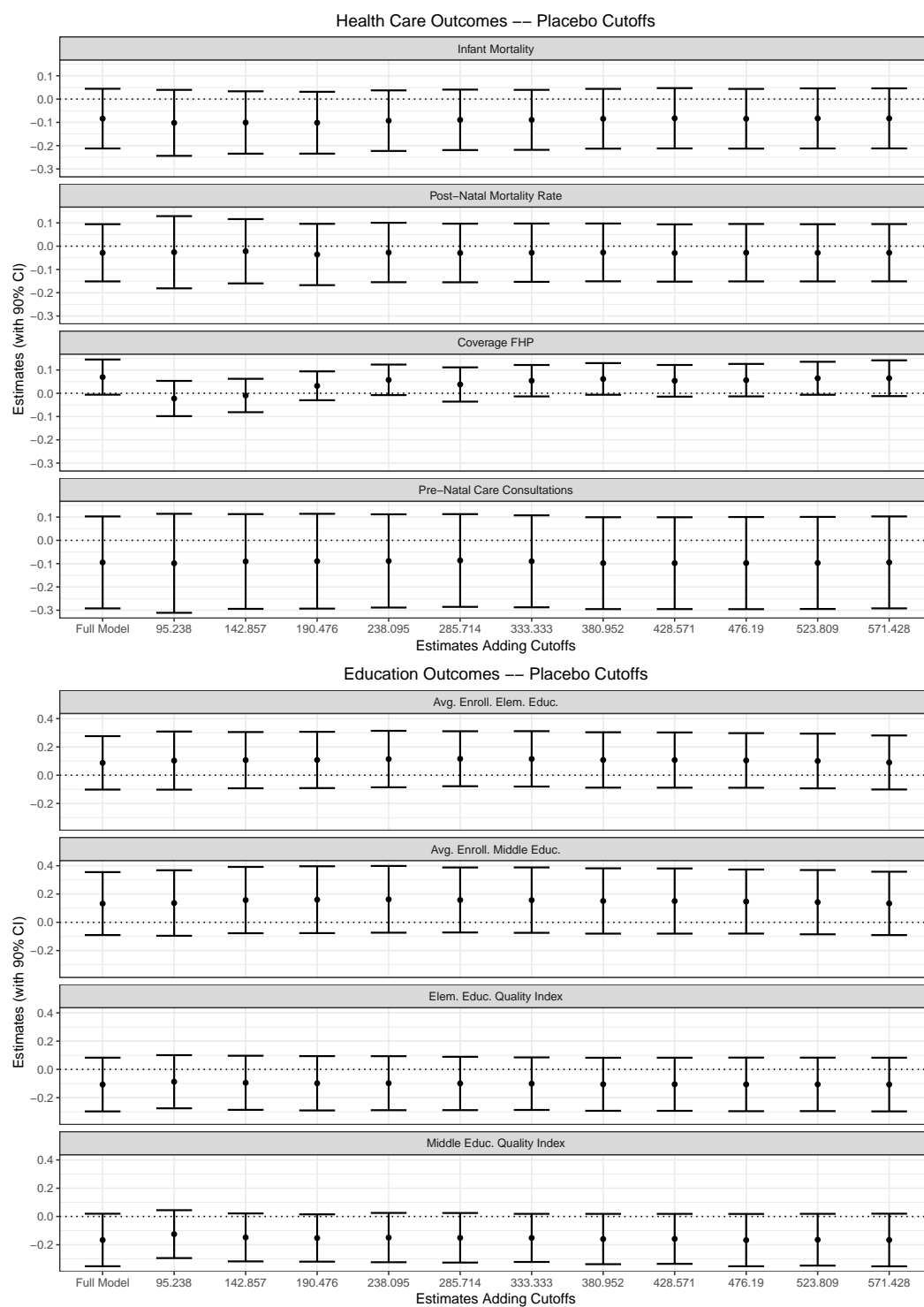


Figure 18: *Sensitivity to Addition of Cutoffs – Placebo Welfare Outcomes*

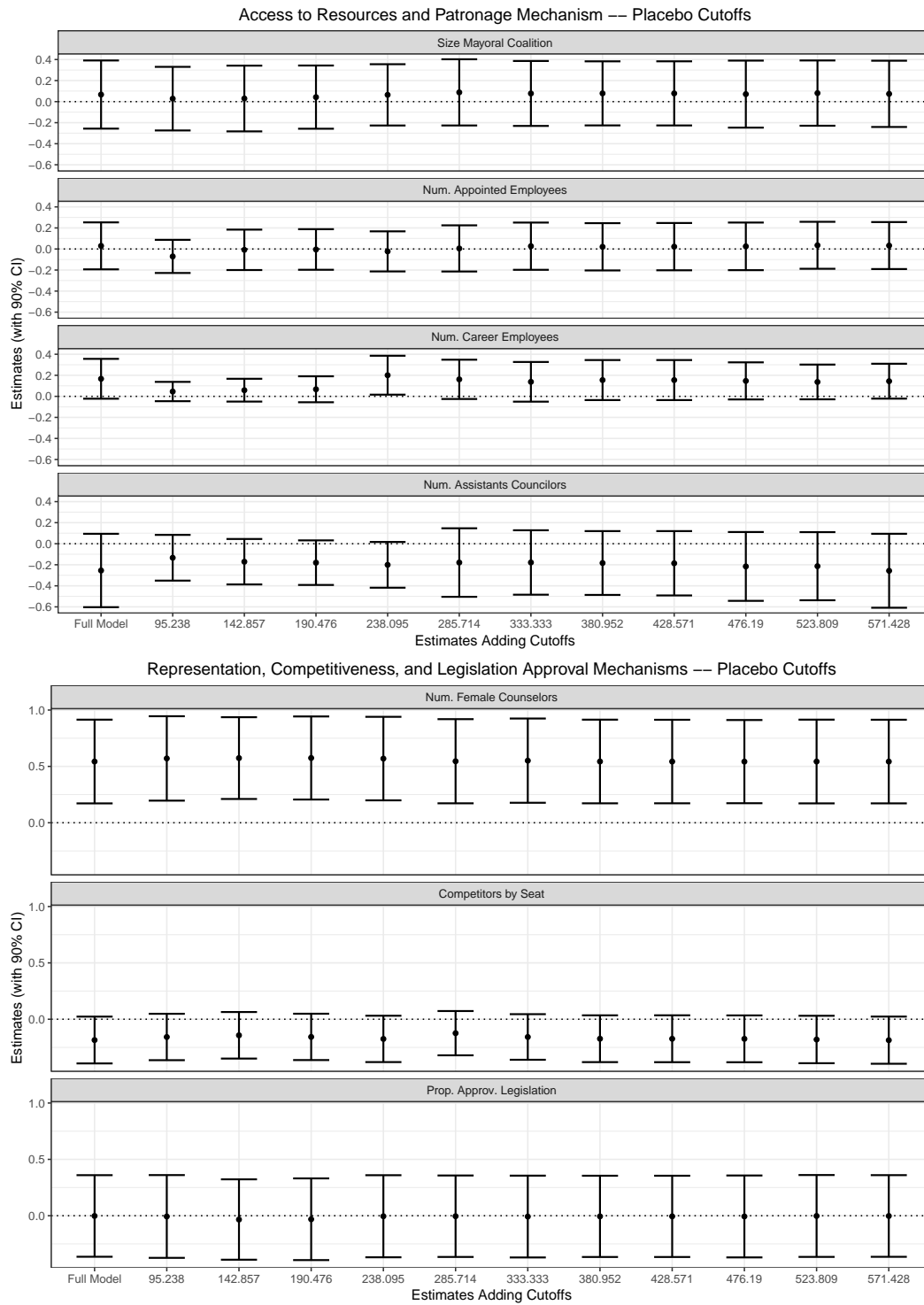


Figure 19: *Sensitivity to Addition of Cutoffs – Placebo Mechanism Outcomes*

B.13 Further analysis on the role of mayors, mayoral parties, and parties in the city council.

In this section, we analyze the role of political composition of city council and mayoral parties on outcomes. We also analyzed the revenues and transfers from the Federal government to municipalities.

B.13.1 Mayoral parties

Mayors in Brazil have considerably more discretionary power to implement policies when compared with city councilors. Therefore, our outcomes could be byproduct of the mayor in power. To avoid this possibility, we run the regressions using the mayoral parties as an outcome. The results below show no differences in likelihood of electing a mayor from PT, PSDB, PMDB, and PFL when we add an extra councilor.

Table 7: Mayors from Major Parties

	Mayor from PT	Mayor from PSDB	Mayor from PMDB	Mayor from PFL (DEM)
LATE	-0.01 (0.09)	0.11 (0.12)	0.0004 (0.10)	0.01 (0.06)
N Left	5069	5069	5069	5069
N Right	335	335	335	335
Eff N Left	257	162	226	105
Eff N Right	166	124	154	103
BW Loc Poly	10.52	7.585	9.637	5.605
BW Bias	16.103	11.409	15.41	9.632

***p < .01; **p < .05; *p < .1

Local linear RD Estimates using CCT Optimal Bandwidth Selection and Triangular Kernel.

Quadratic Robust Standard Errors in Parentheses.

Controls: population, GDP per capita, number of seats in 2000, year, and dummy for northeast region.

B.13.2 Mayoral characteristics

We also run the same regressions on mayoral characteristics. We select four characteristics: gender, schooling, whether the mayor was reelected in 2004, and whether the mayor was

Table 8: Mayors from Major Parties – Placebo

	Mayor from PT	Mayor from PSDB	Mayor from PMDB	Mayor from PFL (DEM)
LATE	0.05 (0.05)	0.02 (0.06)	0.03 (0.07)	-0.11* (0.06)
N Left	4526	4526	4526	4526
N Right	878	878	878	878
Eff N Left	486	823	609	544
Eff N Right	319	453	372	335
BW Loc Poly	5.568	8.407	6.551	6.027
BW Bias	9.222	13.908	10.539	11.459

***p < .01; **p < .05; *p < .1

Local linear RD Estimates using CCT Optimal Bandwidth Selection and Triangular Kernel.

Quadratic Robust Standard Errors in Parentheses.

Controls: population, GDP per capita, number of seats in 2000, year, and dummy for northeast region.

reelected in 2008. The results also show no variation on council size and mayoral characteristics.

Table 9: Mayoral Characteristics

	Female Mayor	Mayor w. College Degree	Reelected Mayor 2004	Reelected Mayor 2008
LATE	0.07 (0.08)	-0.06 (0.13)	-0.09 (0.10)	0.06 (0.14)
N Left	5069	5069	5184	5183
N Right	335	335	343	343
Eff N Left	299	226	192	231
Eff N Right	184	154	141	159
BW Loc Poly	11.738	9.655	8.508	9.596
BW Bias	17.104	15.762	13.338	14.741

***p < .01; **p < .05; *p < .1

Local linear RD Estimates using CCT Optimal Bandwidth Selection and Triangular Kernel.

Quadratic Robust Standard Errors in Parentheses.

Controls: population, GDP per capita, number of seats in 2000, year, and dummy for northeast region.

B.13.3 Transfers and revenue

To investigate whether transfers are driving our results, we run the regressions on federal transfers and revenue raised within the municipalities. There is only a small effect on education transfer. The other indicators remain insignificant. Note that the placebo is significant,

Table 10: Mayoral characteristics – Placebo

	Female Mayor	Mayor w. College Degree	Reelected Mayor 2004	Reelected Mayor 2008
LATE	0.03 (0.05)	0.04 (0.08)	0.08 (0.07)	-0.07 (0.08)
N Left	4526	4526	4621	4620
N Right	878	878	906	906
Eff N Left	567	707	683	759
Eff N Right	342	406	397	427
BW Loc Poly	6.197	7.413	7.006	7.71
BW Bias	10.241	12.64	13.536	12.648

***p < .01; **p < .05; *p < .1

Local linear RD Estimates using CCT Optimal Bandwidth Selection and Triangular Kernel.

Quadratic Robust Standard Errors in Parentheses.

Controls: population, GDP per capita, number of seats in 2000, year, and dummy for northeast region.

but this does not invalidate the placebo tests.

Table 11: Transfers and Revenue

	Total Transfers	FPM Transfers	Education Transfers	Total Revenue
LATE	0.03 (0.04)	-0.03 (0.03)	0.18* (0.10)	0.06 (0.04)
N Left	15555	15555	15460	14668
N Right	1029	1029	1028	998
Eff N Left	804	258	349	626
Eff N Right	516	273	333	442
BW Loc Poly	10.617	4.568	6.005	9.253
BW Bias	16.447	8.243	11.412	15.092

***p < .01; **p < .05; *p < .1

Local linear RD Estimates using CCT Optimal Bandwidth Selection and Triangular Kernel.

Quadratic Robust Standard Errors in Parentheses.

Controls: population, GDP per capita, number of seats in 2000, year, and dummy for northeast region.

B.13.4 City councilors party composition

As the result could be driven by party composition of the mayor, we run the regression on city council party composition. There is no effect of party composition and city council size.

Table 12: Transfers and Revenue – Placebo

	Total Transfers	FPM Transfers	Education Transfers	Total Revenue
LATE	0.07** (0.03)	0.04 (0.03)	0.03 (0.06)	0.07** (0.03)
N Left	13865	13865	13776	13103
N Right	2719	2719	2712	2563
Eff N Left	807	636	1928	848
Eff N Right	619	544	1163	611
BW Loc Poly	3.418	3.028	6.738	3.67
BW Bias	6.021	5.36	10.871	6.222

***p < .01; **p < .05; *p < .1

Local linear RD Estimates using CCT Optimal Bandwidth Selection and Triangular Kernel.

Quadratic Robust Standard Errors in Parentheses.

Controls: population, GDP per capita, number of seats in 2000, year, and dummy for northeast region.

Table 13: Councilors from Major Parties

	Councilors from PT	Councilors from PSDB	Councilors from PMDB	Councilors from PFL (DEM)
LATE	-0.01 (0.02)	-0.05 (0.05)	-0.01 (0.03)	-0.01 (0.02)
N Left	5179	5179	5179	5179
N Right	343	343	343	343
Eff N Left	375	152	267	231
Eff N Right	212	121	172	159
BW Loc Poly	13.99	6.8	10.58	9.63
BW Bias	22.64	11.373	16.803	15.647

***p < .01; **p < .05; *p < .1

Local linear RD Estimates using CCT Optimal Bandwidth Selection and Triangular Kernel.

Quadratic Robust Standard Errors in Parentheses.

Controls: population, GDP per capita, number of seats in 2000, year, and dummy for northeast region.

Table 14: *Councilors from Major Parties – Placebo*

	Councilors from PT	Councilors from PSDB	Councilors from PMDB	Councilors from PFL (DEM)
LATE	0.02 (0.02)	0.01 (0.02)	0.02 (0.02)	0.003 (0.02)
N Left	4617	4617	4617	4617
N Right	905	905	905	905
Eff N Left	434	939	621	845
Eff N Right	303	495	378	461
BW Loc Poly	5.012	9.003	6.505	8.333
BW Bias	8.078	13.701	11.172	13.303

***p < .01; **p < .05; *p < .1

Local linear RD Estimates using CCT Optimal Bandwidth Selection and Triangular Kernel.

Quadratic Robust Standard Errors in Parentheses.

Controls: population, GDP per capita, number of seats in 2000, year, and dummy for northeast region.

B.14 Legislation Dataset

In the Fall of 2018, we collected the data on the legislation approved by the city council of 64 municipalities 10 thousand inhabitants away from the thresholds. There are 202 municipalities at a 10 thousand inhabitants distance from the cutoff, but only 64 had information on the legislation for the period between 2005 to 2008.

To classify the legislation, we hand-coded 1% of the dataset (3,466 cases) and applied a Supporting Vector Machines algorithm to the remaining 99% cases. First, we train and test the accuracy of the SVM classifier on 80% of the dataset. Then, we ran the training on the full hand-coded data and predicted the remaining.³

We hand-coded using five characteristics:

1. **Local Public Goods:** Whether the bills provided a local public good or service. Bills here are, for example, proposals to fix street potholes, staff a given health clinic, purchase equipment to a given school. To lay on this category, the service should have been targeted for a fraction of the population.
2. **Public Goods and Legislation:** Whether a bill is about a municipal public good (e.g., improving education), or about legislation that does not discriminate against any citizen within the polity (general law).

³We tested SVM, Naive-Bayes, Random Forests, and Neural Networks. We choose SVM as it gives the highest prediction rate. We are using a simple bag-of-words classifier, with the R package RTextTools (Collingwood et al., 2013).

Table 15: *Accuracy SVM Classifier (tested in 20% of the data)*

Variable	Accuracy
Local Public Goods	93.8
Public Goods and Legislation	94.2
Oversight	94.9
Others	93.5
Education and Health Care	92.5

3. **Oversight:** Legislation requesting information on the status of service provision.
4. **Others:** Legislation that is not categorized as any of the previous three listed. Legislation here includes honors to notable citizens and procedure legislation, among others.
5. **Health Care and Education:** Bills on education and health care, broadly defined.

We run the SVM on the hand-coded data. Table 15 shows the classification accuracy for each of the variables that we hand-coded. In all models, we set cost equals 10 to avoid overfitting.

After we classify all the bills, the frequency in each category was added to the main paper. We also add the productivity per legislator, consisting of a ratio of the legislation approved in the municipality in the four-year term, divided by the council size. As expected, the results changed little from when we considered the absolute values.

B.15 City Councilors Survey

From November 21st to December 1st, 2016, we surveyed former city councilors that served in the 2005 to 2008 period. We asked them questions regarding how mayors secure electoral support, which services are common in the city councilor's practice, and which services give the highest electoral yield.

We used 3,240 emails from politicians that ran in the 2016 election, filtering the politicians that hold public office in 2005. In December 1st we closed the pool, having 174 responses. Figure 20 displays a distribution of responses.



Figure 20: Geographical Distribution of Survey Responses

To weight the survey, we use the Legislative Census, which was conducted ran in 2005 by the Brazilian Senate company *Interlegis* to improve the quality of the legislative. We use the categories of Brazilian region, legislature size (9 to 15 or more), gender, and age less than 39, re-weighting the collected data to match the population proportions. We use the proportions on each bin to weight the graphs and statistics generated after the raking process.⁴ Table 16 shows the sample, population, and weighted proportions.

Table 16: *Proportions for each bin used in the weighting process*

	Sample Proportions	Population Proportions.	Weighted Proportions
Age less than 39	0.50	0.34	0.34
Female	0.18	0.12	0.12
Number of Seats = 9	0.83	0.90	0.90
Number of Seats = 10	0.10	0.06	0.06
Number of Seats = 11	0.01	0.02	0.01
Number of Seats = 12	0.01	0.01	0.01
Number of Seats = 13	0.006	0.005	0.005
Number of Seats = 14	0.01	0.004	0.005
Number of Seats = 15 or more	0.02	0.009	0.008
Region = CENTRO-OESTE	0.11	0.08	0.08
Region = NORDESTE	0.33	0.32	0.32
Region = NORTE	0.05	0.08	0.08
Region = SUDESTE	0.30	0.30	0.30
Region = SUL	0.20	0.21	0.21

Note that the algorithm performed well, with minimal differences occurring only after the third decimal place.

The questions of interest for this research, asked in the survey were:

1. No Brasil é comum que o prefeito tenha de negociar para ter maioria na Câmara de Vereadores. Com que frequência, o(a) Sr(a) acha que o prefeito usa os seguintes dispositivos para conseguir apoio?
2. Quais dessas atividades o(a) Sr(a) acredita serem mais comuns no trabalho da maioria dos vereadores?

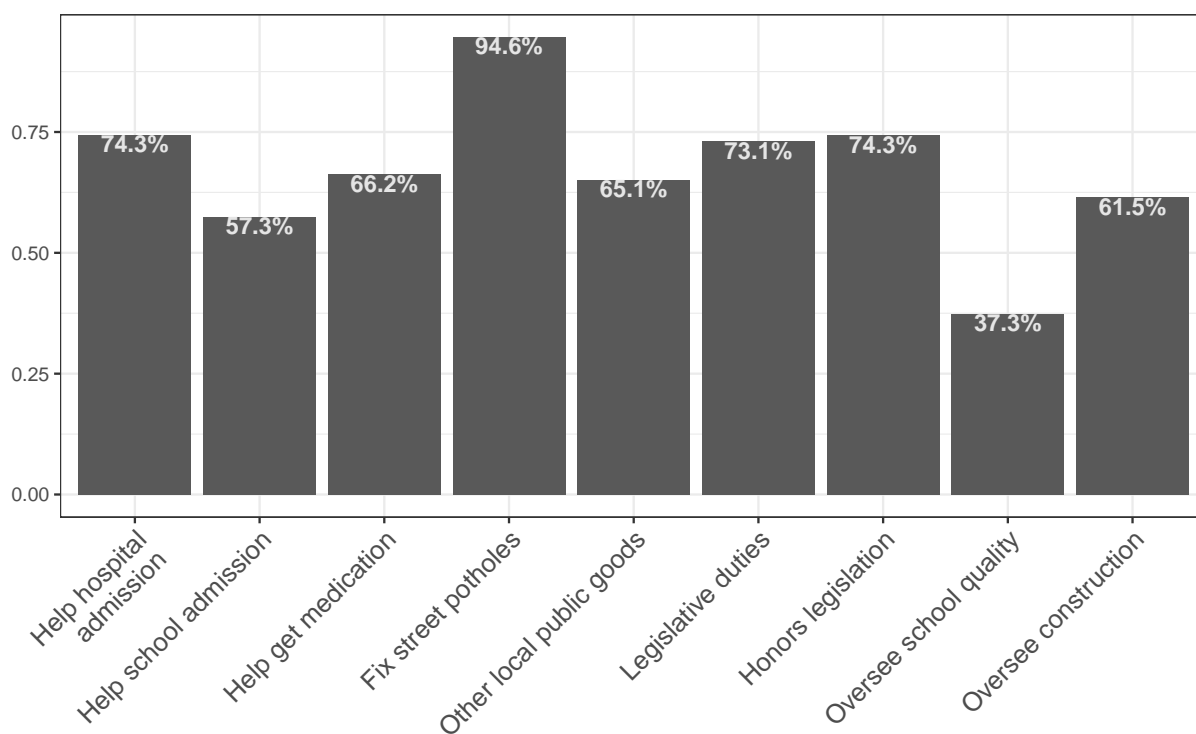
⁴The R package *survey* describes in detail the raking process (Lumley et al., 2004). In summary, it iterates the post-stratification procedure until the sample marginals match the population marginals for all variables.

3. Quais dessas atividades o(a) Sr(a) acredita que ajudam mais um vereador durante a eleição?

A free translation to English would be:

1. In Brazil, it is common that mayors negotiate the majority within the city council. What is the frequency that mayors use the following services in exchange for support?
2. Which of those activities do city councilors perform the most in their representation practices?
3. Which of the following activities do you believe helps city councilors the most in elections?

The second question is essential, as it reports whether councilors do the activities that give more electoral yield. Figure 21 shows the results for each of the activities we studied the electoral yield.



How common in the councilor's practice are the following services?

Figure 21: *City Councilor's Common Activities*

The last question measures the willingness of mayors to give services to city councilors. This question is relevant, as mayors control most of the bureaucracy and the mediation of services requires a good relationship with mayors. Figure 22 shows the results for the mayoral activities.

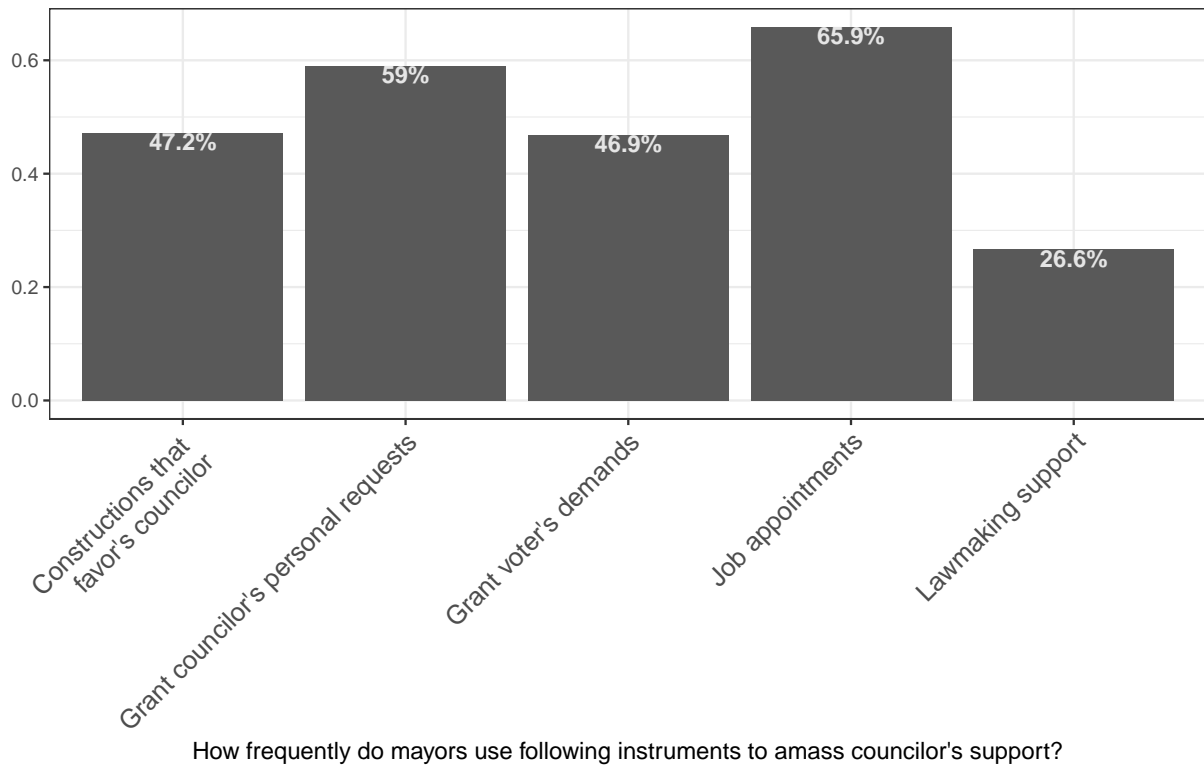


Figure 22: *Mayor negotiated services in exchange of support*

Therefore, both Figures show that councilors do perform the tasks that give the most electoral yield. The exception is the category of honor legislation, which most legislators seem to perform, even though they acknowledge that it provides little electoral returns.

Regarding the services that mayors use to negotiate with the coalition, note that jobs in exchange of support are the highest ranked strategy by councilors. Our results capture that, as an increase in city council size has a positive effect on the number of appointed employees in the municipality.

References

- Bueno, Natalia S and Guadalupe Tuñón. 2015. "Graphical Presentation of Regression Discontinuity Results." Available at SSRN 2549841.
URL: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2549841
- Calonico, Sebastian, Matias D Cattaneo, Max H Farrell and Rocio Titiunik. 2019. "Regression discontinuity designs using covariates." *Review of Economics and Statistics* 101(3):442–451.
- Calonico, Sebastian, Matias D Cattaneo and Rocio Titiunik. 2014. "Robust Nonparametric Confidence Intervals for Regression-Discontinuity Designs." *Econometrica* 82(6):2295–2326.
- Cattaneo, Matias D, Michael Jansson and Xinwei Ma. 2019. "Simple local polynomial density estimators." *Journal of the American Statistical Association* 0(0):1–11.
- Cattaneo, Matias D, Rocío Titiunik, Gonzalo Vazquez-Bare and Luke Keele. 2016. "Interpreting regression discontinuity designs with multiple cutoffs." *The Journal of Politics* 78(3):1229–1248.
- Cavalcanti, Vitor Gonçalves. 2017. Essays on Economics Evaluation PhD thesis Universidade Federal de Pernambuco Department of Economics: .
<https://repositorio.ufpe.br/bitstream/123456789/27590/1/TESE%20Vitor%20Goncalves%20Cavalcanti.pdf>.
- Collingwood, Loren, Timothy Jurka, Amber E Boydston, Emiliano Grossman, WH van Atteveldt et al. 2013. "RTextTools: A supervised learning package for text classification." *The R Journal* 5(1):6–12.
URL: <http://dare.uvu.vu.nl/bitstream/handle/1871/49295/310585.pdf>
- Gelman, Andrew and Guido Imbens. 2014. "Why High-Order Polynomials Should Not be Used in Regression Discontinuity Designs." NBER Working Paper.
URL: <http://www.nber.org/papers/w20405.pdf>
- Lumley, Thomas et al. 2004. "Analysis of complex survey samples." *Journal of Statistical Software* 9(1):1–19.
- McCrary, Justin. 2008. "Manipulation of the Running Variable in the Regression Discontinuity Design: A Density Test." *Journal of Econometrics* 142(2):698–714.