Supplementary Materials for “Number of Legislators, Bargaining Costs, and Local Public Goods Provision”

Umberto Mignozzetti*

5 September 2021

Contents

*Visiting Assistant Professor, Quantitative Theory and Methods Department, Emory University, umberto.mignozzetti@emory.edu, http://umbertomig.com.

B.1 A Model of Legislature Size and Service Provision

B.1.1 Primitives of the Model

Consider an strategic interaction between a mayor (M) and $N \geq 3$ city councilors, indexed in $i \in \{1, 2, \cdots, N\}$. The mayor is the head of the local executive branch and has the prerogative of proposing a vector of policies voted by the city councilors. Policy proposals are a combination of public goods provision g, rents for the mayor r, and a vector of transfer for city councilors $\mathbf{x}$.

The city council votes the mayor's proposal, and if they accept it, it is implemented. Otherwise, a reversal policy takes place. Reversal policy in this context means that the mayor's proposal failed to secure the majority of council votes. The decision process leaves the mayor's office and either immediately stops or is transferred to the council. The types of reversal policies are crucial for my argument, as it changes the relative strength of the council in their bargaining with the mayor. I investigate three types of reversal policies: a *non-partisan* reversal mechanism, where city councilors have no partisan affiliation; a *partisan* reversal mechanism, where the council is divided into supporters and non-supporters of the mayor; and finally, a *hybrid* reversal mechanism, that combines partisan with non-partisan features. The main paper focuses on the hybrid model, as it is the more realistic scenario. Despite that, comparing the partisan and non-partisan reversal mechanisms clearly illustrates my argument that the partisan mechanism drives my results.

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

Finally, after paying the govern costs, the mayor proposes a level of public goods provision (g) and rents (r). Public goods provision helps the mayor to get reelected. Rents are for direct mayor's consumption and do not contribute to the mayor's electoral success. This makes the mayor's expected utility a sum of the gains from rents and the benefits from reelection. Both the utilities from rents $u(.)$ and the probability of reelection $\pi(.)$ are concave functions, meaning that more rents or public goods increase the utility at a decreasing rate.[1]

[1] In technical terms, $u' > 0$ and $\pi' > 0$; and $u'' < 0$ and $\pi'' < 0$.

The probability of reelection is multiplied by the benefit from holding office $B_M > 0$. This benefit captures the tangible and intangible gains that the mayor perceives from holding the public office. I assume that the benefits are high enough to rule out an equilibrium with only rents and transfers, which is equivalent to saying that mayors strongly prefer to be reelected. If the mayor's policy proposal is approved, then the expected utility for the mayor is:

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

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

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

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

The expected utility for the city councilors depends on the reversal policy. As discussed, I explore three different mechanisms. First, in *non-partisan* reversal mechanism, when the council rejects the mayor's proposal, a reversal stage starts with resources diminish by a factor of $\delta \in (0, 1)$ and the selection of one councilor randomly. The randomly selected councilor becomes the new proposer. If her proposal is accepted, it is implemented. If rejected, the budget shrinks again by a factor δ, and another city councilor is recognized to propose. The process repeats until one proposal is finally accepted.

In the second reversal mode, the *partisan* reversal mechanism, I assume that each councilor has a party affiliation. Party affiliations are mutually exclusive (a councilor cannot belong to two parties at once). If a city councilor is affiliated to a party aligned with the mayor, I say that she belongs to the government coalition $G \subset \{1, 2, \cdots, N\}$. Otherwise, the city councilor belongs to the opposition $O = \{1, 2, \cdots, N\} \setminus G$. The mayor's policy generates a political value of $p > 0$ for the councilors, and whether it adds or subtracts from the councilor's utility depends on the party affiliation of the councilor. If the mayor's proposal is rejected, a city councilor aligned with the mayor that should have received p from the policy now receives zero. On the other hand, a city councilor that belongs to the opposition would receive $-p$ from the mayor's policy and now receive zero. Although these assumptions are strong, they capture the underlying political dynamics of partisanship: the political preferences in public goods provision are shared by councilors aligned with the mayor. Voting against the mayor's proposals would represent defying the partisan label.

Lastly, in the *hybrid* reversal mechanism, I combine partisanship with legislature bargaining costs.

Councilors in this mechanism receive a partisan utility from the mayor's policy, but if they reject the policy, a reversal policy similar to the non-partisan reversal mechanism takes place. In the mayor's proposal stage, city councilors that belong to the mayor's coalition receive a gain of $p > 0$ when the mayor's policy is implemented. On the other hand, opposition members receive $-p$ when the mayor's proposal is implemented. If the mayor's proposal is rejected, as the city council does not control the Executive when the two branches are separated, no public goods are provided ($p = 0$). Moreover, in equilibrium, I assume that city councilors would prefer to receive transfers instead of providing public goods. This aligns with the empirical evidence in most developing economies.

The timeline of the game is as follows:

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

2. The mayor proposes a policy vector $(r, g, x)_M$.

3. The city council votes the proposal.

    - If the council accepts, the policy is implemented, and the game ends.

    - Otherwise, the reversal policy is implemented.

4. (Reversal Policy) Depends on which mechanism, I propose three different reversal policies. The details are in the following sections.

The solution concept I use in this model is the Sub-game Perfect Nash Equilibrium. A Sub-game Perfect Nash Equilibrium requires that the strategies played are a Nash Equilibrium in each of the subgames of the game. The solution is found using backward induction. In the model with infinitely repeated proposals, I extend the equilibrium concept to require that the equilibrium is Stationary. A Stationary Sub-game Perfect Equilibrium requires that, at each given point of the game, if a politician accepts an offer at time $k + 1$, she should take the same offer at time k. Stationarity provides the intending to find a proposal that would be accepted at any stage in the game. Applying this reasoning, I can find a sequence of offers for each point k in time. For the mayor, the optimal offer is at $k = 0$, representing a no delay in policy implementation.

Definition 1. *The equilibrium for the game consists of a sequence of strategic policy vectors $(g^*, r^*, x^*)_k$, indexed in $k \in \{0, 1, \cdots, \infty\}$, such that, at every stage of the game, the mayor and the councilors have no profitable deviations from the equilibrium.*

Moreover, I assume that the players play no dominated strategies, even when there is less than sufficient support for implementing the policy.

B.1.2 The Mayor's Decision Stage

Solving the game by backward induction requires me to start with the councilor's strategies. However, for exposure convenience, assume that I solved the game for the councilors and found the equilibrium cost of governing $C_G(N)$ when there are N city councilors. In the next section, I define $C_G(N)$ for each mechanism using backward induction, and the definitions are well-behaved. In this section, I use this assumption to simplify the exposition.

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

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

In equilibrium, the budget binds, and the provision of the public goods maximizes:

$$\max_{g} \{u(R - g - C_G(N)) + B_M \pi(g)\}$$

The first-order condition for an optimal public goods provision makes the marginal benefits to increase rents, in this case, marginal costs of providing the public goods, equals to the marginal benefits of reelection:

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

This is sufficient for the equilibrium, as the second order condition reassures the concavity of the mayor's expected utility: $u''(R - g^* - C_G(N)) + B_M \pi''(g^*) < 0$.

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

Proof. To prove this result, I need to show that the mayor's expected utility satisfies the increasing differences in g and N. This would mean that when increasing the size of the council, the optimal solution g^* would also increase. However, as N increases discretely, I cannot take the cross-partial derivative on N or even use the implicit function theorem. Instead, I use monotone comparative statics to derive these results (Milgrom and Shannon 1994).

The mayor's expected utility satisfy the increasing differences in g and N when, for $g > g'$ and $N + 1 > N$,[2]

[2] Moreover, the requirement that the decision and type space is a complete lattice, is satisfied for $\mathbb{R} \times \mathbb{N}$.

I have:

$$\mathbb{E}\mathrm{U}(g, N+1) - \mathbb{E}\mathrm{U}(g', N+1) \geq \mathbb{E}\mathrm{U}(g, N) - \mathbb{E}\mathrm{U}(g', N)$$

After substituting, I have:

$$u(R-g-C_G(N+1))+B_M\pi(g)-u(R-g'-C_G(N+1))-B_M\pi(g') \geq u(R-g-C_G(N))+B_M\pi(g)-u(R-g'-C_G(N))-B_M\pi(g')$$

Which is equal to:

$$u(R-g-C_G(N+1)) - u(R-g'-C_G(N+1)) \geq u(R-g-C_G(N)) - u(R-g'-C_G(N))$$

Multiplying both sides by $\dfrac{1}{g-g'}$ and taking the limit when $g \longrightarrow g'$, I have:

$$u'(R-g-C_G(N+1)) \geq u'(R-g-C_G(N))$$

It is now clear to see that the function satisfies the increasing differences in g and N when the governing costs of a $N+1$-sized city council are lower than the governing costs of a N-sized city council:

$$C_G(N+1) \leq C_G(N)$$

□

This provides the first empirical hypothesis to test: *if the governing costs decrease when the legislature increases, then the public goods provision increase when the legislature size increase.*

At this stage, I need to solve for the existence of these governing costs. Below I show that this proposition is valid for the *partisan* and *hybrid* mechanisms, but it is not suitable for the *non-partisan* mechanism.

B.1.3 Non-Partisan Reversal Mechanism

In the *non-partisan reversal* mechanism, I assume that when the council rejects the mayor's office, a reversal stage starts with the selection of one councilor randomly. To find the stationary sub-game perfect Nash equilibrium, suppose that there were $k-1$ rejections, and the game is at the k-th stage. A councilor accepts the proposer's offer if, and only if, to get the offer at k is better than to wait until the next stage $k+1$. If the offer is x_i, then:

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

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

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

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

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

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

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

Proof. The difference in costs when there are $N+1$ city councilors versus when there are N city councilors is equal to:

$$\begin{aligned} C_G(N+1) - C_G(N) &= \frac{(N+1)\delta R}{2(N+1)+1} - \frac{N\delta R}{2N+1} \\ &= \frac{\delta R}{(2N+3)(2N+1)} \\ &> 0 \end{aligned}$$

Therefore, the costs always increase when the size of the legislature increases.

□

Corollary 1. *In the non-partisan reversal mechanism, public goods provision decreases as the legislature size increases.*

This result is crucial to understand the role of politics in my model. If the governing costs increase with legislature size, then any increase in public goods provision associated with legislature size has come from a different mechanism. In my case, I show that there is a *political* reason for increasing the public goods provision.

B.1.4 Partisan Reversal Mechanism

I now look into the other extreme, which is a fully politicized legislature. In this case, when the mayor implements the policy, it generates a value of $p > 0$. A legislator aligned with the mayor receives a benefit p while an opposition legislator receives a cost of $-p$. Moreover, as in the non-partisan reversal, the mayor can choose to distribute x_i private goods for a legislator i. In this case, when the policy is implemented, the aligned legislator's utility equals $x_i + p$. When the legislator is not aligned with the mayor, her utility equals $x_i - p$. If the policy is not implemented, then I assume a reversal policy of zero in all choice vectors $g = x_i = p = 0$.

A legislator aligned with the mayor always supports the mayor's policy, regardless of receiving private goods. This is because as $p > 0$, the councilor always receives positive benefits from the policy.[3] However, politicians not aligned with the mayor require compensation when their votes are needed. In this case, if the mayor's proposal requires the support of an opposition politician, then the mayor compensates the councilor for the policy costs. In such case:

$$x_i \geq p$$

Optimality dictates that the mayor offers $x_i = p$ to the opposition legislator. Let γ be the ex-ante probability of electing a politician aligned with the mayor. Then, the costs of governing when the legislature size is N is equal to the expected number of politicians in the opposition that the mayor has to compensate minus the amount needed to implement the policy, in this case, half of them:

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

Proposition 3. *In the partisan reversal mechanism, if the chance of electing a mayor-aligned politician is greater than one-half, then the costs of govern decrease as the legislature size increases.*

Proof. The differences in costs when there are $N + 1$ versus when there are N legislators are equal to:

[3] The mayor could even impose a cost to the city councilors aligned with the government. Although this seems unrealistic, it is mostly the case when government-aligned legislators are recognized to draft legislation for the mayor's office or even take the fallout from a failed policy.

$$
\begin{aligned}
C_G(N+1) - C_G(N) &= p\left(\frac{N+1}{2} - \gamma(N+1)\right) - p\left(\frac{N}{2} - \gamma N\right) \\
&= p\left(\frac{1}{2} - \gamma\right)
\end{aligned}
$$

Therefore, when $\gamma < \frac{1}{2}$, the costs of govern increase. Otherwise, the costs decrease.

□

Corollary 2. *In the partisan reversal mechanism, if the chance of electing a mayor-aligned politician is greater than* $1/2$*, then public goods provision increase as the legislature size increases.*

This result shows that when the chances of electing an aligned politician are sufficiently high, the government costs decrease. As a response, the public goods provision (and also rents) increase. The rate distribution between these two vectors is determined by the marginal change in the utility from rents and the utility from reelection. In any case, the amount allocated for both increases.

B.1.5 Hybrid Partisan and Non-partisan Reversal Mechanism

The *hybrid reversal* mechanism combines both partisan and non-partisan motivations. In the hybrid mechanism, a city councilor aligned with the government favors the mayor's offer if:

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

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

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

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

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

Proposition 4. *In the hybrid reversal mechanism, if* $\gamma \leq \frac{1}{p}\left[\frac{1}{(2N+1)(2N+3)}\right]$*, then the costs of govern increase as the legislature size increases. Otherwise, the costs decrease when the legislature size increases.*

Proof. The difference in costs when there are $N+1$ city councilors versus the costs when there are N councilors is equal to:

$$\begin{aligned} C_G(N+1) - C_G(N) &= \frac{N+1}{2}\left(\frac{2\delta R}{2(N+1)+1} - p\right) + \left(\frac{N+1}{2} - \gamma(N+1)\right)p \\ &\quad - \frac{N}{2}\left(\frac{2\delta R}{2N+1} - p\right) - \left(\frac{N}{2} - \gamma N\right)p \\ &= \frac{\delta R}{(2N+3)(2N+1)}\left[1 - \gamma(2N+1)(2N+3)p\right] \end{aligned}$$

The conditions for the differences in governing costs decrease when the legislature size increases are:

$$\gamma \geq \frac{1}{p}\left[\frac{1}{(2N+3)(2N+1)}\right] \equiv \underline{\gamma}$$

□

Corollary 3. *In the hybrid reversal mechanism, when the chances of electing a city councilor aligned with the mayor are sufficiently high, then increasing council size lowers the bargaining costs for mayors.*

The threshold $\underline{\gamma}$ for the probability of electing a politician aligned with the government is decreasing in the value of the mayor's policy p and the legislature size N. This means that higher political values and larger legislatures make it easier to satisfy the electoral threshold.

B.1.6 Main Hypotheses

Our model provides two empirically testable hypotheses. Consider a city council comprised of N legislators that increase its council size to $N + 1$. Then:

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

In the paper, I show that the provision of education and healthcare improves in Brazil. This results from the fact that the chances of electing a city councilor aligned with the mayor are 91%.

B.2 Variable Sources and Descriptive Statistics

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

B.2.1 Outcomes Aggregated at the Municipal Level

- **Number of Seats 2000**: Number of councilors in the municipality in 2000 (source: TSE).
- **Population 2000**: Municipal population according to the 2000 Brazilian Census (source: IBGE).
- **Per-Capita GDP 2000 (in millions)**: Municipal per-capita GDP computed by the Brazilian Census (source: IPEA).
- **Proportion of Poverty 2000**: Proportion of poverty in the municipality defined as people living on less than R$ 70.00 a month (source: Social Development Ministry [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)
- **Postneonatal Mortality 2005–2008**: Infant mortality computed as the number of children that lived at least 28-days, but died before reaching one year of age divided by the number of children that reached 28-days alive, multiplied by 1,000 (source: DataSUS)
- **Enrollment Elementary School 2005–2008**: Number of children enrolled in elementary schools, averaged by classroom size (K–4) (source: INEP).
- **Quality of Elementary School Index 2005–2008**: IDEB score averaged by schools in the municipality. IDEB scores are composed of 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 INEP reweights the estimators to avoid influences of schools and classroom 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)

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

- **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 the city council. I collected this data for municipalities less than 10,000 inhabitants away from the cutoffs (source: own compilation based on the TSE candidate pictures).
- **Competition per Seat 2004**: Number of people running for city-councilor divided by the city council size (source: TSE)
- **Proportion Approved Legislation 2005**: Number of approved legislation in 2005 divided by the number of proposed legislation (source: InterLegis)

B.2.2 Legislation Dataset

I coded the legislation approved by the councilors in 63 municipalities within ten thousand inhabitants away from the council size thresholds. I classified the legislation into five categories:

- **Public Goods**: Legislation that provides public goods or services.
- **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.

B.2.3 Online 2016 Former City Councilors Survey

I ran an online survey asking 174 councilors, among other questions, about their representation duties, which mayors used services to improve the mayor's coalition support. The services were:

- **Councilors Job Appointments**: The frequency that mayors appoint people allied to city councilors to bureaucratic jobs (source: survey).
- **Councilors Demands**: The frequency that mayors satisfy an allied councilors' demand (e.g., build a health clinic in a councilor's neighborhood) (source: survey).
- **Councilors Personal Requests**: The frequency that mayors satisfy an allied councilors' requests (e.g., hire an ally in the bureaucracy) (source: survey).

- **Councilors Legislation**: The frequency that mayors support councilors' legislative agenda (source: survey).

- **Councilors Constructions**: The frequency that mayors support councilors' requests for constructions (e.g., fix potholes in the councilor's neighborhoods) (source: survey).

This Appendix presents other questions I asked in the survey. They are meant to improve my knowledge about the city councilors' perceptions of their municipality roles. I omitted these questions in the main paper because they are not of general interest to my argument. The descriptive statistics of the variables used in the main article 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
GDP Census 2000	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	13,328	20.64	13.45	1.28	209.30
Postneonatal Mortality 2005-2008	6,113	9.29	8.64	0.59	200.00
	Education Outcomes				
Enrollment Elementary School 2005-2008	10,842	20.62	5.32	1.00	57.80
Quality of Elementary School Index 2005-2008	9,266	3.73	0.94	0.70	8.10
	Bargaining, Coalition, and Public Employment				
Mayoral Pre-electoral coalition Size 2004	5,522	4.86	1.71	0.00	17.00
Number of Appointed Bureaucrats 2005-2008	16,563	67.77	126.68	0	2,894
	Representation and Competition				
Number Female Elected 2004	5,526	1.12	1.20	0	8
Number Non-White Elected 2004	397	2.23	1.87	0	9
Competition per Seat 2004	5,527	6.27	3.82	1.00	25.83
Proportion Approved Legislation 2005	3,693	0.83	0.28	0.00	1.00
	Legislation Approved Data				
Legislation – Public Goods	346,553	0.76	0.43	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 – Strategy to Consolidate Coalition Support				
Coalition Support – Councilors Job Appointments	174	0.64	0.48	0	1
Coalition Support – Councilors Demands	174	0.44	0.50	0	1
Coalition Support – Councilors Personal Requests	174	0.56	0.50	0	1
Coalition Support – Councilors Legislation	174	0.25	0.43	0	1
Coalition Support – Councilors Constructions	174	0.43	0.50	0	1

Notes: The legislation approved dataset has data on 63 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.3 Threshold Manipulation, Sorting, and Pre-Treatment Consistency

The validity of the causal claim relies on three assumptions:

1. That municipalities cannot sort themselves on the left or the right-hand side of the cutoffs by their choices.
2. That the regression models are consistently comparing cities in the adjacent cutoffs.
3. That I have no pre-treatment differences in the sample.

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 my research, the McCrary statistic is 0.391 (SE = 0.299), showing no evidence of manipulation.

I run the Cattaneo et al. (2019) manipulation test, which is based on the density of the local polynomial estimator. I 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).

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

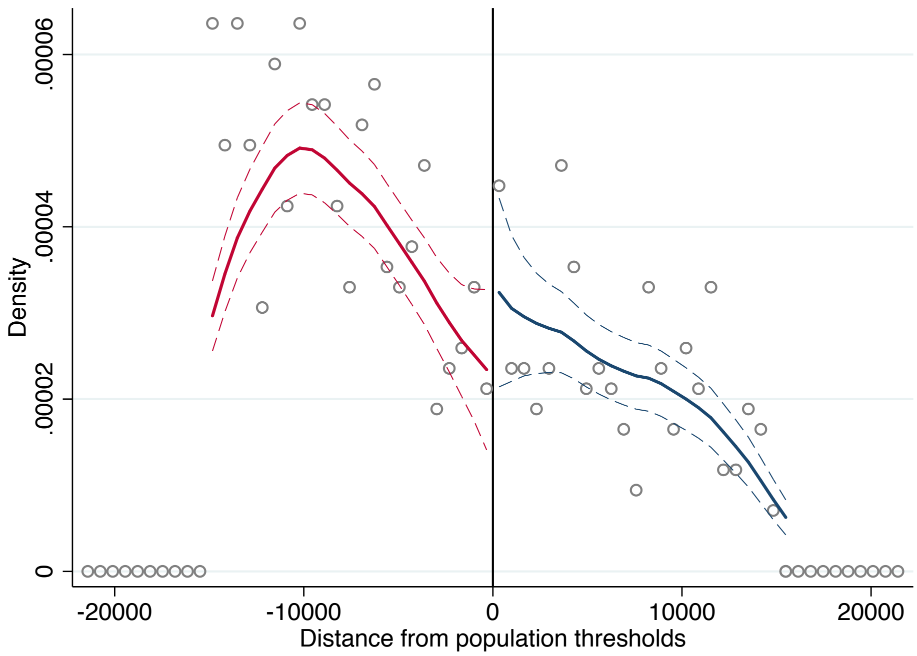


Figure 1: McCrary (2008) manipulation test

B.4 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 I exploit here, the 1988 Brazilian Constitution stated 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, beginning with nine legislators, until the maximum number of councilors, 55. Following this decision, the Superior Electoral Tribunal (TSE) decided the thresholds for 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, I decided to restrict the attention to cities with less than $571,429 + 47,619 = 619,048$ inhabitants. Table 5 displays the frequency of municipality by thresholds used in my paper.

The Supreme Court ruled that the electoral courts use the 2003 population projection to assign municipalities to cutoffs. In Brazil, the Brazilian Institute of Geography and Statistics (IBGE) proposes the official population projections. Sorting is not an issue for my identification strategy, as IBGE is an insulated bureaucracy 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, I give the contour of every Brazilian city, coloring it by the proximity to the council size thresholds. Darker colors represent municipalities closer to the population thresholds. In regression discontinuity, the closer a city is to the cutoff, the more influential it is in the estimation. Figure 2 also shows that the municipalities are reasonably distributed around the whole country.

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

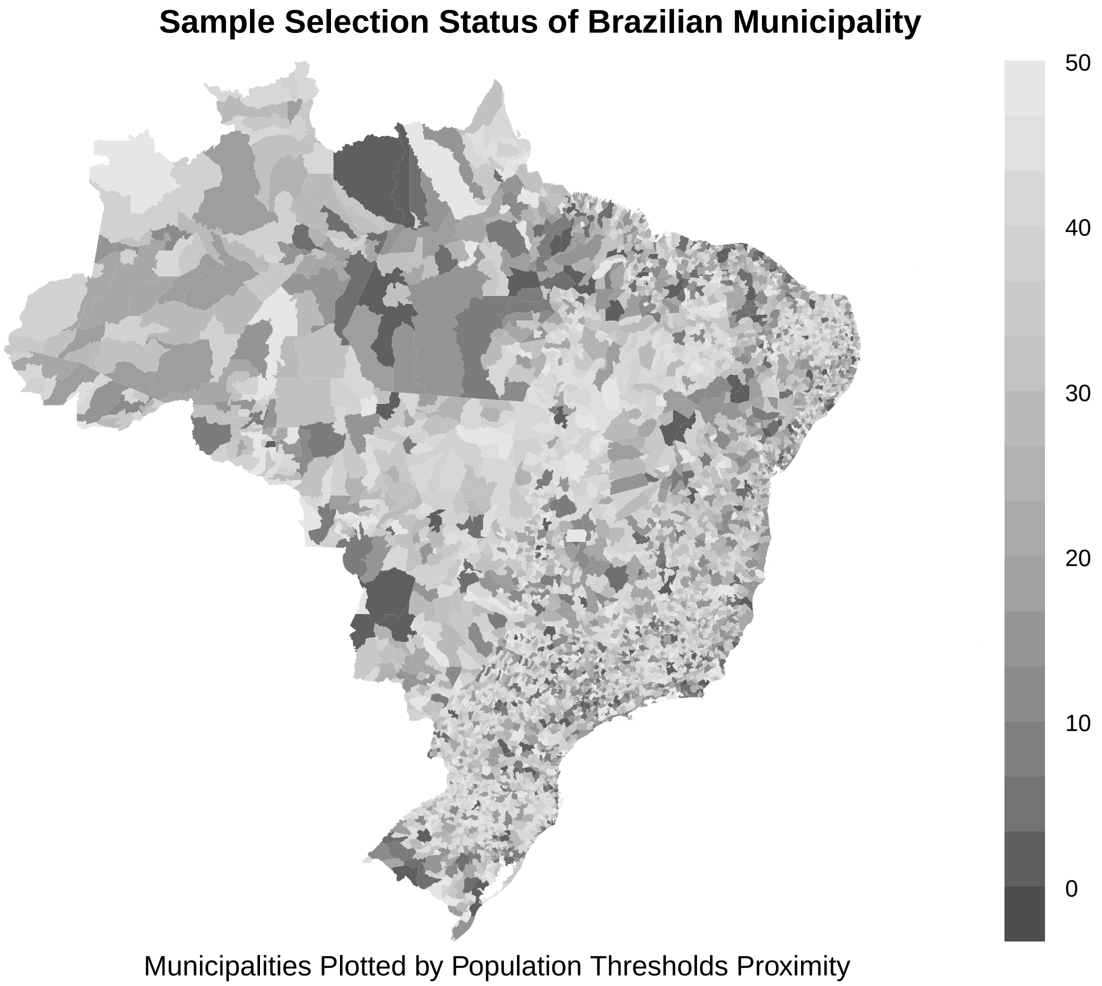


Figure 2: Municipalities by their Selection Status

B.5 Identification Strategy in Multiple Thresholds Regression Discontinuity Design

When carrying out regression discontinuity with multiple cutoffs, authors pool all the discontinuities together and estimate the effect of council size on outcomes (Cattaneo et al. 2016a). Let $C = \{c_0, c_1, \cdots, c_n, c_{n+1}\}$ 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:

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

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. (2016b). To ensure comparability, I estimate the average LATE for all cutoffs, avoiding most of the heterogeneity. I 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 runs smoothly around each cutoff, it makes it a perfect control to add. The new estimator is:

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

I 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 cutoffs, making them adequate control variables for this case (Calonico et al. 2019). To perform the estimations, I use a triangular kernel, which weighs the municipalities closer to each cutoff. To compute the optimal bandwidth, I use the Calonico et al. (2014) method. To study the sensitivity to the bandwidth choice, I vary the bandwidth from 50% to 200% of the optimal bandwidth size. I 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, I run a series of simulations to show that controlling for the variable that determines the assignment helps improve the consistency of the estimates and improves their efficiency.

Consider the data distributed in one of the four forms depicted by Figure 3. I add nine thresholds, at 0.1, 0.2, and so on until 0.9, creating six types of outcomes. The first three outcomes are sharp changes. In the first, I add variations from one to 10, with one step for each shift. In the second, I 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, I 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 previous three outcomes are the same as depicted here, added by a Normal random disturbance, mean zero, and variance 0.01. I then run a thousand Monte Carlo simulations for each combination, $4 \times 6 \times 2 = 48$ in total, fitting a regression with and without the running variable as a control.

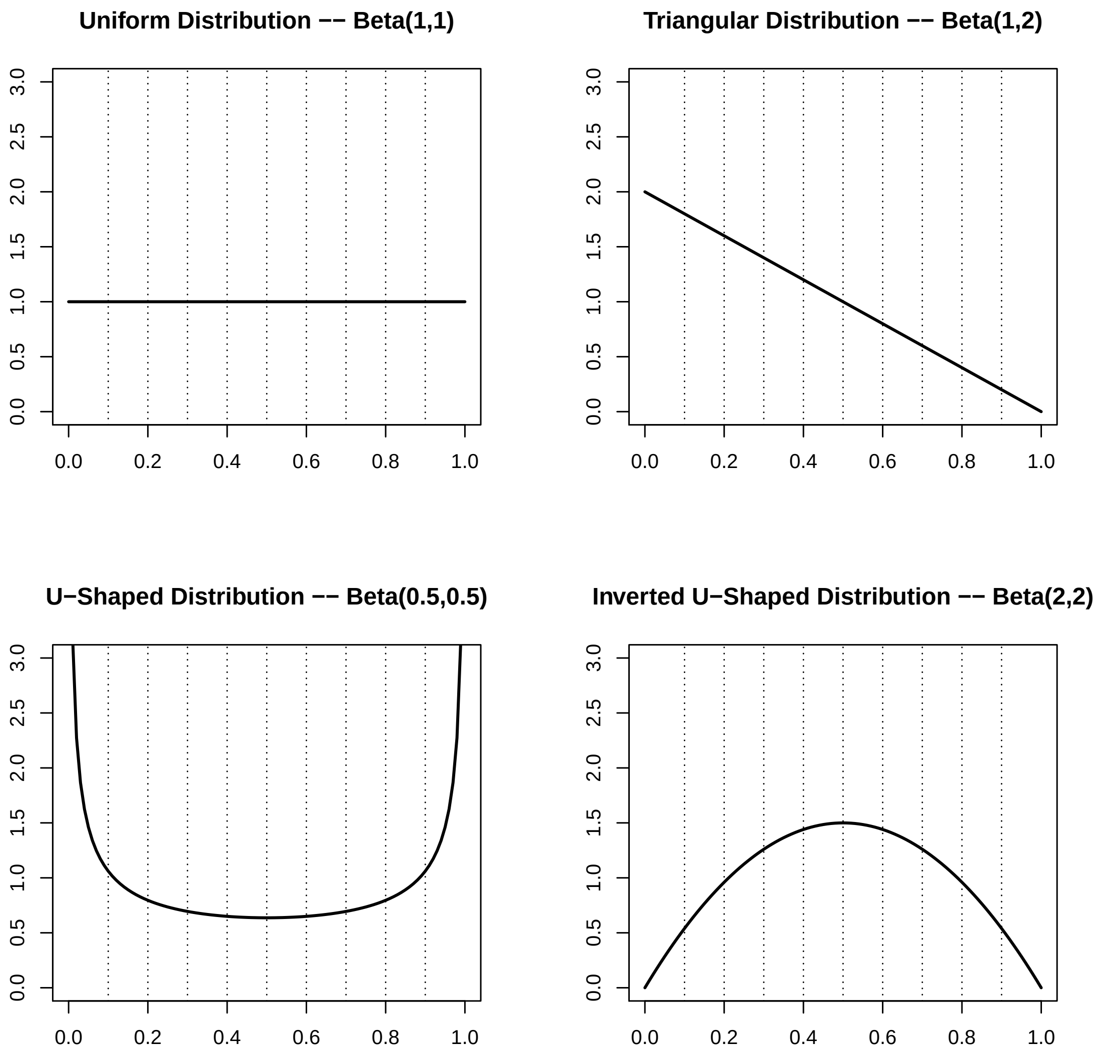


Figure 3: Simulation RD with Multiple Thresholds – Data Distribution

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. I display the results in Figure 4, showing that the controlled models are more consistent and efficient.

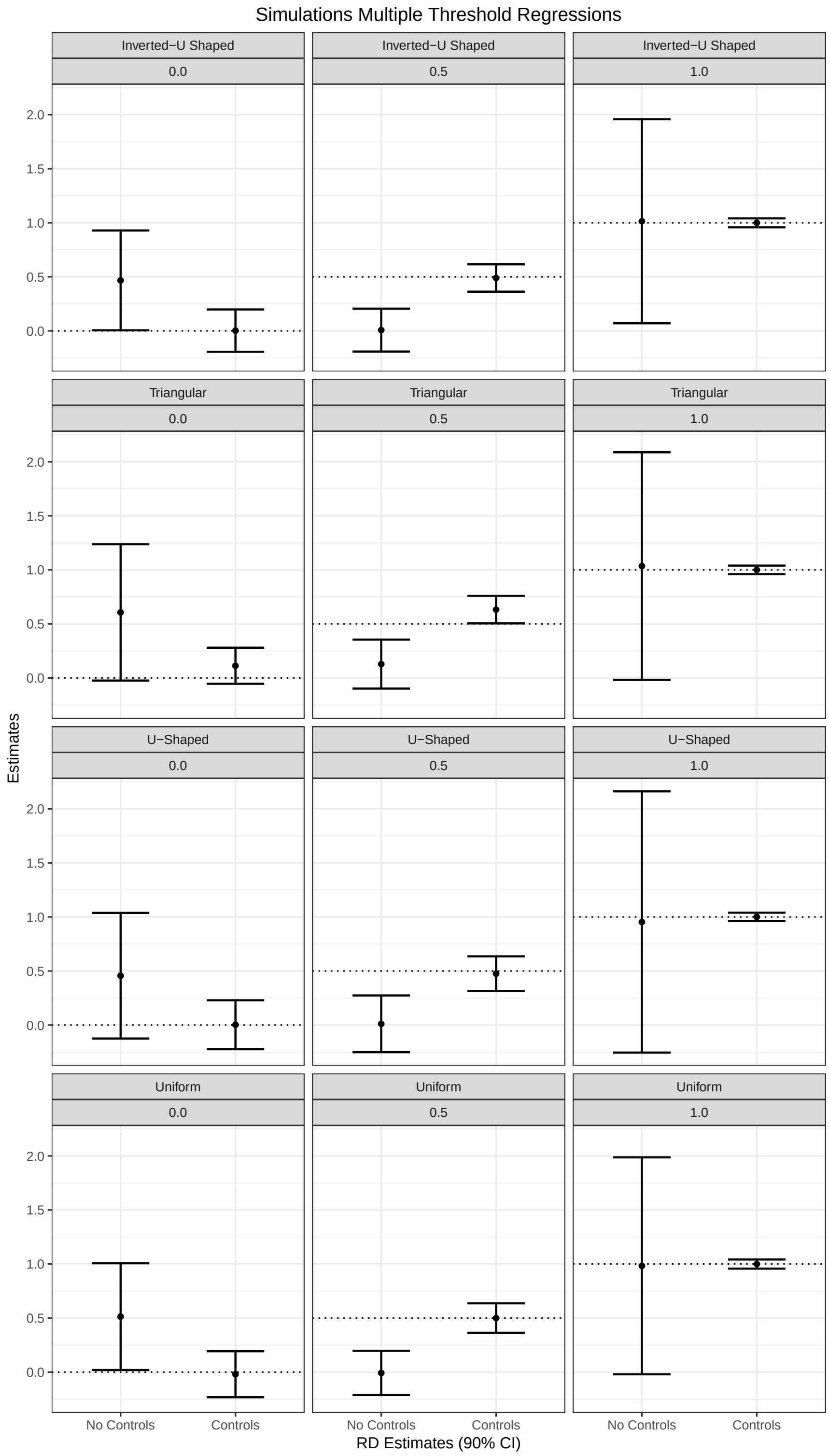


Figure 4: Estimations for the Different Data Generating Processes

B.6 Placebo Regressions for Political Mechanism

Here I present the placebo regressions for the mechanism-aggregated outcomes. In Panel A of the main paper, I run the regression on alternative explanations. Only the number of female councilors changed significantly, but a change is statistically expected in at least 10% of cases. I have not collected data on non-white legislators in the placebo cutoffs; therefore, I leave it blank. In Panel B, I have the placebo regressions for the primary mechanism: bargaining costs and public appointed employees. As expected, the placebo regressions were statistically insignificant.

Table 6: Political Effects of Legislature Size – Placebo Cutoffs

	Panel A: Representation and Elections			
	Representation		**Elections & Leg. Productivity**	
	Num. Female Councilors	Num. Non-white Councilors	Candidates Per Seat	Prop. Laws Approved Council
LATE	0.65^{**}		-0.72	-0.001
	(0.27)		(0.48)	(0.06)
N Left	4620		4621	2990
N Right	906		906	703
Eff N Left	414		567	356
Eff N Right	298		347	229
BW Loc Poly	4.874		6.104	5.583
BW Bias	8.789		10.312	8.89
	Panel B: Bargaining, Coalition, and Public Employment			
	Mayoral Coalition Size	Num. Politically Bureaucrats		
LATE	0.13	-0.58		
	(0.33)	(17.14)		
N Left	4618	13854		
N Right	904	2709		
Eff N Left	654	1345		
Eff N Right	394	915		
BW Loc Poly	6.813	5.127		
BW Bias	10.501	8.194		

Note: $^{***}p < .01$; $^{**}p < .05$; $^{*}p < .1$. RD estimates using Calonico et al. (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.7 Sensitivity Analysis for Bandwidth Selection

I present here the sensitivity to the bandwidth selection. Following the suggestions of Bueno and Tuñón (2015), I vary the bandwidth from 50% to 200% of the Calonico et al. (2014) estimate.

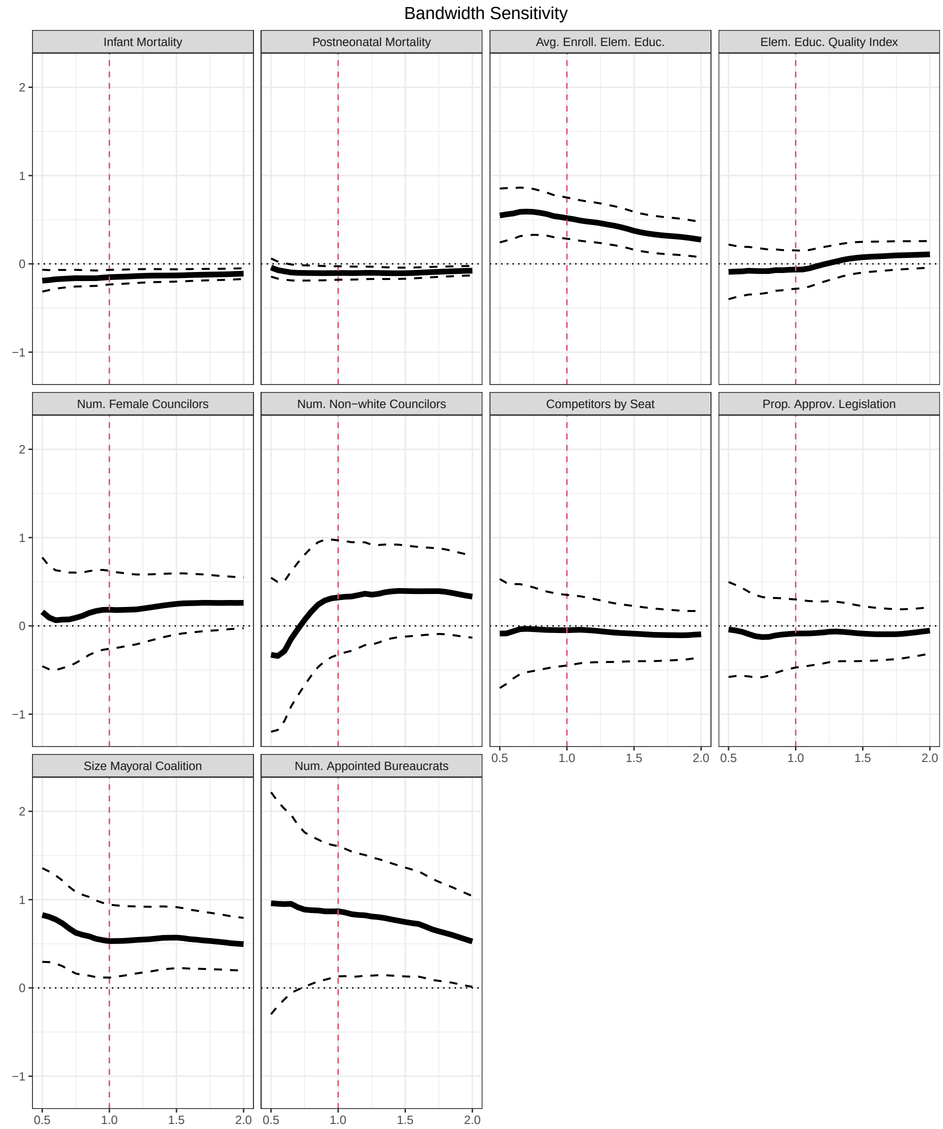


Figure 5: Bandwidth Sensitivity – Main Models

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

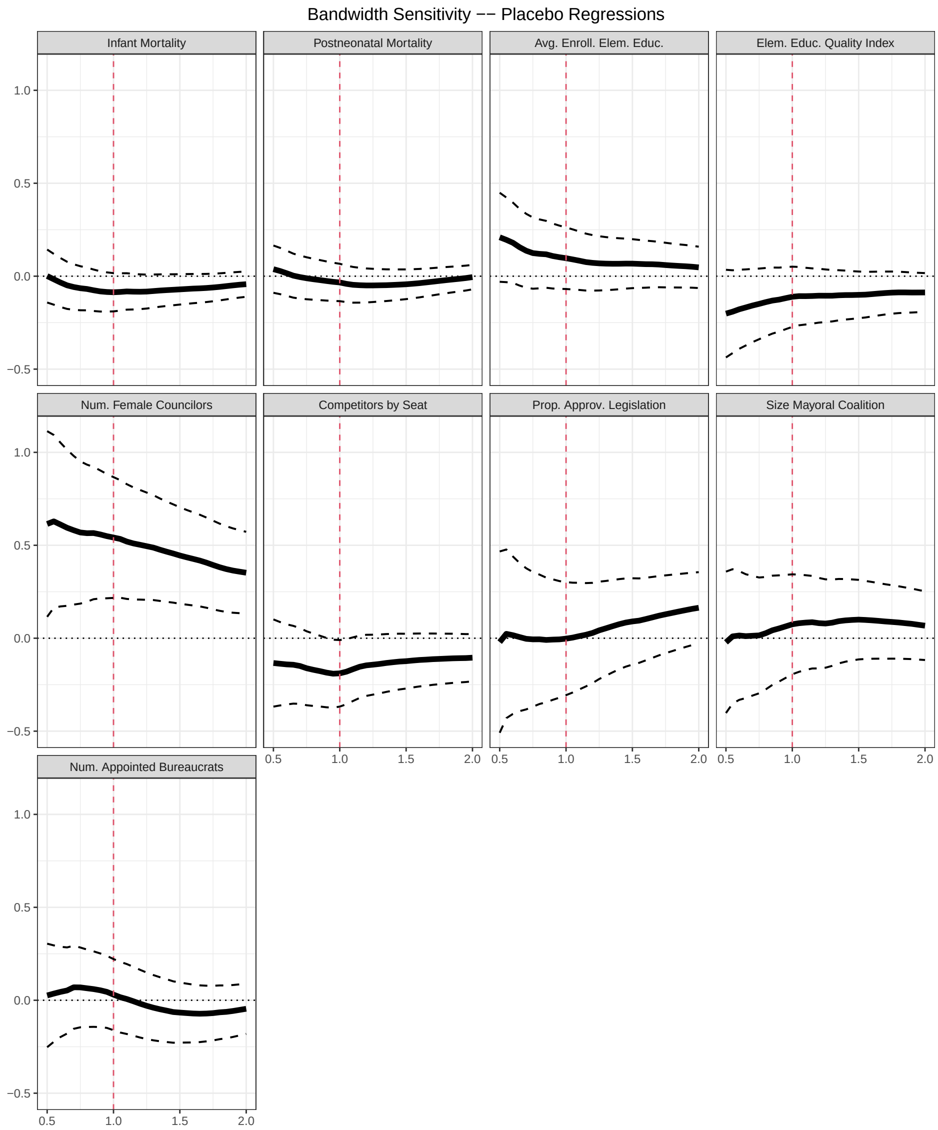


Figure 6: Bandwidth Sensitivity – Placebo Regressions

B.8 Sensitivity to Brazilian States Characteristics

The literature about Brazil recognizes that the country presents considerable variability. Moreover, some states had such poor Health Care and Education systems that they could be driving our results. I run the analysis dropping one state at a time to investigate this statewide heterogeneity. The results are in Figures 7,8, 9, and 10.

First, note that for infant mortality and education enrollment, all coefficients remain significant upon the removal of the state. For postneonatal mortality, the coefficient loses significance when removing Bahia, Pernambuco, Rio Grande do Norte, and Rio Grande do Sul. The mayoral coalition size remains significant in most models, losing significance when removing Rio Grande do Norte and Sao Paulo. The number of appointed employees lose significance when removing Espirito Santo and Sao Paulo. All the alternative mechanism models are insignificant, regardless of the state removed.

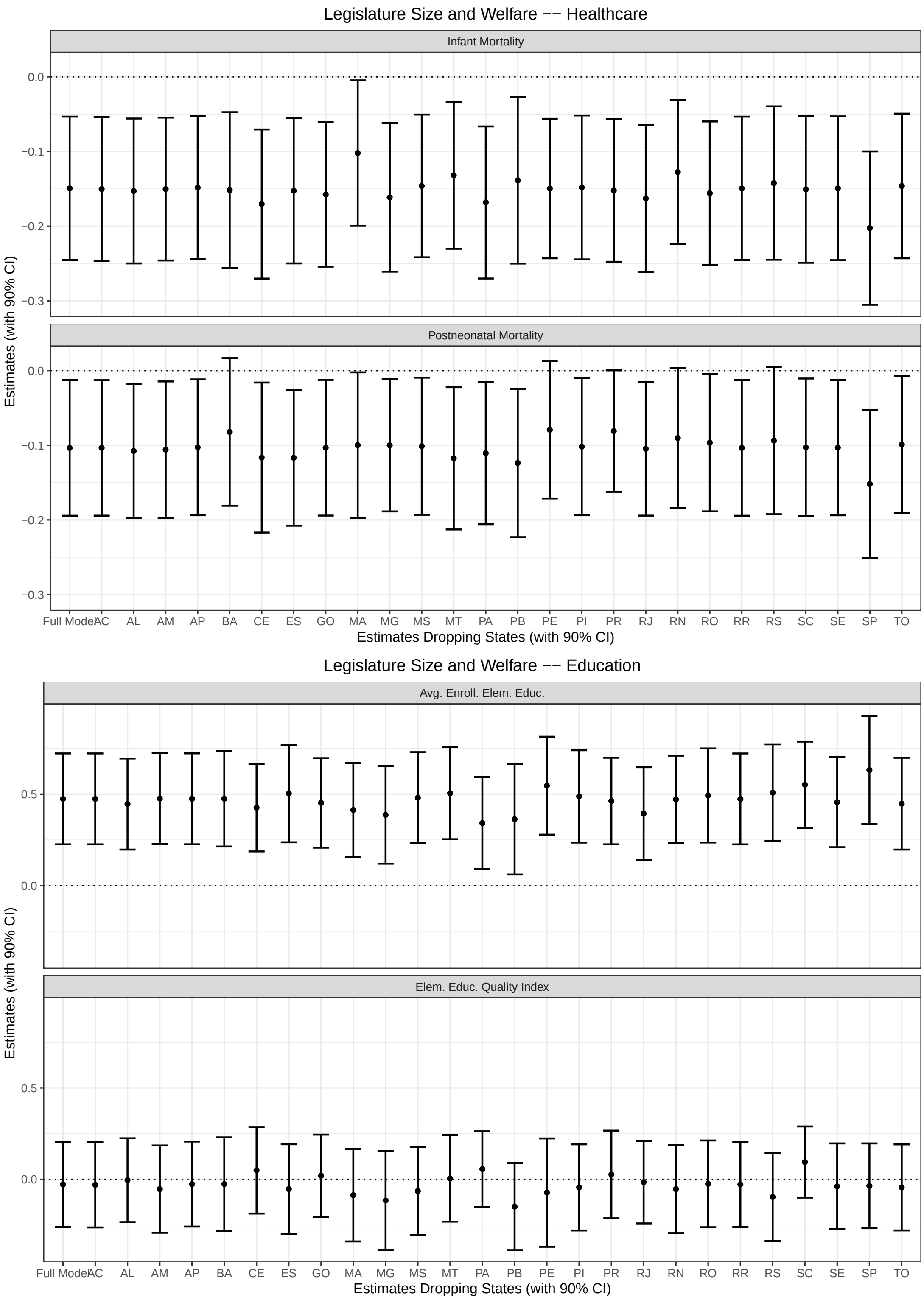


Figure 7: Sensitivity Analysis for the States in the Sample – Welfare Outcomes

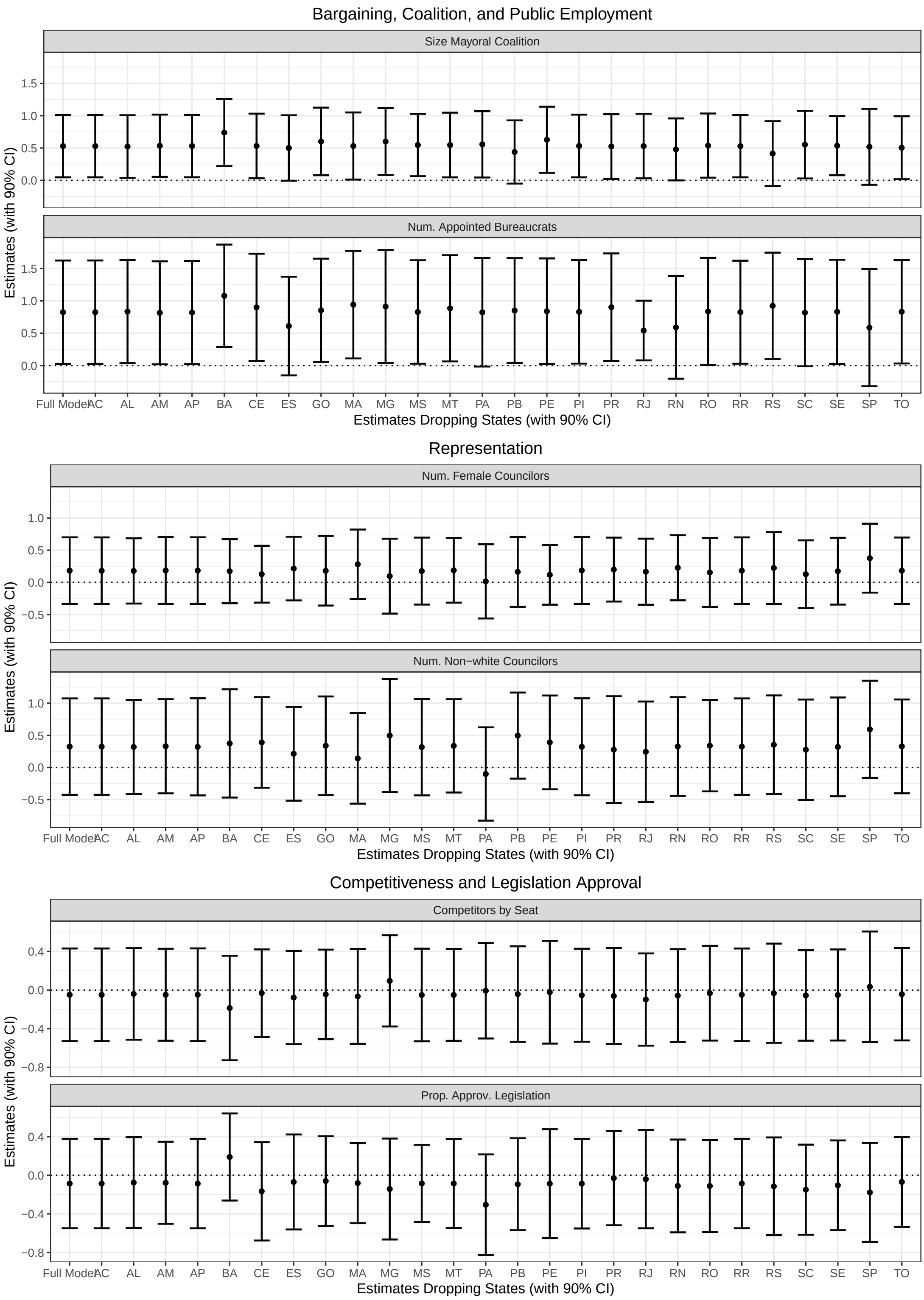


Figure 8: Sensitivity Analysis for the States in the Sample – Mechanism Outcomes

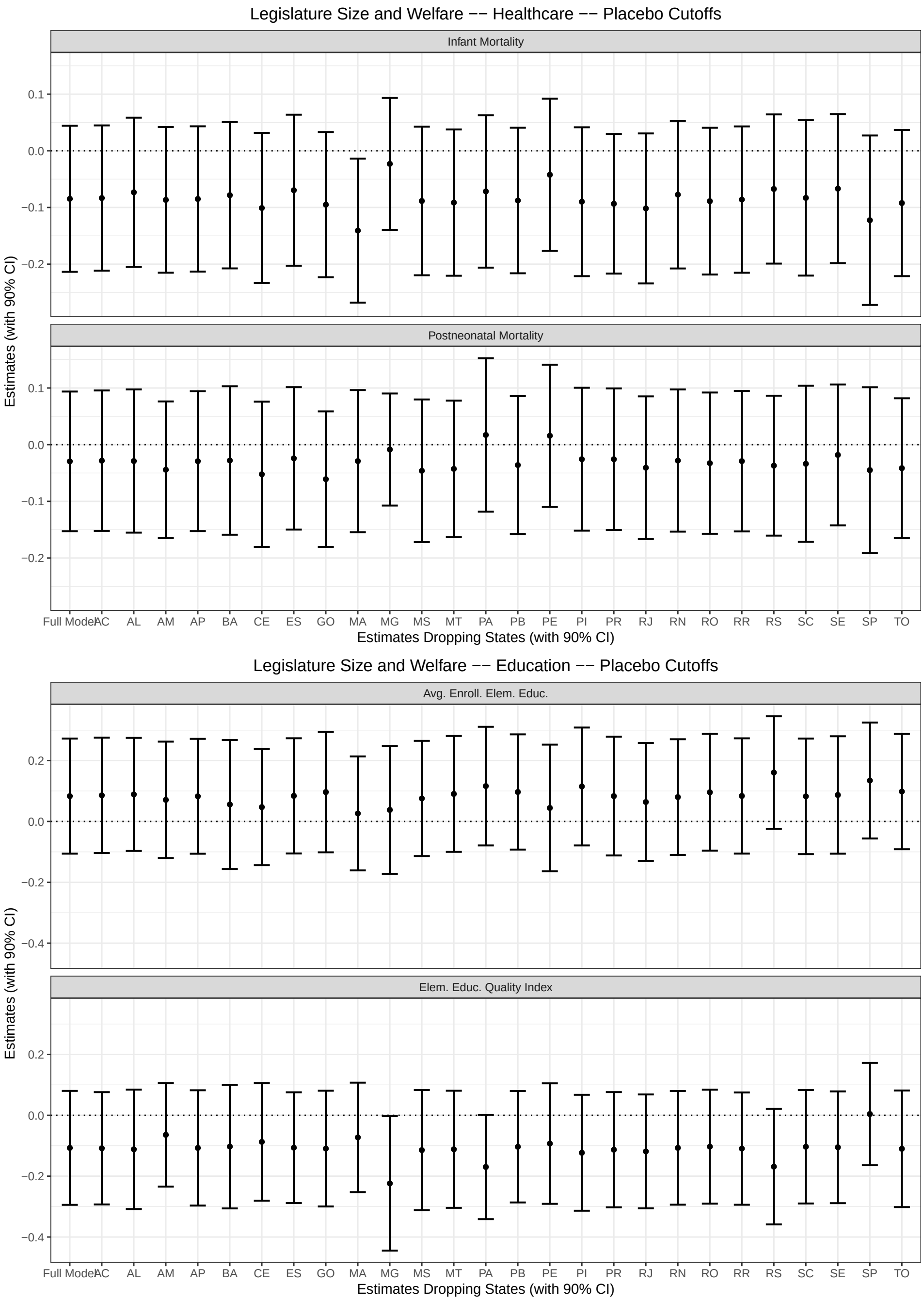
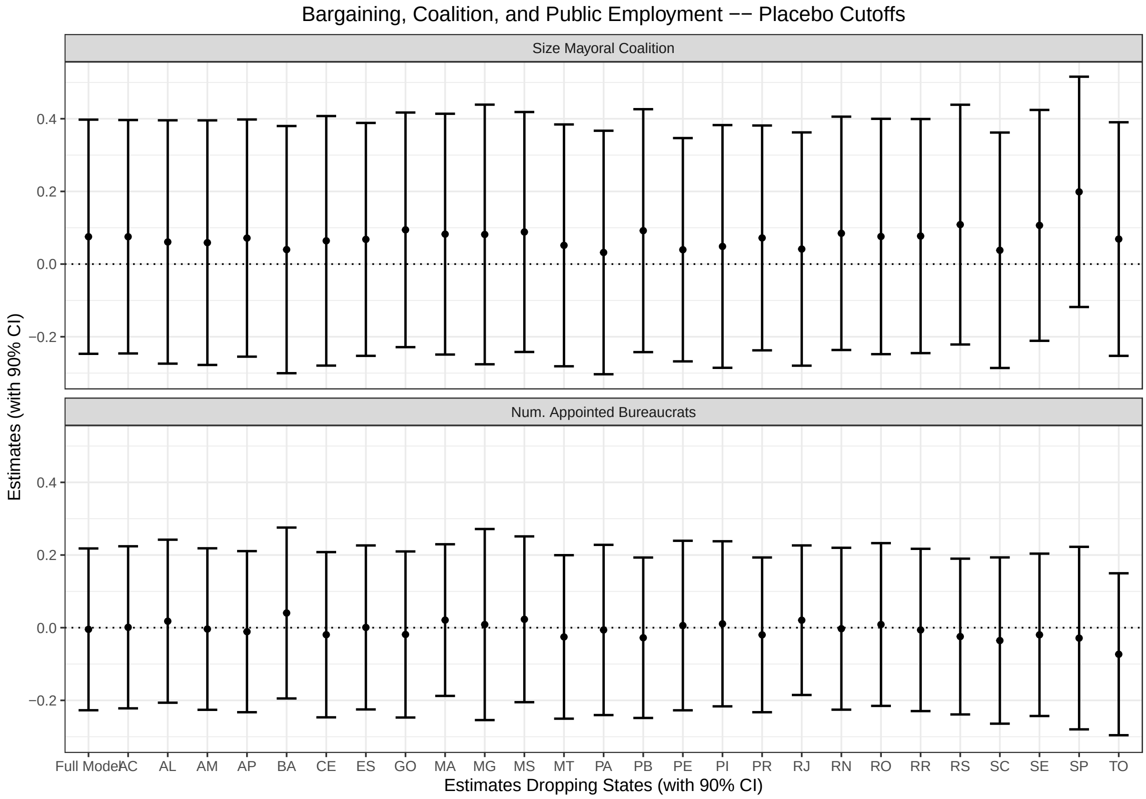


Figure 9: Sensitivity Analysis for the States in the Placebo Cutoffs – Welfare Outcomes



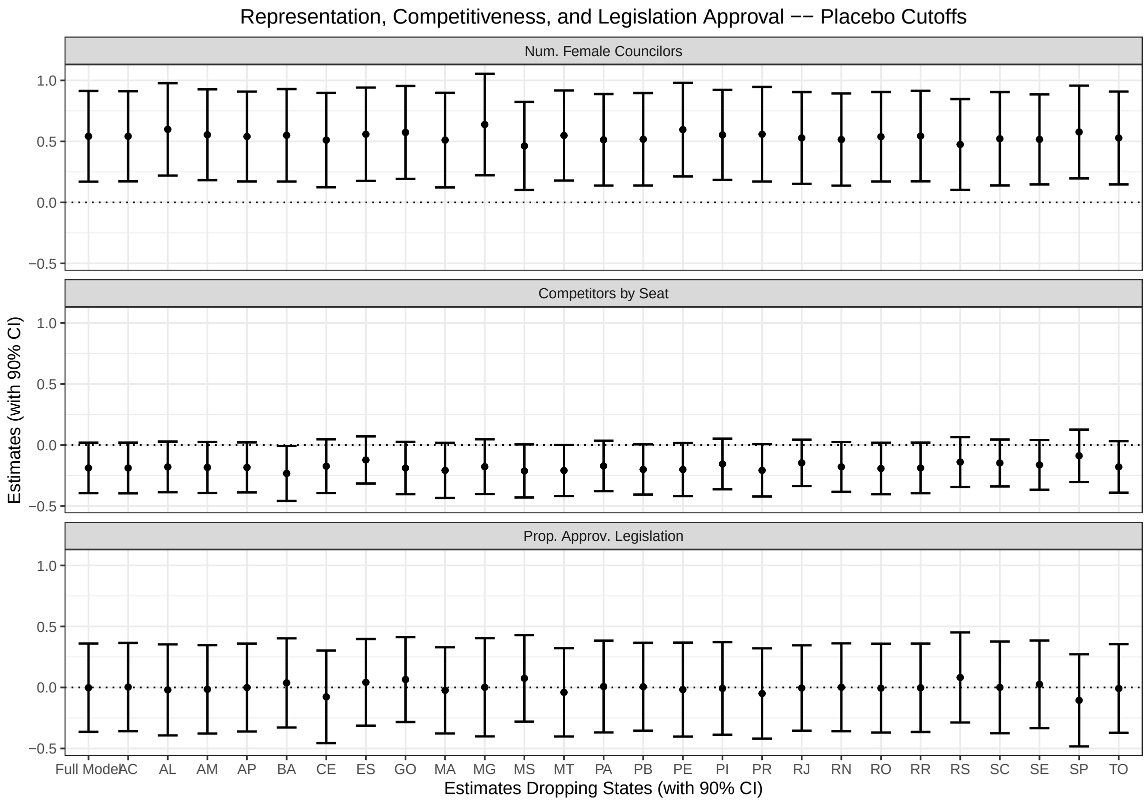


Figure 10: Sensitivity Analysis for the States in the Placebo Cutoffs – Mechanism Outcomes

B.9 Sensitivity to the Functional Form Analysis

In the paper, I 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, I run all the models using polynomials from local linear to a quartic, showing that my results are robust to different regression functional forms. The results are similar in all models, with significance changing only in the quartic polynomials. Figures 11 and 12 present the results for the real and the placebo cutoffs.

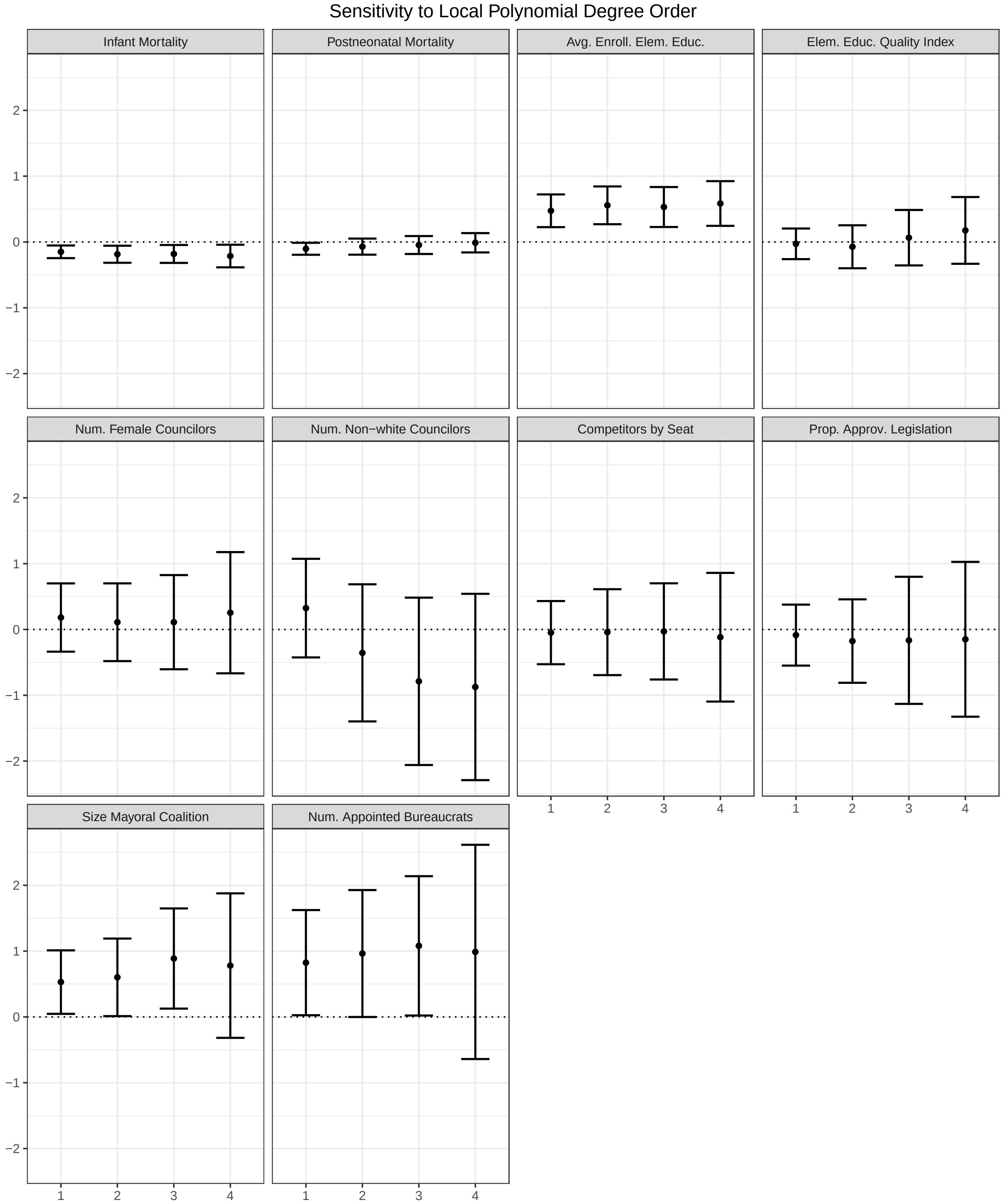


Figure 11: Sensitivity Analysis for the Functional Form

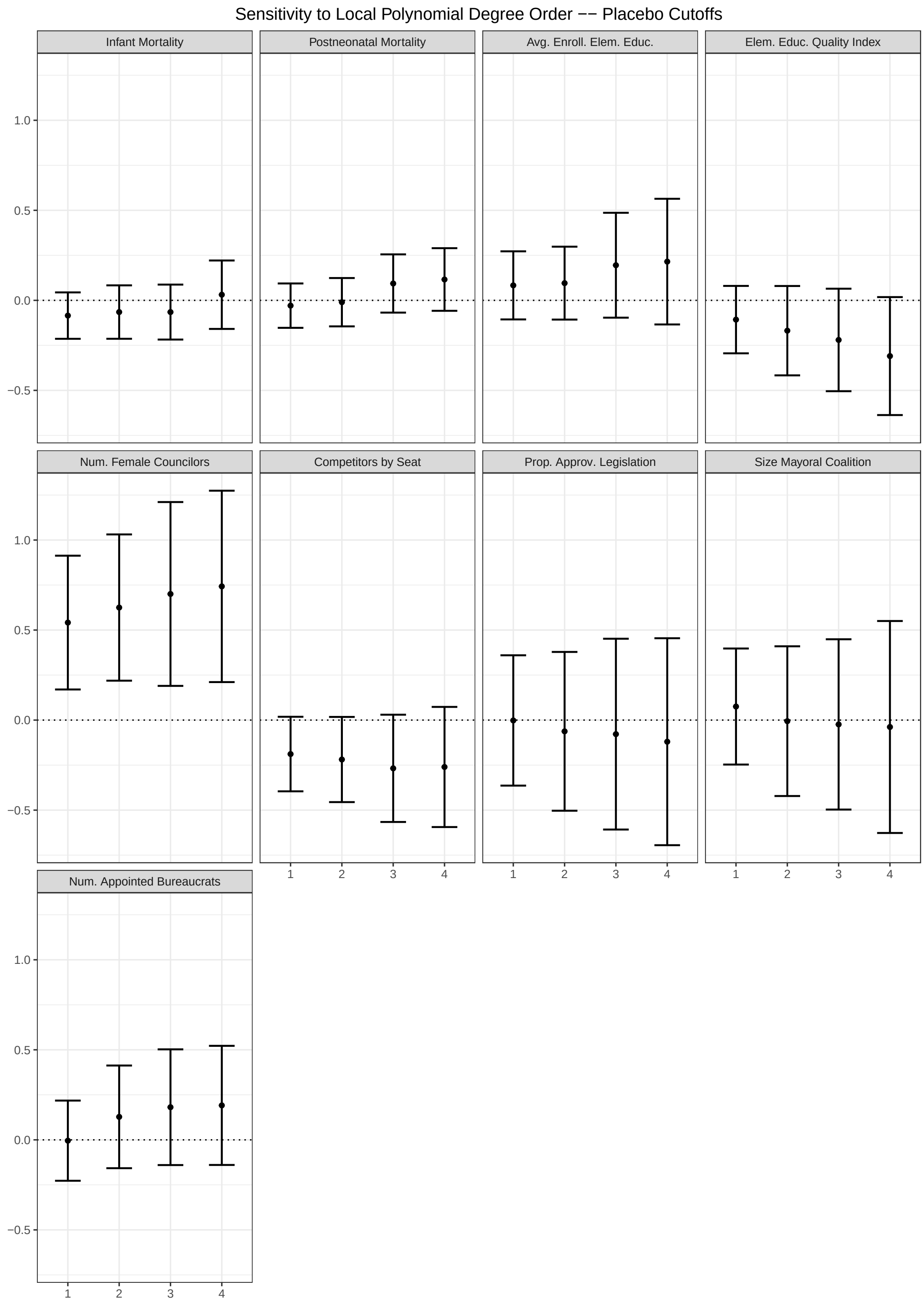


Figure 12: Sensitivity Analysis for the Functional Form – Placebo Cutoffs

B.10 Sensitivity to Covariates

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

However, if the selection of controls makes the models overestimate quantities in the directions my narrative emphasizes, this would pose a significant credibility issue for my analysis. To study the sensitivity to controls, I run the same regressions for all possible control combinations. Figure 13 displays the results for this sensitivity test.[4]

[4] In 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*, population in 2003; and *year*.

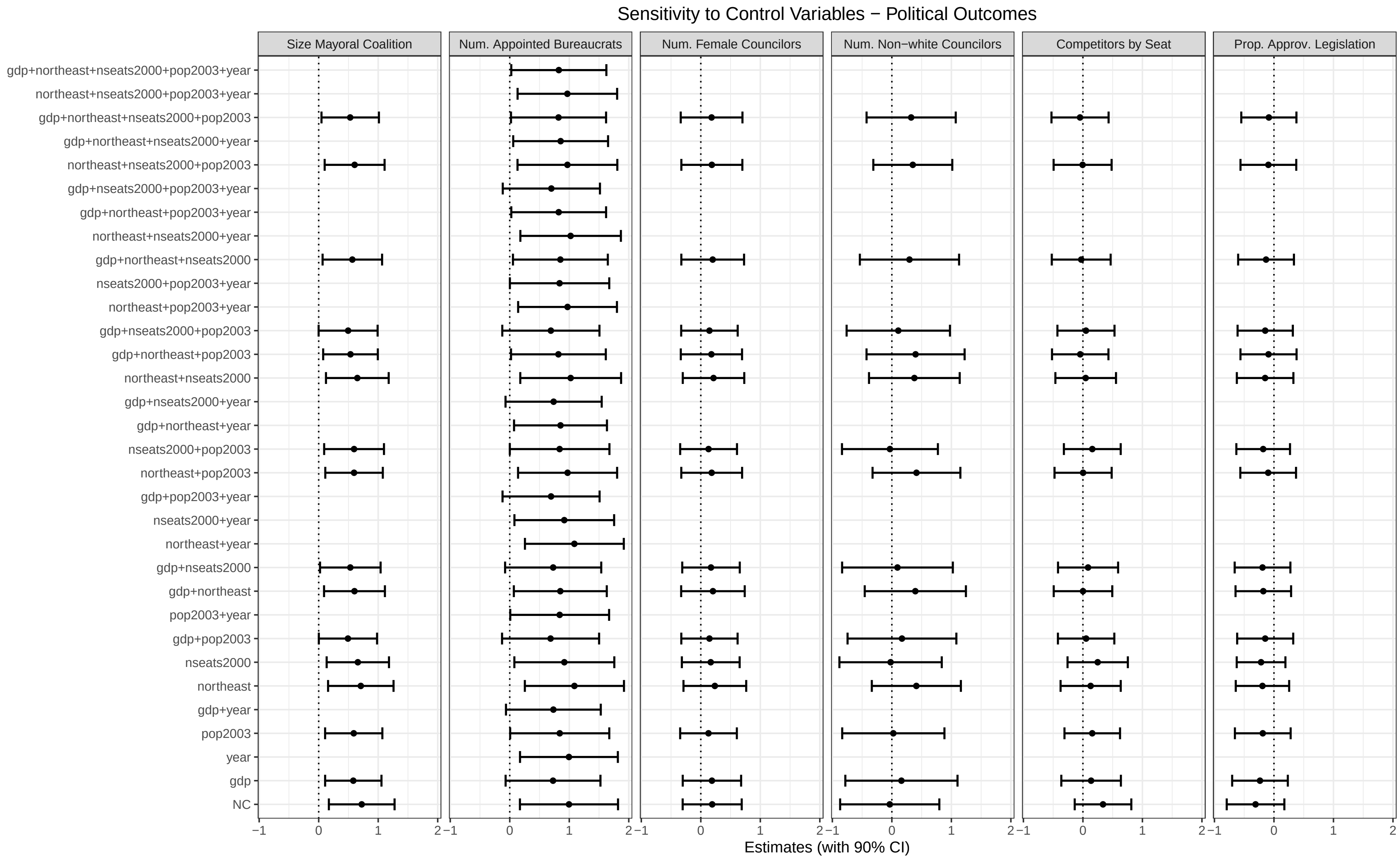


Figure 13: Sensitivity Analysis for the Control Variable's Choices

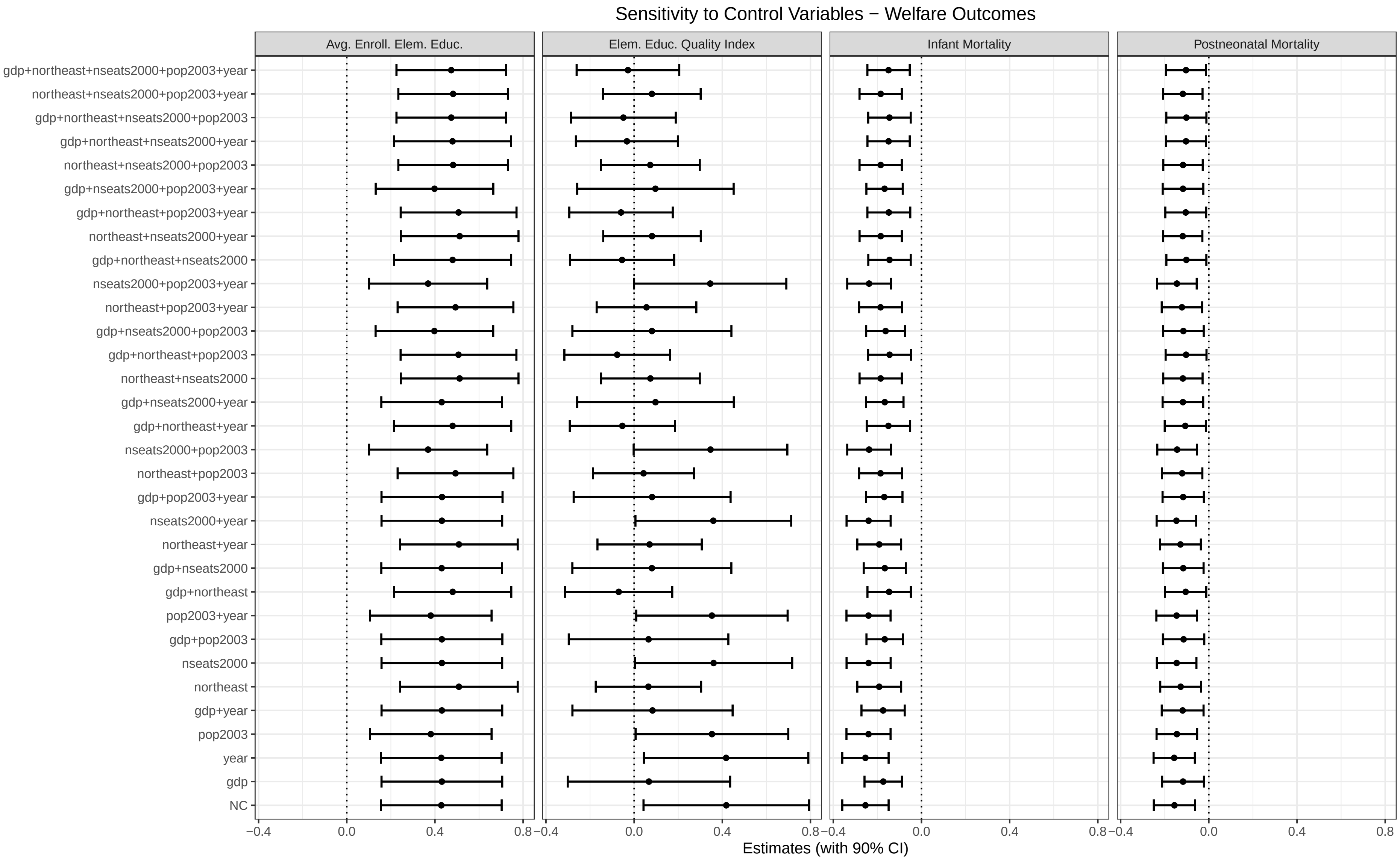


Figure 14: Sensitivity Analysis for the Control Variable's Choices

For instance, changes in controls substantially affect the detected differences in Elementary Education Quality, making some combinations of controls fit a positive effect on education quality. However, most combinations of controls were insignificant in this variable.

My choice of full controlled model was the most conservative. This is because the Full Model is significant only when most of the combinations also are significant. Regarding the point estimates, my choices of controls tend to keep the models with smaller coefficient sizes.

I also plot sensitivity tests to covariates in the placebo regressions in Figures 15 and 16. The theoretical expectations here are that most of these outcomes would fail, and the graphs confirm these expectations.

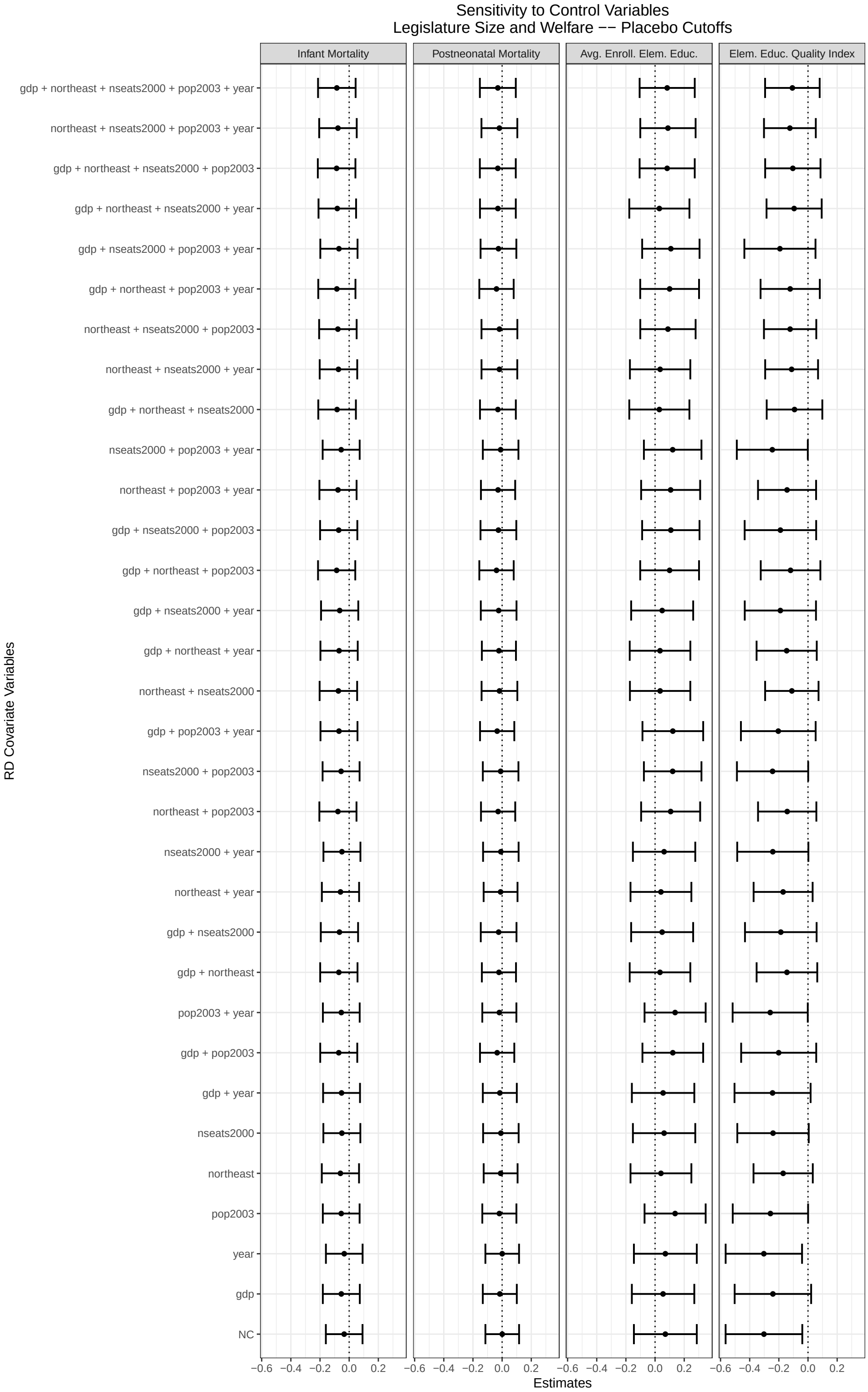


Figure 15: Placebo Regressions Outcomes – Sensitivity to Covariates

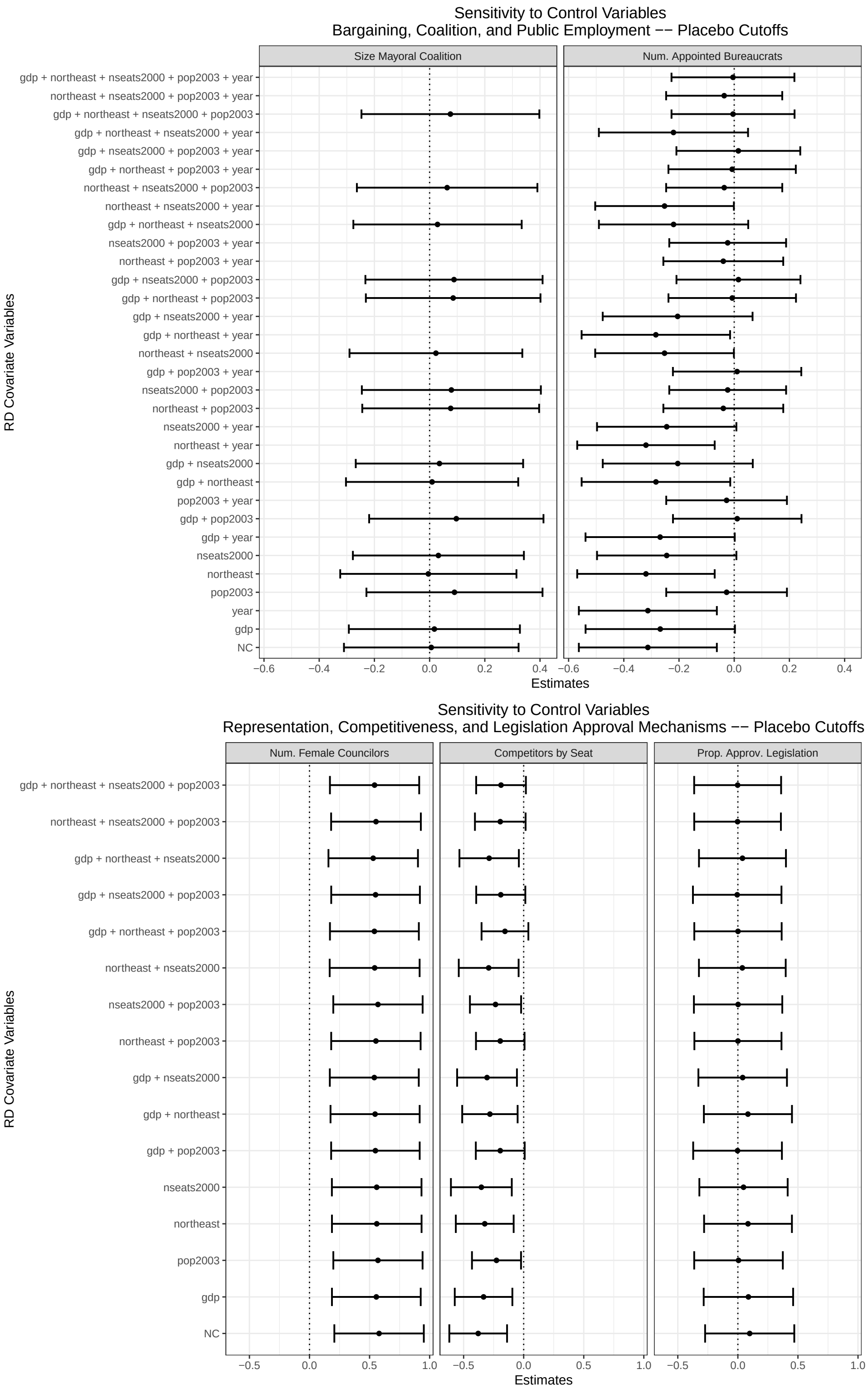


Figure 16: Placebo Regressions Mechanisms – Sensitivity to Covariates

B.11 Sensitivity to Additional Cutoffs

To study the sensitivity to the number of cutoffs and the possibility of diminishing returns from the additional legislator, I 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 the main conclusions. Moreover, there is no increasing or decreasing pattern, which would indicate that differential returns were occurring. Figures 17 and 18 display the results for the main cutoffs, while Figures 19 and 20 present the same results for the placebo cutoffs.

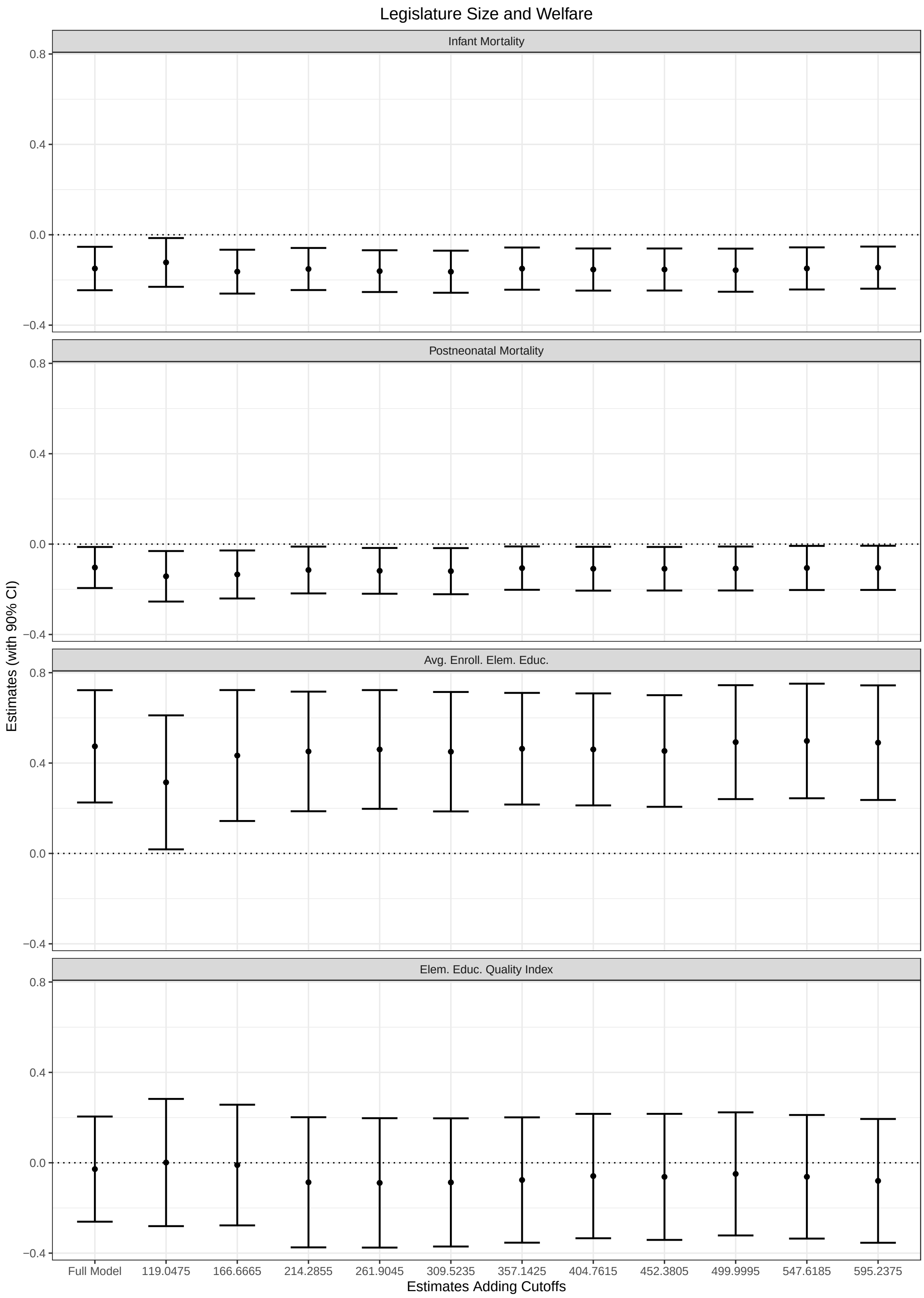


Figure 17: Sensitivity to Addition of Cutoffs – Welfare Outcomes

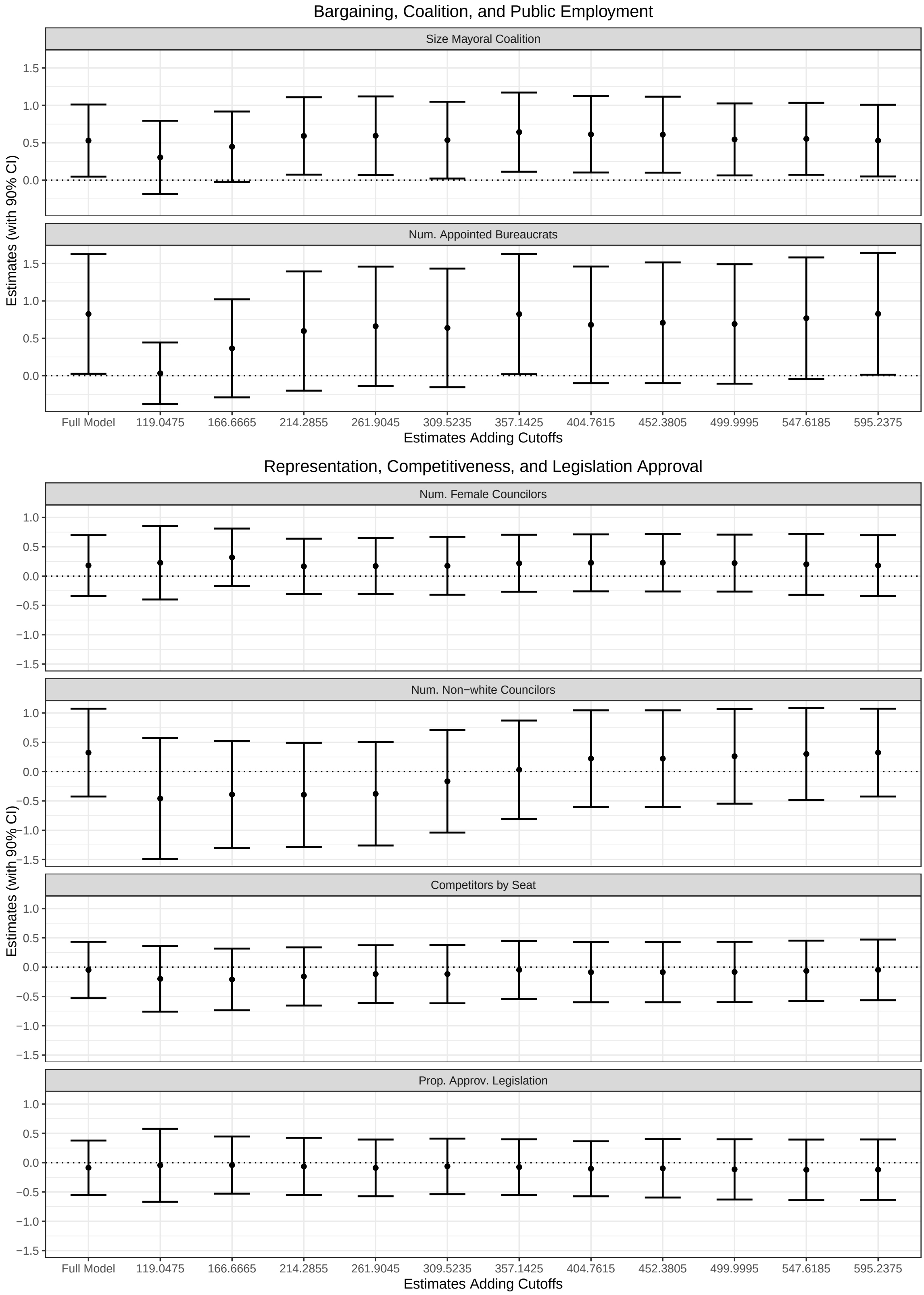


Figure 18: Sensitivity to Addition of Cutoffs – Mechanism Outcomes

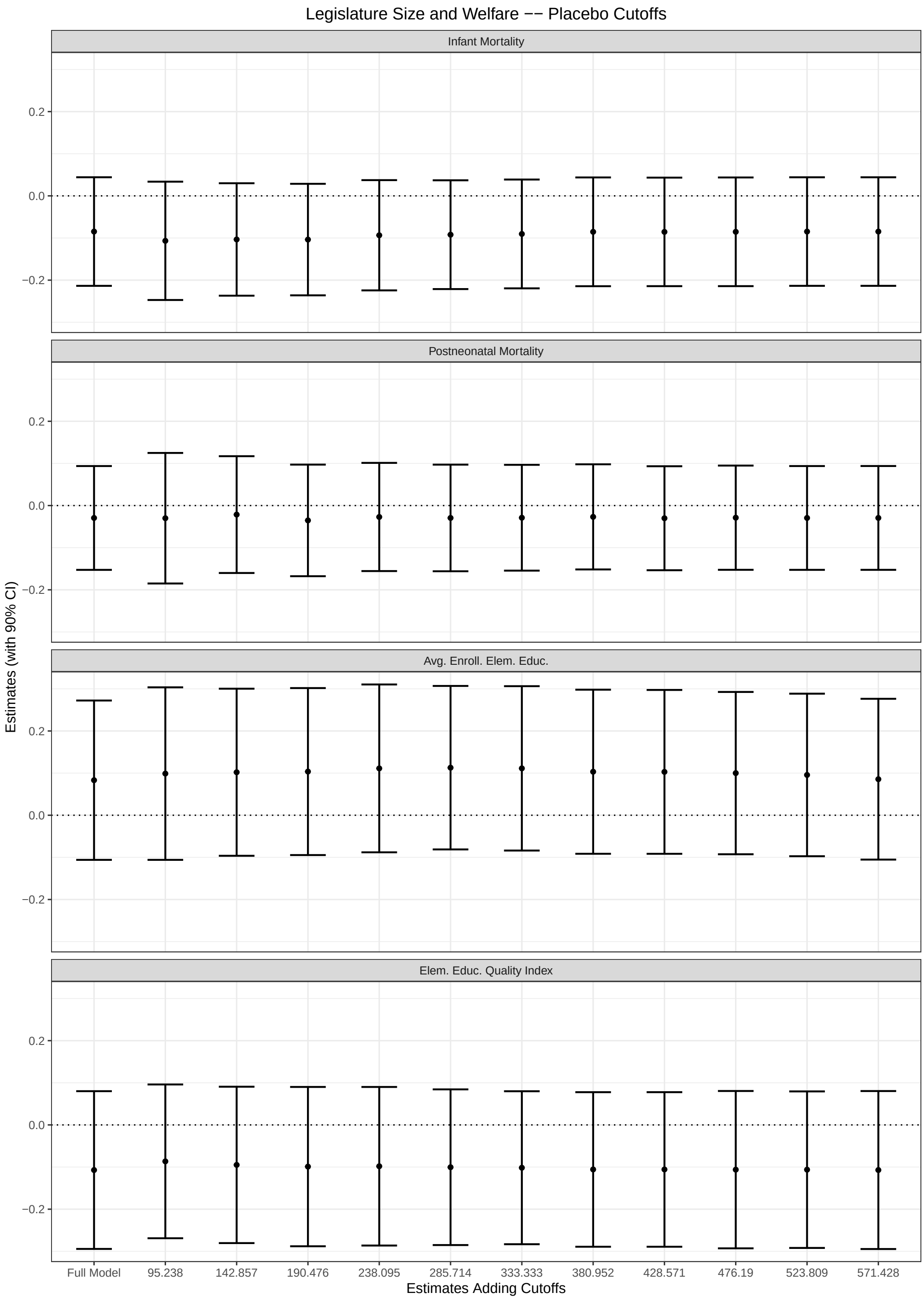
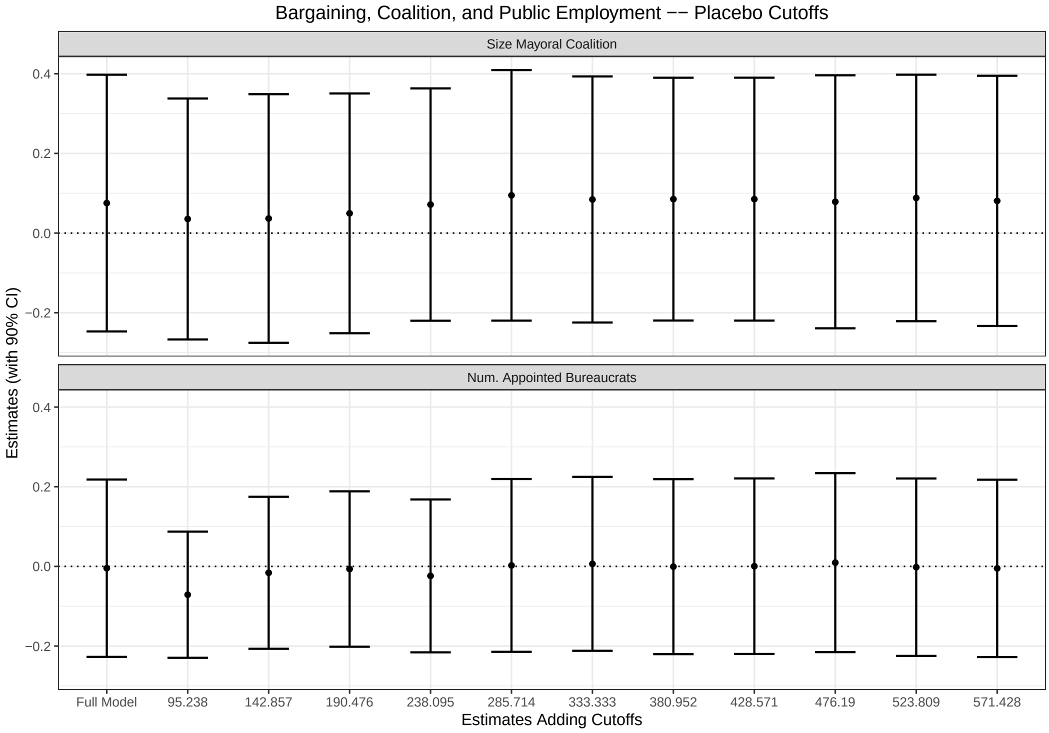


Figure 19: Sensitivity to Addition of Cutoffs – Placebo Welfare Outcomes



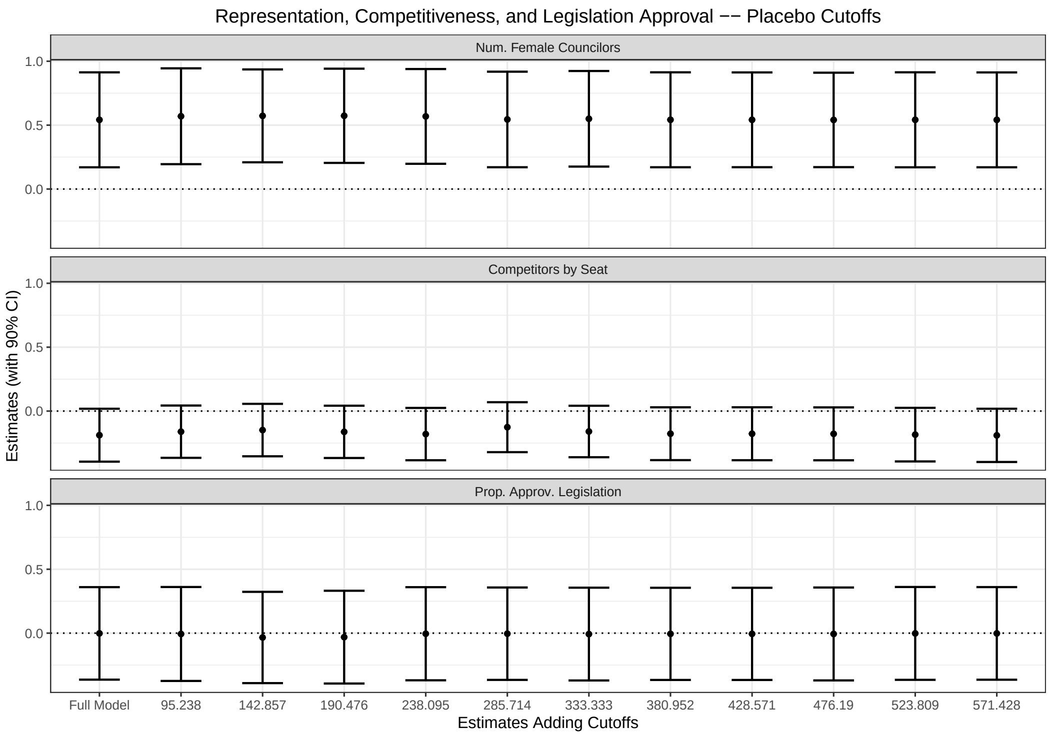


Figure 20: Sensitivity to Addition of Cutoffs – Placebo Mechanism Outcomes

B.12 Mayor's Characteristics, Revenues, and Transfers from the Central Government

Two alternative explanations could confound the results. First, the mayor's selection could be affected by the city council size, and then the welfare improves by the quality of the mayor, not by the partisan mechanism described. Second, the partisan mechanism could be confounded by an argument similar to the Weingast et al. (1981) "law of 1/n' ', and the improvements in welfare could have resulted from higher revenues. This section shows that none of these concerns are true in my case.

B.12.1 Mayors' characteristics

I select four characteristics: gender, schooling, whether the mayor was reelected in 2004, and whether the mayor was reelected in 2008. The results show no variation in council size and mayoral characteristics.

Table 7: Mayoral Characteristics

	Female Mayor	**Mayor w. College Degree**	**Reelected Mayor 2004**	**Reelected Mayor 2008**
LATE	0.07	-0.06	-0.09	0.06
	(0.08)	(0.13)	(0.10)	(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.

Table 8: Mayoral characteristics – Placebo

	Female Mayor	**Mayor w. College Degree**	**Reelected Mayor 2004**	**Reelected Mayor 2008**
LATE	0.03	0.04	0.08	-0.07
	(0.05)	(0.08)	(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.

B.12.2 Revenues and Transfers

I run the regressions on federal transfers and revenue raised within the municipalities. There is only a negligible effect on education transfer, barely significant at 10%. The other indicators remain insignificant. Note that the placebo is significant, which reinforces the claim that the education effect may be spurious.

Table 9: Transfers and Revenue

	Total Transfers	FPM Transfers	Education Transfers	Total Revenue
LATE	0.03	-0.03	0.18*	0.06
	(0.04)	(0.03)	(0.10)	(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.

Table 10: Transfers and Revenue – Placebo

	Total Transfers	FPM Transfers	Education Transfers	Total Revenue
LATE	0.07**	0.04	0.03	0.07**
	(0.03)	(0.03)	(0.06)	(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.

B.13 Legislation Dataset

In the Fall of 2018, I collected the data on the legislation approved by the city council of 63 municipalities 10 thousand inhabitants away from the thresholds. There are 202 municipalities at a 10 thousand inhabitants distance from the cutoff, but only 63 had information on the legislation between 2005 to 2008.

I hand-coded 1% of the dataset (3,466 cases) and applied a Supporting Vector Machines algorithm to the remaining 99% cases to classify the legislation. First, I train and test the accuracy of the SVM classifier on 80% of the dataset. Then, I ran the training on the complete hand-coded data and predicted the remaining.[5]

I hand-coded using four 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.

2. **Oversight**: Legislation requesting information on the status of service provision.

3. **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.

4. **Health Care and Education**: Bills on education and health care, broadly defined.

I run the SVM on the hand-coded data. Table 11 shows the classification accuracy for each of the variables that I hand-coded. In all models, I set cost equals 10 to avoid over-fitting.

Table 11: Accuracy SVM Classifier (tested in 20% of the data)

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

After I classify all the bills, the frequency in each category was added to the main paper. I 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 I considered the absolute values.

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

B.14 City Councilors Survey

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

I used 3,240 emails from politicians that ran in the 2016 election, filtering the politicians that hold public office in 2005. On December 1st, I closed the pool, having 174 responses. Figure 21 displays a distribution of responses.

Figure 21: Geographical Distribution of Survey Responses

To weight the survey, I use the Legislative Census, which was conducted ran in 2005 by the Brazilian Senate company *Interlegis* to improve the quality of the bodies in Brazil. I use the categories of Brazilian region, legislature size (9 to 15 or more), gender, and age less than 39, reweighting the collected data to match the population proportions. I use the proportions on each bin to weight the graphs and statistics generated after the raking process.[6] Table 12 shows the sample, population, and weighted proportions.

Table 12: 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?
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?

[6] The 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.

The second question is essential, as it reports whether councilors do the activities that give more electoral yield. Figure 22 shows the results for each of the activities I studied the electoral yield.

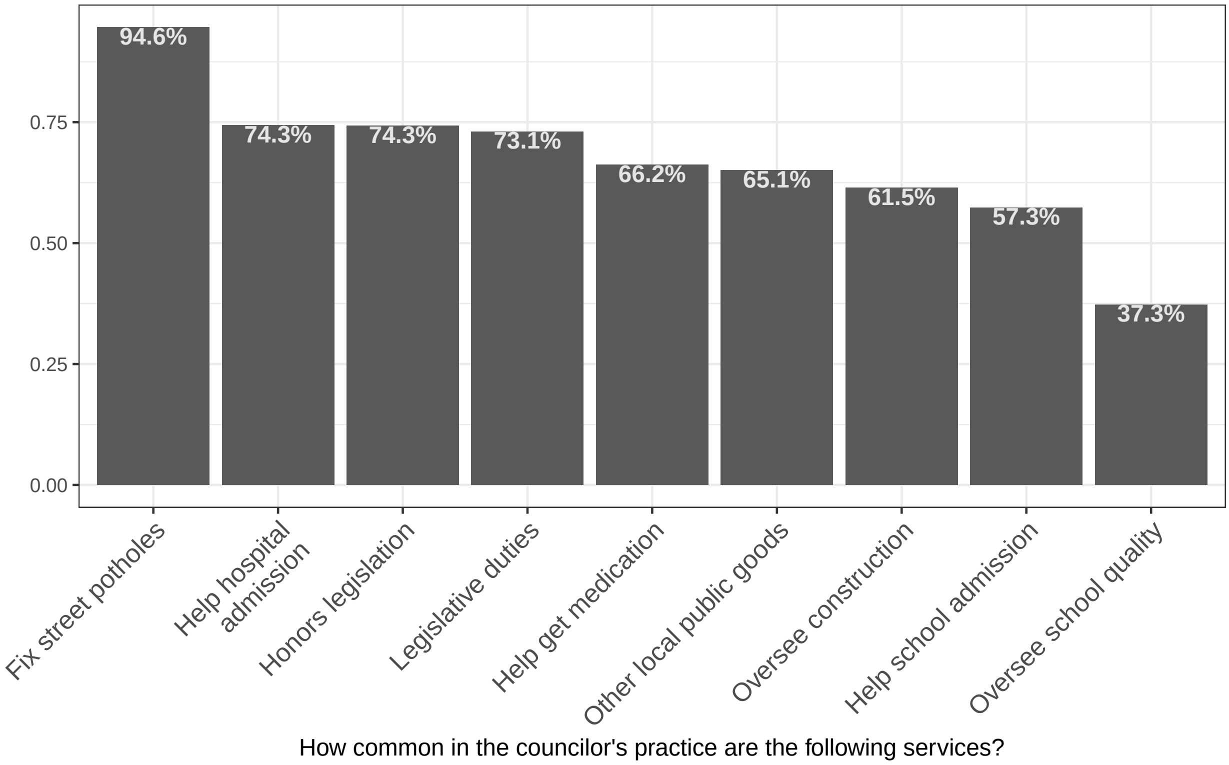


Figure 22: City Councilor's Common Activities

References

Bueno, N. S. and Tuñón, G. (2015). Graphical presentation of regression discontinuity results. Available at SSRN 2549841.

Bueno De Mesquita, B., Smith, A., Siverson, R. M., and Morrow, J. D. (2005). *The Logic of Political Survival.* MIT Press.

Calonico, S., Cattaneo, M. D., Farrell, M. H., and Titiunik, R. (2019). Regression discontinuity designs using covariates. *Review of Economics and Statistics*, 101(3):442–451.

Calonico, S., Cattaneo, M. D., and Titiunik, R. (2014). Robust nonparametric confidence intervals for regression-discontinuity designs. *Econometrica*, 82(6):2295–2326.

Cattaneo, M. D., Jansson, M., and Ma, X. (2019). Simple local polynomial density estimators. *Journal of the American Statistical Association*, 0(0):1–11.

Cattaneo, M. D., Titiunik, R., Vazquez-Bare, G., and Keele, L. (2016a). Interpreting regression discontinuity designs with multiple cutoffs. *The Journal of Politics*, 78(4):1229–1248.

Cattaneo, M. D., Titiunik, R., Vazquez-Bare, G., and Keele, L. (2016b). Interpreting regression discontinuity designs with multiple cutoffs. *The Journal of Politics*, 78(3):1229–1248.

Collingwood, L., Jurka, T., Boydstun, A. E., Grossman, E., van Atteveldt, W., et al. (2013). Rtexttools: A supervised learning package for text classification. *The R Journal*, 5(1):6–12.

Gelman, A. and Imbens, G. (2014). Why high-order polynomials should not be used in regression discontinuity designs. NBER Working Paper.

Lumley, T. et al. (2004). Analysis of complex survey samples. *Journal of Statistical Software*, 9(1):1–19.

McCrary, J. (2008). Manipulation of the running variable in the regression discontinuity design: A density test. *Journal of Econometrics*, 142(2):698–714.

Milgrom, P. and Shannon, C. (1994). Monotone comparative statics. *Econometrica*, pages 157–180.

Weingast, B., Shepsle, K., and Johnsen, C. (1981). The political economy of benefits and costs: A neoclassical approach to distributive politics. *Journal of Political Economy*, 89(4):642–664.