Larger Legislatures and the Cost of Political Brokerage: Evidence from Brazil

Abstract

This article shows that larger legislatures reduce the electoral power of incumbent parties in the executive. The electoral effects of legislature size have been largely overlooked by a literature that emphasizes its impact on policies. I estimate the effects of municipal council size on the performance of the local incumbent party in gubernatorial, presidential, and mayoral races in Brazil. The regression discontinuity design exploits variation from a law that set non-linear council size caps after 2012. In a nutshell, every additional seat triggers a 5pp vote loss for the candidates backed by the mayor's party. Additional evidence suggests that these losses are a consequence of a breakdown in the political brokerage relationships that often characterize developing democracies: in Brazil, mayors exchange patronage for the councilors' electoral support. Larger councils raise this transaction cost for mayors, more so when council and mayor have unaligned electoral incentives at the state/national levels.

Keywords: Legislature Size; Political Brokerage; Coattail Effects; Electoral Coalitions.

Scholars that study institutional design in democracies have been particularly interested on how the size of legislatures shapes representation, both in terms of policy outcomes and governability (Chen and Malhotra, 2007; Primo and Snyder, 2008; Weingast, 1994).[1] In this context, it is puzzling that little attention has been paid to the effects of legislature size on elections – the most central of all democratic institutions. If the number of seats at the very least influences the bargain between powers, it should also affect the levels of electoral competition and incumbency advantage.[2] Perhaps this omission derives from the intrinsic difficulty in finding exogenous variation in the size of legislatures,[3] or in identifying the mechanisms that connect this institution to electoral outcomes.

This article fills this gap in two significant ways. First, it identifies the effects of municipal legislature size in the three executive elections in Brazil in 2014-16 (president, governor, and mayor). In doing so, it primarily focuses on a dimension of electoral competition that has raised ample interest in the literature: reverse coattail effects (Broockman, 2017; Erikson, Folke, and Snyder, 2015; Feierherd, 2020; Magar, 2012); and thus emphasizes the performance of the tickets backed by the mayor's party in the state and national races. The effects are identified with a quasi-natural experiment: a federal law that set non-linear caps for the size of local councils based on population thresholds, starting as low as 15,000. The caps range from 9 to 55 seats, increasing by two at every threshold. In these elections, a fuzzy regression discontinuity (FRD) design shows that the vote shares of candidates supported by the mayor fall by nearly 5 percentage points for every additional council seat.

Second, I argue that this vote loss is driven by a previously uncharted theoretical mechanism: a breakdown in the political brokerage relationships that characterize elections in much of the develop-

[1] These articles focus on the impact of chamber size on public spending. Barber, Bolton, and Thrower (2019) have also shown that legislative capacity affects certain dimensions of policy implementation by the executive. The size of legislatures is even more relevant in light of separation of powers, as it might also influence the executive-legislative bargain process.

[2] Shugart and Taagepera (2017) is one notable exception. The authors use a cross country analysis to show that assembly sizes are correlated with the number of effective parties that win seats. While they primarily focus on parliamentary systems, they also argue that larger legislatures, by increasing the number of represented parties, might increase the fragmentation of executive elections.

[3] Legislature size is often jointly determined with other institutions that also affect electoral outcomes. This limits the ability of most cross country comparisons to identify the causal effects of assembly size.

ing world (Gingerich, 2020; Holland and Palmer-Rubin, 2015; Larreguy, Montiel Olea, and Querubin, 2017; Larreguy, Marshall, and Querubín, 2016; Rueda, 2017; Stokes et al., 2013).[4] This mechanism is particularly pivotal to the mayors' ability to provide reverse coattails in state and national elections.

In a nutshell, local political power in Brazil is shared between the executive (mayor) and the council. Mayors are often effective party brokers in state and national elections, given their ample control over spending (Avelino, Biderman, and Barone, 2012; Brollo and Nannicini, 2012; Novaes, 2018). On the other hand, councilors are particularly close to voters. In that position, they have the ability to influence elections at all levels, typically due to their long-standing clientelistic relationships with their constituencies (Bobonis et al., 2017; Lopez, 2004; Nichter, 2018; Nichter and Peress, 2017). In this context, mayors often rely on patronage-based coalitions to obtain the support of multiple parties in the council (Colonnelli, Prem, and Teso, 2020; Mignozzetti, 2021), and to co-opt councilors as sub-brokers in elections at all levels.

In Brazil's decentralized and fragmented political system, these alliances can be ideologically incoherent, and local coalition parties typically have electoral incentives in higher races that are unaligned with the mayor's party. In this case, coalition members face a trade-off between supporting the candidates backed by their allied mayor – which provides *patronage-based* incentives – or endorsing their own party candidates due to *alignment-based* incentives. These latter intra-party incentives typically include campaign resources, higher ideological congruence, and future career opportunities.

It is in this context that larger councils hurt the mayor's ability to sustain reverse coattails in presidential and gubernatorial races. By design, a larger council implies that the executive needs the loyalty of more legislators to obtain the same proportional level of support. Everything else equal, every individual coalition member now extracts less rents from the executive and, from their perspective, the relative value of supporting the mayor's candidates over their own party tickets decreases.

[4]These works study different dimensions of brokerage, such as the impact of monitoring capacity on brokers' performance (Rueda, 2017; Larreguy, Marshall, and Querubín, 2016), the party's ability to allocate resources across brokers (Gingerich, 2020), the broker's diverse incentives (Larreguy, Montiel Olea, and Querubin, 2017) and types of engagement with parties (Holland and Palmer-Rubin, 2015); and the impact of development on brokers' efficiency (Stokes et al., 2013).

Even though I do not directly measure the *quid-pro-quo* implied in these local brokerage relationships, I show further empirical evidence that is consistent with this mechanism. First, I estimate the FRD effects of legislature size on the profile of the mayor's coalition elected in the council in 2012. In short, where legislatures are larger, local coalitions include more individual councilors, even though these alliances still attain a similar level of proportional support in the legislature.

Second, the heterogeneity in the reverse coattail results also suggests that the trade-off described above is behind the negative electoral effects of council size. I estimate reverse coattail effects for two sub-samples, which are built based on the alignment between the pre-electoral coalitions at the local (2012) and national/state levels (2014). In short, all electoral losses are concentrated in municipalities where the alignment is low. In these locations, candidates endorsed by the mayor's party **lose** 12-15 pp of their vote for every additional council seat. The losses, however, disappear in municipalities where local coalitions are highly aligned with national/state ones.

Third, I further explore the impact of council size on the subsequent mayoral election in 2016. The trade-off faced by local coalition members is slightly different in these races, given that councilors face much less pressure from higher level party members when defining alliances for the mayoral contest. Nevertheless, the results suggest that a decline in patronage-based incentives also disrupts the electoral power of the incumbent mayor's party in 2016, and drives coalition members to seek alternative electoral options: where councils are larger, I observe the following: (i) the ticket supported by the 2013-2016 incumbent lose votes in 2016; (ii) the 2013-2016 incumbent coalition also breaks down more often between 2012 and 2016; and (iii) pre-electoral coalitions in 2016 are more likely to be formed around ideological proximity between parties, which suggests that patronage-based incentives become relatively less important in these races.

Fourth, I also rule out potential alternative explanations for the findings, particularly the competing view that these electoral losses are a secondary consequence of the impact of council size on policy. At first, this explanation might resonate within the Brazilian political environment, where voters are highly responsive to the performance of local politicians in areas such as public good provision or corruption (Boas, Hidalgo, and Toral, 2021; Ferraz and Finan, 2008; Zucco Jr., 2013). In fact,

underperforming mayors have been shown to tarnish both their party reputations and electoral performance in both municipal and higher races (Feierherd, 2020; Klašnja and Titiunik, 2017). However, I show that the effects cannot be explained by changes in the size, allocation, or volatility of public spending, or even by shifts on health and education policy outcomes. I also show that council size does not affect the profile of the politicians that are elected locally in 2012 – for both the executive and the legislature. Finally, municipalities with larger councils do not see an increase in the number of mayoral candidates in 2016. This rules out the potential explanation that the electoral losses in mayoral races might be the consequence of a higher fragmentation in the executive contest (Shugart and Taagepera, 2017).

Local coalitions and political brokerage in Brazil

Brazilian Mayors have ample control over public good delivery due to a highly decentralized system of policy implementation (Ames, 1994; Avelino, Biderman, and Barone, 2012; Novaes, 2018). Most spending in areas such as health, education, and infrastructure is done by municipal administrations, financed primarily by scheduled transfers from the federal and state governments. In this context, linkages between politicians and voters are often rooted on the exchange of targeted public resources for votes (Frey, 2019; Gingerich, 2014; Hidalgo and Nichter, 2016; Nichter, 2018). Voters often request goods and favors from local politicians – such as medicine, medical treatments, and construction goods – with a promise of political support (Nichter, 2018). These demands are then met "using political criteria, given that the number of requests often exceeds available resources" (Bobonis et al., 2017). This allows local politicians, notably mayors, to play an important role in raising votes for their candidates in national and state elections (Avelino, Biderman, and Barone, 2012; Feierherd, 2020; Frey, 2020; Novaes, 2018), and in supporting the survival of their parties. In exchange for their loyalty, mayors rely on their intraparty relationships with state and federal politicians to receive discretionary resources and campaign funds (Brollo and Nannicini, 2012; Bueno, 2018; Frey, 2020), and

to access their parties' TV and radio time allotment during municipal races.[5]

Mayors also share the local political power with a council that ranges in size from 9 up to 55 members. Both are elected at the same time – every four years – while state and national elections happen in the midterms – also every four years. Brazil has a fragmented party system with nearly 30 active parties, 26 of which won at least one mayoral election in 2012. In this context, mayors rely on broad and large coalitions to support their administrations (despite the nearly 30 parties, municipalities have less than 3 mayoral candidates on average). Each of these candidates relies on the electoral support of council candidates from multiple parties: the average number of parties in a winning mayoral coalition is 6.2. What is more, the mayor's coalition elects 50%+1 of all councilors in 58% of all races, but in only 4% of the elections the mayor's party achieves the council majority alone.

These strength of these coalitions often relies on a *quid-pro-quo* between mayor and parties in the legislature.[6] Mayors need the council to approve legislation, accounts, and to minimize the risk of prosecution from malfeasance (Poulsen and Varjao, 2019). Councilors can also be useful brokers for the mayor's electoral interests (Colonnelli, Prem, and Teso, 2020; Novaes, 2018). Council candidates are typically closer to voters, and often secure their grasp over their constituencies with long-term clientelistic relationships, and the provision of targeted access to public jobs, goods, and services (Lopez, 2004; Nichter, 2018; Nichter and Peress, 2017).[7] On the other hand, councilors depend on mayors to access resources, given that the executive controls both the budget and most public sector jobs. The result is an exchange of political support for rents, which councilors use for their private consumption, or to meet the demands of their constituencies (Mignozzetti, 2021).

[5]Media time during elections is allocated to parties according to their national strength, measured by their share of seats in congress. Candidates in the small municipalities studied in this article often rely on radio rather than TV adds.

[6]Similar to what happens in national politics (Figueiredo and Limongi, 2000), the local branches of the parties often intermediate the negotiation of these local alliances between their council candidates and the mayoral tickets. This does not mean that individual councilors do not break rank in specific issues, or even move parties.

[7]Ties between councilors and voters are often personalistic and based on clientelism (Nichter and Peress, 2017). However, while both the press and the literature show extensive evidence that clientelism is common in Brazil (Brollo et al., 2013; Hidalgo and Nichter, 2016), it is not necessarily the only reason that leads voters to follow electoral endorsements of councilors. Voters might simply reward politicians that claim credit over policies (Zucco Jr., 2013), for example.

This dynamic is well illustrated by the recent events in Ribeirão Preto (SP). In 2016, the federal police uncovered a scheme of bribes directed to nine councilors from six different parties, which were paid to support the local PSD administration. The bribes included payments in cash, and jobs for their closer activists in companies with ties with the mayor.[8] Similar bribing schemes are a relatively common practice in the country, and have been uncovered in multiple other municipalities such as Joaquim Gomes (AL), Fundão (ES), Parauapebas (PA), Cuiabá (MT), and Iranduba (AM), for example.[9]

What is more, these local pre-electoral coalitions are typically formed around local rivalries and interests, span the entire ideological spectrum, and are often inconsistent with party behavior at the state/national levels. Neither the Brazilian electoral legislation nor most of the large parties prohibit their local branches to enter alliances with state and national rivals in municipal elections. In this decentralized context, local party branches have ample autonomy to negotiate their own coalitions. This is illustrated in the first plot of Figure 1, where the arcs represent the number of coalitions between a pair of parties in any local election. As an example, even PT and PSDB – notable rivals in national politics (Samuels and Zucco Jr., 2014) – support each other's mayoral candidates in hundreds of races.[10] The second plot shows, for each winning mayoral coalition, the share of parties that support the same candidate as the mayor's party in gubernatorial and presidential elections. In more than half of the cases, 50% or less of the coalition partners formally support coincident tickets.

In this context, the loyalty of councilors in state and national elections is often divided. In the one hand, the local incumbent party attempts to use its local alliances to obtain the council's electoral backing. For example, in Teresina (PI), the gubernatorial candidate from PSDB used his relationship with the partisan mayor to seek the support of the 25 councilors that make up the the mayor's base – including councilors from parties that opposed PSDB at the state level (PP, for example).[11]

[8] See *Globo.com* in https://glo.bo/2YPXf9O.

[9] See in *Globo.com* (https://glo.bo/3hJqbHB), *A Gazeta* (https://bit.ly/308hQHi), *Globo.com* (https://glo.bo/32HqlJx), *MidiaNews* (https://bit.ly/3gR8g0U), and *Acritica* (https://bit.ly/3lx23dT).

[10] In 2012, PT supported a mayoral candidate from PSDB, or vice-versa, in 350 municipalities, i.e., 12% of all elections in which at least one of these parties presented a candidate. I emphasize that in 2012 PT's leadership only allowed coalitions with its major rivals as long as PT did not appoint the vice-mayor in the ticket (or vice-versa). See https://glo.bo/3ccy2x7.

[11] See in *Cidade Verde* (https://bit.ly/3gwOIyw)

On the other hand, councilors might prioritize their intraparty relationships over their commitments to the local incumbent. In Caxias do Sul (RS) and Goiânia (GO), for example, councilors openly endorsed a gubernatorial candidate opposing the one favored by their partner mayor.[12] In Passo Fundo (RS), a councilor declared that while he admired the mayor's candidate, he would rather "follow the party."[13] This unalignment of electoral incentives has the potential to hinder the electoral success of the candidates supported by local incumbent parties, especially in a context where councilors actively employ their mobilization capacity to raise votes for their candidates. In Juazeiro (BA), one councilor expressed that, in support of their presidential candidate, councilors would "unite friends and communities. We would go to the streets as if this (presidential) election was the council race."[14]

Finally, local alliances are also unstable. On average, only 50% of the parties in the winning mayoral coalition (2012) remained supporting the incumbent in the 2016 race. This is not surprising for patronage-based coalitions with loose ideology – councilors often revoke their support if they find more attractive alternatives. For example, in Guanambi (BA), three councilors left the mayor's coalition to support a former state governor in the upcoming mayoral race.[15] In Batalha (BA), councilors and mayor disagreed on issues of chamber leadership, and the coalition that previously held eight of the nine seats fell apart.[16] Politicians also revoke support due to their relationships in national politics: in Ladário (MS), councilors left PSDB to DEM by request from members of the national cabinet.[17]

Legislature size and electoral power: theoretical predictions

This article identifies the effect of legislature size on the electoral performance of the executive branch of government in Brazil. Based on the context described in the previous section, I interpret these effects as a consequence of a dilution in the patronage available to the parties that compose the

[12] See in *Pioneiro* (https://bit.ly/3hZmEoP) and in *Jornal Opção* (https://bit.ly/309s9ep).

[13] See in *O Nacional* (https://bit.ly/2BEhcIc).

[14] In Portuguese: "Não basta declarar o voto. Vamos unir nossos amigos e nossas comunidades. Vamos para a ruas como se esta fosse a eleição de cada um dos vereadores." See in https://bit.ly/2CSdXxE

[15] See in *Agência Sertão* (https://bit.ly/2DcwdBw).

[16] See in *Sete Segundos* (https://bit.ly/3fbfknS).

[17] See in *Diário Corumbaense* (https://bit.ly/2DjRc5C).

mayor's coalition in the local council. This mechanism is better highlighted in the analysis of reverse coattail effects, i.e., the performance of the state and national tickets backed by the mayor's party in each municipality. In this context, local councilors might face a clear trade-off between *patronage-based* incentives provided by their partner mayor, and *alignment-based* incentives provided by their own parties at the state and national level. This logic is summarized below.

Local councilors are the closer elected officials to voters, and they often sustain their electoral capital through long-term clientelistic relationships. They also use their position to influence executive elections at all levels. In doing so, alignment-based incentives drive them to campaign for candidates supported by their own parties in state and national elections, as councilors rely on parties for campaign funds, career opportunities, and radio/TV time at each electoral cycle. As for patronage-based incentives, they tie councilors to the electoral interests of mayors. Because of their control of the municipal budget, mayors themselves are the main local brokers for state and national politicians. In that position, they employ patronage to co-opt local councilors as brokers to support their candidates.

This dynamic is only relevant when the patronage-based and alignment-based incentives are incongruent, i.e., when coalition parties support candidates that oppose the ones backed by the mayor's party. Now, larger legislatures forcibly require mayors to sustain coalitions with a higher number of councilors to obtain the same level of proportional support. Everything else equal – including the budget – every coalition member now extracts less rents from the executive. Note that this argument holds even if the mayoral coalition remains with the same number of parties after the increase in seats. Thus, larger legislatures reduce the relative attractiveness of patronage-based incentives vis-à-vis the alignment-based ones to coalition members. As a result, councilors are more likely to campaign for the candidates of their own parties instead of backing the mayor's ticket. This logic generates the following hypotheses:

H1: Candidates supported by the mayor's party lose votes when the council is larger.

H2 (Reverse Coattails): In state and national races, these effects are concentrated in locations where local coalitions have a low degree of electoral alignment with state and national alliances.

Mayoral elections. Although a dilution in patronage is expected to also affect subsequent mayoral elections, the trade-off faced by coalition members here is slightly different. First, there are less alignment-based incentives, as state and national politicians seldom interfere in the coalition choices of the local party branches in small municipalities. Second, even if parties decide to leave the mayoral coalition for an alternative candidate, they would also be affected by the dilution in rents should they win the 2016 mayoral race. Nevertheless, a dilution in rents should still raise the relative importance of all other non-patronage incentives for local coalition formation in municipalities with larger councils. In other words, parties that joined the governing coalition in 2012 primarily in the pursuit of rents might be less inclined to remain in 2016 if they focus on other factors such as ideological congruence.

In this context, the prediction in H1 should still hold for the 2016 mayoral election, i.e., larger councils hurt the electoral performance of the incumbent. In addition, the pre-electoral coalitions formed in 2012 should be more likely to fall apart in municipalities with larger councils, as parties realign preceding the 2016 race. Finally, the 2016 coalitions are more likely to be based on non-patronage incentives. These latter two arguments imply the additional testable hypotheses.

H3: Where councils are larger, mayoral coalitions formed in 2012 are more likely to fall apart preceding the 2016 election.

H4: Where councils are larger, new 2016 pre-electoral coalitions are more likely to be based on non-patronage incentives such as ideology.

Empirical design and data

This article's empirical strategy exploits a federal legislation from 2009 that established caps for the size of municipal councils in Brazil, based on several population thresholds – see details in Table A.1 (appendix). This discontinuous assignment in the maximum number of seats allows me to use a regression discontinuity design to compare the electoral outcomes in municipalities just above each population threshold (those with a larger cap), to the ones in municipalities just below. I use this design to identify the effect of council size on the electoral performance of the local incumbent party in

executive elections in Brazil (mayoral, gubernatorial, and presidential). Figure 2 illustrates the number of council seats in Brazil after the municipal 2012 election.[18]

The maximum council size set by the legislation is not binding. This means that local administrations can choose not to increase the number of seats, or to increase it to less than the assigned cap (80% of all municipalities have their council size at the cap). This has direct implications for the empirical specification here, which requires a fuzzy RD (FRD) design (Calonico, Cattaneo, and Titiunik, 2014; Imbens and Lemieux, 2008). In the sharp RD design, the uptake of treatment is forcefully determined at the discontinuity, in which case the probability of an increase in council size is always one. Here (FRD), the probability of treatment compliance still *jumps* at the threshold, but it is between zero and one.

Accordingly, the estimation of the FRD resembles an instrumental variables (IV) design, where the discontinuous assignment rule first identifies an exogenous change in council size (under the usual RD assumptions), and this variation in council size is used to identify the local treatment effect on electoral outcomes at the discontinuity, in a second stage.[19] This is better illustrated by the equations below.

$$SEATS_{iw} = \gamma_0 + \gamma_1 T_{iw} + \gamma_2 POP_{iw} + \gamma_3 T_{iw} POP_{iw} + \lambda_w + \mu_{iw} \tag{1}$$

$$Y_{iw} = \beta_0 + \beta_1 \hat{SEATS}_{iw} + \beta_2 POP_{iw} + \beta_3 T_{iw} POP_{iw} + \lambda_w + \epsilon_{iw} \tag{2}$$

Equation 1 is the first stage, which estimates the effects of the assignment rule on the compliance

[18] In the previous two elections, instead of a cap, the law determined the exact council size of each municipality. Although the size was also based on the population, the thresholds were different (much higher). As a result, under the previous rule, not many municipalities are found with population around the cutoff points (the lowest was cutoff was 47,619, followed by 95,238). In contrast, the 2009 rule set the first three thresholds at 15,000, 30,000 and 50,000. Figure 2 shows how the vast majority of municipalities in Brazil have less than 50,000 inhabitants, which provides a lot more observations around the thresholds – this explains this article's choice for the 2009 assignment rule. For perspective, using all locations within 7,500 inhabitants of any threshold allows me to use nearly 3,000 municipalities (53% of Brazil) under the 2009 rule. However, under the same range, this number drops to less than 300 (5% of Brazil) under the 2004 rule.

[19] In the FRD case, the treatment effect is doubly local: it is the effect both (i) at the the discontinuity threshold; and (ii) on the compliers, i.e., the municipalities that increased their number of seats as a result of the legislation.

with treatment (i.e. on the increase in council seats) for municipality i, and assignment window w around each population threshold. The variable T_{iw} indicates whether the municipality is just above the threshold in each window w, and thus eligible to a larger council. The variable POP_{iw} is the normalized value of the population.[20] Finally, I also include fixed effects by assignment window (λ_w), given that the assignment to treatment is made locally around each population threshold.

The data on council size, electoral results, pre-electoral coalitions, and the profile of candidates comes from the Superior Electoral Courts in Brazil (TSE).[21] Figure 3 shows the estimation of equation 1. On average, treated municipalities have roughly one more council member than the control group. Table A.2 (appendix) shows that these coefficients are robust to the choice of bandwidth, polynomial, and the inclusion of state fixed effects and other demographic covariates, which are also balanced at the discontinuity. Table A.3 (appendix) shows the usual RD balance test for these covariates, and describes the construction of each variable. Finally, as it is usual, observations are weighted by the triangular kernel, and the estimation only includes observations within a bandwidth around each threshold, set by the algorithm in Calonico, Cattaneo, and Titiunik (2014).

Ultimately, this article studies the effects estimated by equation 2. Here, for any electoral outcome Y_{iw}, the explanatory variable is now the predicted number of council seats ($\widehat{SEATS}_{iw}$) obtained with equation 1. Accordingly, the local treatment effect is given by β_1. In most specifications, I also include fixed effects by state, and demographic and political party covariates fully described in the appendix.[22]

[20] This is the highest value of municipal population among the official IBGE measures of 2010 and 2011, subtracted by the threshold value in each assignment window. These were the years before the 2012 election in which municipalities were allowed to change their bylaws to increase the council size.

[21] The effective sample excludes 2% of municipalities that had the 2012 election canceled by the courts, and 0.5% of municipalities that had missing data on covariates. Also, only municipalities with population below 305,000 are potentially included in the estimation – 99% of the total – given that only the first seven population thresholds have at least one observation on each side of the discontinuity within the optimal bandwidth (see Table A.1, appendix).

[22] As it is typical in RD designs, pre-treatment covariates are included to improve the precision in the estimation. I later show that the results are robust to their exclusion. Table A.3 (appendix) shows the description of the demographic covariates, and their sources. The political party covariates are dummies that indicate whether the mayor elected in 2012 belongs to one of the seven largest parties in Brazil by number of mayors (PT, PMDB, PSDB, PSB, PSD, PP, and PDT), and one dummy that indicates whether the incumbent is part of PT's federal coalition. Table A.4 (appendix) shows that these

Finally, the caps for both the wages of legislators and the municipal spending with councils are also assigned in a discontinuous manner over population thresholds in Brazil. Two of these thresholds coincide with the ones used in the present empirical strategy (50,000 and 300,000).[23] This could present a threat to the identification strategy here if legislators' wages or legislative expenses significantly affect the elections under analysis. Accordingly, I rule out this potential source of confounding using to empirical exercises.

First, I show that results remain robust for a subsample that excludes the two "contaminated" assignment windows around the 50,000 and 300,000 thresholds (Table A.5, appendix). Table A.6 (appendix) also shows the same for first threshold (15,000) only, which includes most of the municipalities in the sample (68%). Second, Table A.7 (appendix) shows a placebo test using past elections (2010, 2012). While the discontinuous assignments in wages and expenditures were already in place during the electoral tenure preceding the 2010/2012 races, the ones for council size were not. If the wage/expenditure assignment rules had significant direct effects on electoral results, we should already observe significant estimates in this exercise. The fact that all coefficients are weak and insignificant further suggests that these rules are not relevant threats to this article's identification strategy.

Council size and electoral losses by local incumbents

Table 1 shows the effect of council size on the electoral performance of the candidates backed by the mayor's party in the three executive elections during the mayoral tenure of 2013-2016 (gubernatorial and presidential in 2014, and a new mayoral election in 2016).[24] The outcome is always the

variables are also unaffected by the treatment assignment.

[23] See the Brazilian Constitution, articles 29 and 29A. For legislators' wages, the population thresholds (equal or below 300,000) are 10,000, 50,000, 100,000, and 300,000. For legislative spending, they are at 100,000, and 300,000.

[24] These candidates are the ones whose 2014/2016 pre-electoral coalition includes the mayor's party, either as the coalition head (e.g. governor or vice-governor's party) or just as a member. Figure A.1 (appendix) shows that the main results do not significantly vary depending on the status – head or member – of the mayor's party in the coalition. In cases where the mayor's party did not support any candidate, the outcome could not be measured. This represents .001% of the gubernatorial races, and 11% of mayoral races. Accordingly, the last line of Table A.8 (appendix) also shows that the incumbent

percentage of the municipal vote obtained by the candidate.

The first outcome is an index that aggregates the electoral losses in all three elections[25] – a direct test of H1. Table A.9 (appendix) shows that these estimates are robust to polynomial and bandwidth changes.[26] Overall, the effects are consistently negative across all elections and specifications. On average the candidates of the local incumbent party lose roughly 4.7 percentage points for every extra council member in the municipality. Given that these candidates average 46% of the vote in the pre-treatment baseline, the effect of one council member is a decrease in vote percentage of nearly 10%. Finally, the placebo test (Table A.7, appendix), where I re-estimate this Table using electoral results from the pre-treatment period, finds no significant statistical effects.

Local coalitions and losses in reverse coattails (H2). Table 2 presents additional empirical evidence in support of the mechanism. First, council size had no effect on the number of parties or candidates running in the 2012 election (rows 1 and 2), and on the number of parties that composed the pre-electoral alliance of the eventual mayor (row 3). However, legislature size affected the size of the mayoral coalition elected for the council (*post-election panel*): although the mayor still managed to control a similar share of the total seats (row 6), mayoral coalitions are now composed by a significantly larger number of individual councilors (row 5).

Second, Figure 4 shows the heterogeneous effects of council size on the vote shares of the mayor's party in gubernatorial and presidential races – a direct test of H2. The sample is split by the level of alignment between the incumbent mayoral coalition and the state and national alliances supported by the mayor's party. Alignment here is measured as the share of parties in the 2012 mayoral alliance that were also part of the 2014 state and national coalitions supported by the mayor's party. Although these variables are measured post-treatment, they are uncorrelated with council size at the discontinuity (last rows of Table 2). In short, the negative effects on reverse coattails are highly concentrated in municipalities where coalitions are less aligned with party positions in higher races. This is consistent with the argument in H2 that coalition councilors become more likely to endorse their own party

party's decision not to participate in the 2016 mayoral race is uncorrelated with treatment at the discontinuity.

[25] The index is the average of the outcomes, weighted by the inverse of their covariance matrix.

[26] Table A.10 (appendix) shows that they are robust to the inclusion of congressional elections.

candidates over the mayor's ticket after a dilution in patronage.[27]

These results also suggest that brokerage does not respond to a dilution in patronage unless councilors have an attractive alternative to the mayor's candidates. This has further implications for the theoretical argument: it indicates that the losses are not driven by a potential reduction on the effort of councilors in campaigning for higher candidates. If this was the case, the dilution in rents would have also affected the effort of councilors in highly aligned coalitions. On the contrary, this evidence is consistent with a narrative where the rent dilution primarily affects the councilors' choice of candidates in these races, as they face the trade-off between patronage- and alignment-based incentives.

The appendix contains additional evidence linking the mechanism to the main results. Table A.11 shows that the bulk of the electoral losses comes from municipalities with weaker financial capacity in 2013-2016.[28] The intuition here is that, because local administrations with more access to resources were better shielded against the dilution in patronage, the mayor's party in these municipalities was less likely to lose electoral power. Finally, Figure A.2 shows that the negative electoral effects of council size are concentrated in smaller municipalities, as expected, given that the 2-seat increase is proportionally much more significant for councils with a small pre-treatment size. Table A.1 (appendix) shows the percentage increase in council size for each population threshold (appendix).

Local coalitions and subsequent mayoral races (H3, H4). Table 1 shows that legislature size

[27] Although the local-state (or local-national) alignment in **pre-electoral** coalitions is uncorrelated with council size at the discontinuity, Table A.8 shows that, where councils are larger, mayors are less likely to elect in 2012 coalition councilors that are allied at the state level (this is not the case for the local-national alignment). Given that most of the electoral losses happen where unalignment is high, this is an additional channel through which larger councils further hurt, at least marginally, the electoral power of the incumbent party.

[28] I use two different measures of financial capacity for local administrations. The first is the average per capita municipal budget for the period. Here the sample is split by the median value into "high" and "low" budget subsamples. Even though this variable is measured post-2012, Figure 6 shows that it is unaffected by the treatment assignment. The second measure is a proxy for access to discretionary public resources from inter-government transfers. The variable here is a dummy that indicates whether the mayor's party is part of **both** the gubernatorial and presidential governing coalitions in 2012, given that inter-government alignment is an important determinant of access to discretionary funds for Brazilian mayors (Brollo and Nannicini, 2012; Frey, 2020). The results remain similar using either variable to split the sample.

also has a negative effect on the electoral performance of the mayor's party in the subsequent mayoral election (2016) – the first race after a 4-year term where the council size differences were in place (2013-16). For mayoral races, H3 predicts that the mayor's coalition is more likely to collapse between 2012 and 2016 in municipalities with larger councils. This is shown by Figure 5: the first estimate shows that council size is uncorrelated with the proportional support obtained by the mayor in the 2012 election. However, the second coefficient shows that the mayor's party loses the support of a significant share of elected councilors in advance of the 2016 run.[29]

I also assess the effect of council size on the ideological profile of incumbent mayoral coalitions in 2012-2016 – a test of H4. Aware of the limitations of this exercise,[30] I use the ideological leaning of the largest parties in Brazil – PT, PSB, PDT on the Left and PMDB, PSDB, PSD, and PP on the Right – to build a binary variable that indicates whether the pre-electoral mayoral coalition was ideologically inconsistent, i.e., where a Left-wing party supported a Right-wing candidate, or vice-versa. In 2012, these coalitions were present in 39% of the sample. In a second and similar specification, I define inconsistent coalitions as the ones where PT or PSB (Left) supported candidates from PSDB or DEM (Right), or vice-versa. These are the large parties that were consistently at opposite sides in national politics since 1994. These coalitions represent 14% of the sample. For both specifications, the outcome is the difference between the value of the dummy in 2016 and 2012, which measures the shift in the ideological profile of the coalition in the period.

The last two coefficients in Figure 5 show the effect of council size on these two variables: in both cases, there is a decrease in the number of ideologically inconsistent coalitions between 2012 and 2016 where councils are larger. This is in line with H4's prediction that patronage-based incentives become

[29] The outcome variable for these two coefficients is the share of the elected councilors that belong to the mayor's pre-electoral coalition, in 2012 and 2016. The same pattern is observed for a sub-sample that only considers coalition councilors that actually attempted reelection in 2016 (i.e. the third and fourth coefficients).

[30] Local elections in Brazil have often weak ideological appeals, and many parties are primarily office seeking (Power and Rodrigues-Silveira, 2018a). On the other hand, a recent literature has shown how party labels still inform vote choice in the country (Samuels and Zucco Jr., 2014), and how mayoral candidates propose policies that are highly consistent with the national ideological brands of their parties (Desai and Frey, 2021). This latter article also shows extensive evidence that voters, politicians, and experts alike can consistently classify the main Brazilian parties in broad Left and Right groups.

less important in mayoral races relative to the ideological convergence between parties.

Alternative explanations

In this section I assess the merit of two potential alternative explanations for the electoral effects of council size observed in Table 1.

Council size and local public policy. One might be concerned that the electoral results are spillovers of the impact of legislature size on public policy provision, rather than the consequence of the proposed mechanism. This potential explanation is particularly pertinent to Brazil, where voters in all elections are highly responsive to the performance of mayors (Boas, Hidalgo, and Toral, 2021; Feierherd, 2020; Ferraz and Finan, 2008; Klašnja and Titiunik, 2017). In principle, there are at least two reasons why council size could affect the mayor's policies. First, the average preference of legislators could change with chamber size. For example, if larger chambers have on average more left-leaning members, the executive will likely face more pressure to increase both taxation and spending. Second, the executive-legislative bargaining process itself might be affected by the change in the number of players involved. For example, more seats could put pressure on the executive for sub-optimal increases in spending (Chen and Malhotra, 2007; Primo and Snyder, 2008), or for more services that are highly salient to voters (Mignozzetti, 2021).

Nevertheless, Figure 6 shows that council size is uncorrelated with several local public policy outcomes in 2013-2016. These variables measure changes in both the intensity of policy implementation (e.g. increases in budget size) and shifts across policy priorities such as spending in health care or public security – all variables are described in the Figure's footnote. In a nutshell, the coefficients are small in magnitude, and none of the twelve is statistically significant.

I also show that the lack of policy effects does not jeopardize the councilors' status as brokers. The mechanism proposed in this article relies on the notion that their electoral strength comes from their ability to target public goods and services across voters. Thus, one might wonder whether the absence of policy expansions might lead voters to see larger councils as ineffective, which would threaten their

electoral power. Table A.8 (appendix) suggests that this is not the case: under larger councils, legislators elected in 2012 are no more or less likely to run for reelection in 2016. What is more, council size has no effect on the reelection rate of both coalition and opposition councilors. Overall, this is highly consistent with political environments characterized by clientelism where politicians succeed by selectively targeting public resources to voters, and by relying on the relative scarcity of public services to keep voters dependent (Frey, 2020; Weitz-Shapiro, 2014). Additionally, the electoral losses shown in Table 1 are also consistent with this argument: if these legislators lose their effectiveness as brokers, they would also fail to steal votes from the mayor's party in state and national elections.

Finally, in what follows I discuss potential explanations for the observed absence of policy effects in the context of Brazilian municipalities in 2013-2016. First, the null effect of council size on total spending – a straightforward measure of policy intensity – is likely the consequence of the decentralized spending system in Brazil where local budgets are primarily financed by scheduled transfers from federal and state resources, which are often non-discretionary. In this context, mayors are limited in their ability to significantly affect the size of their budgets.[31]

Second, the absence of shifts in policy priorities might mirror the fact that council size also has no effect on the profile of elected politicians – see Figure 7 for effects on the profile of both the average councilor (left-side plot) and mayor (right-side plot). If the policy preferences of politicians are correlated with their observable characteristics such as gender, age, political party, or experience, it is not surprising that the policy outcomes here remain similar across different council sizes.

Third, the polarization in policy preferences in small Brazilian municipalities is relatively low, which likely leads mayors and legislators to support similar types of spending. To illustrate this, consider a case where the mayor supports an increase in health programs, but most coalition councilors

[31] A recent study examines the policy effects of council size in Brazil using the assignment rule that prevailed in 2004-2008 (Mignozzetti, 2021) – see my detailed explanation in footnote 18, page 10. Similar to the results here, they do not find any council size effects on either the size of the local budget or its allocation. They do, however, find some positive effects on the quality of selected health and education services (mortality rate and primary school enrollment). The differences between results are most likely caused by methodological differences: their study examines a different time period, and identifies effects for a different sample of much larger municipalities.

prefer education programs. The stronger the councilors' preference for education over health, the more patronage it takes for them to embrace the mayor's agenda. However, if health spending also widely benefits the council's constituencies – and polarization is low in this dimension – a small reduction in patronage might not jeopardize the mayor's control over the coalition's policy choices.

Even though I cannot directly measure the policy preferences of individual local politicians, the 2012 Brazilian Barometer survey (LAPOP) provides some insight on the preferences of voters, which are likely correlated with the councilors' positions. The survey shows that health and education programs are by far the most relevant priorities for voters: 93% of them mention at least one of these categories when asked about their top two spending preferences.[32] What is more, 77% rate health policy as their number one priority, and among the voters that do so, two-thirds also rate education as their second priority. Overall, this pattern strongly suggests a high level of congruence in policy preferences at the local level, and offers a possible explanation for why a weakening of mayoral coalitions doesn't significantly impact policy outcomes.

This is further enlightening for this article's results when compared with polarization in electoral preferences, as illustrated by Figure 8. For the 106 municipalities in the LAPOP survey, the dark shade shows the distribution of the average preference for health spending. Again, voters are highly likely to agree in the policy dimension, as 77% of them favor this category. On the other hand, the lighter shade suggests that voters were much less likely to agree on the choice of presidential candidate in the 2010 race. Here I show the distribution of the average vote for the incumbent (PT party) and election winner across the same 106 municipalities: on average, only 46% of voters rally behind PT. This relatively higher split in electoral preferences is consistent with a political environment where the electoral support of legislators is relatively "more expensive" than their support for policy. Thus, a reduction in patronage it is also more likely to have a stronger impact on the electoral endorsement of councilors than on their support for policy implementation.

Council size and new entrants in politics. I also assess a second alternative explanation that

[32] The survey question is: "what is the area in which the public sector should invest more resources?" The options were: education, security, infra-structure, anti-poverty policies, retirement, health, housing, and environmental policies.

the observed electoral losses, in the case of the mayoral race only, are the mechanical effect of a higher fragmentation in the executive race triggered by new entrants in the contest (Shugart and Taagepera, 2017). The argument is simple: seat-winning parties, through newly acquired local political representation, might be empowered to present candidates in the mayoral race. If larger councils elect more parties (as it is the case here – Table 2), then executive races might be more fragmented, and the arguably stronger incumbent party might loses more votes. Nevertheless, Table A.8 (appendix) shows that council size has no effect on the number of candidates competing in the subsequent mayoral election in 2016, nor on the coalition size and electoral strength of the eventual winner.

Conclusion

This article uses a fuzzy regression discontinuity design to examine the effects of municipal legislature sizes on gubernatorial, presidential, and mayoral elections in Brazil. In a nutshell, every additional council seat in a municipality triggers a reduction of nearly 5pp in the vote percentage obtained locally by the candidates backed by the mayor's party. Additional evidence supports the theory that these electoral losses arise from a breakdown in the local executive-legislative electoral coalitions. In a context where councilors often extend political support to mayors in exchange for patronage, an increase in council size raises the cost of support for the executive, more so when council and mayor have unaligned electoral incentives at the state and national levels.

These findings have at least three significant implications for future research. First, there is burgeoning literature that studies the demise of entrenched, dominant political organizations in the developing world (Dasgupta, 2018; Frey, López-Moctezuma, and Montero, 2021), especially in a context where their hegemony is based on the targeted redistribution of public resources (Fujiwara and Wantchekon, 2013; Larreguy, Marshall, and Trucco, 2015). By revealing a mechanism for how legislature resizing weakens the electoral power of entrenched incumbents, this article suggests that this research agenda should also focus on how changes in other democratic institutions might affect electoral competition.

Second, the mechanism here is also relevant to research that aims to further understand the incentives faced by political brokers, and their electoral consequences. In many developing countries brokers often face a trade-off between their party interests and other attachments, either ideological or monetary (Holland and Palmer-Rubin, 2015; Larreguy, Montiel Olea, and Querubin, 2017; Larreguy, Marshall, and Querubín, 2016). In these political environments, patronage-based appeals are likely pivotal in defining both the brokers' loyalties and their effort.

Finally, municipal races in Brazil are often personalistic, and the conventional wisdom dictates that most parties in the country are patronage-oriented and ideologically weak (Ames and Smith, 2010; Klašnja and Titiunik, 2017). However, the findings here show that parties matter in local elections, even in this political environment. In doing so, this article adds to a recent body of evidence that highlights the relevance of Brazilian parties in (i) organizing vote brokerage in elections at all levels (Avelino, Biderman, and Barone, 2012; Feierherd, 2020; Frey, 2020; Novaes, 2018); (ii) guiding individual voting behavior (Power and Jr., 2009; Power and Rodrigues-Silveira, 2018b; Samuels and Zucco Jr., 2014); and (iii) determining municipal policy outcomes (Desai and Frey, 2021). In this context, this also implies that the mechanism uncovered here is likely present in other developing democracies that posses a stronger party system, and where patronage is also pervasive.

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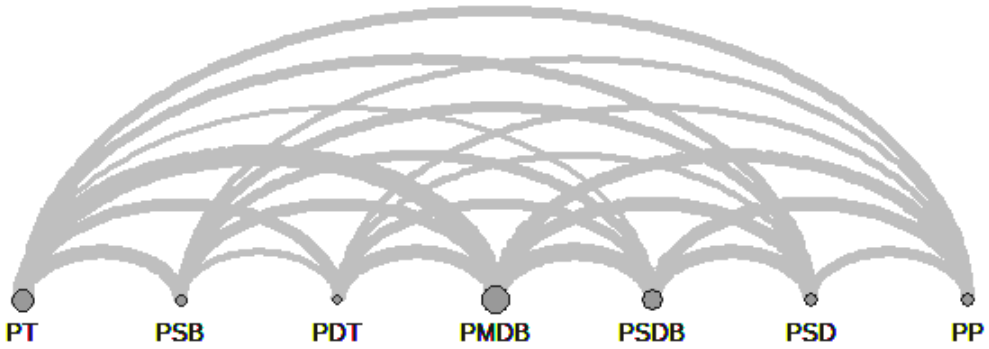
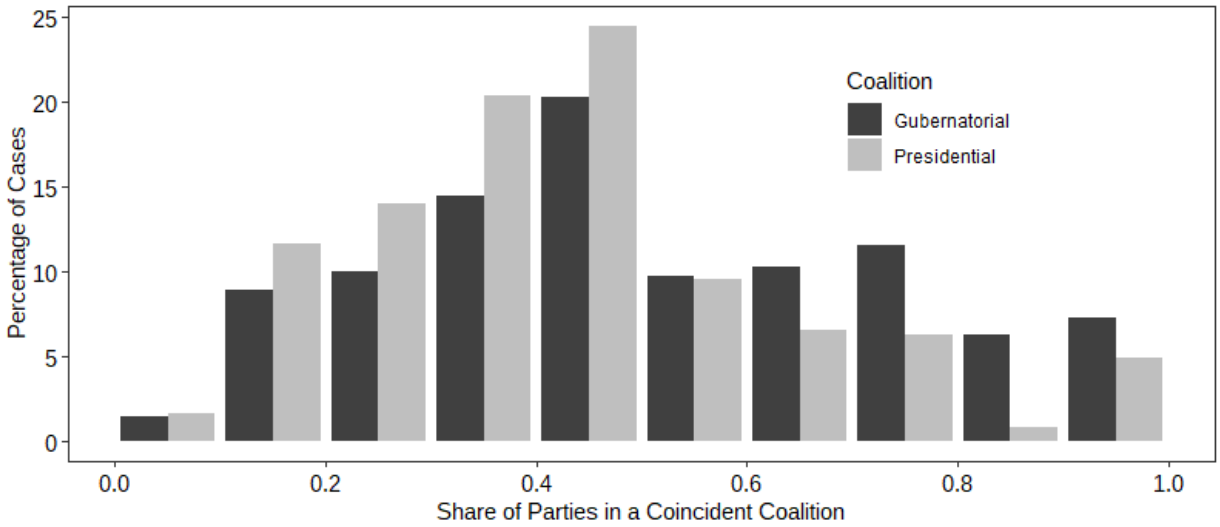
Figure 1: Local political coalitions by party in Brazil



Plot 1: Frequency of coalitions between the main parties in 2012

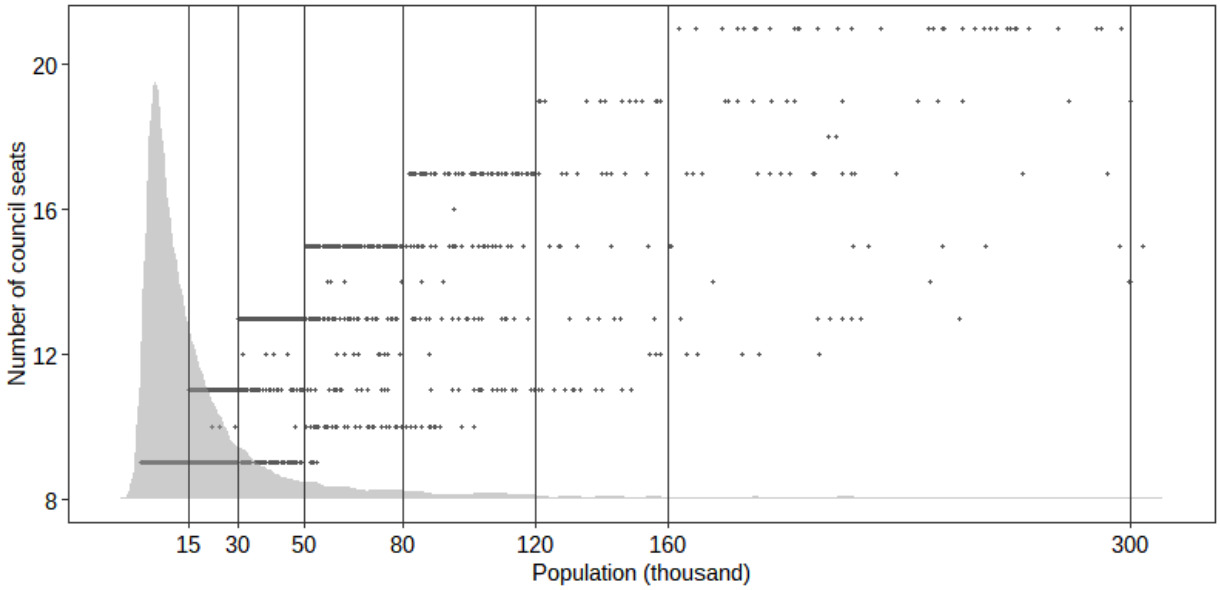
Only the 7 largest parties in the country are shown (based on the number of mayors in 2012). Parties are ordered from left to right by their L-R ideology score (Power and Jr., 2009). The size of the dots represent the number of times each party had a mayoral candidate. The thickness of the arc represents the number of alliances between party pairs. An alliance is counted every time one of these parties supports the mayoral candidate of the other party. PSD was created after the survey, so I placed the party in the Right-wing group due to the fact that most members came from PP and DEM, even though PSD supported the federal government under Leftist PT.



Plot 2: Coalition members often support different gubernatorial or presidential candidates

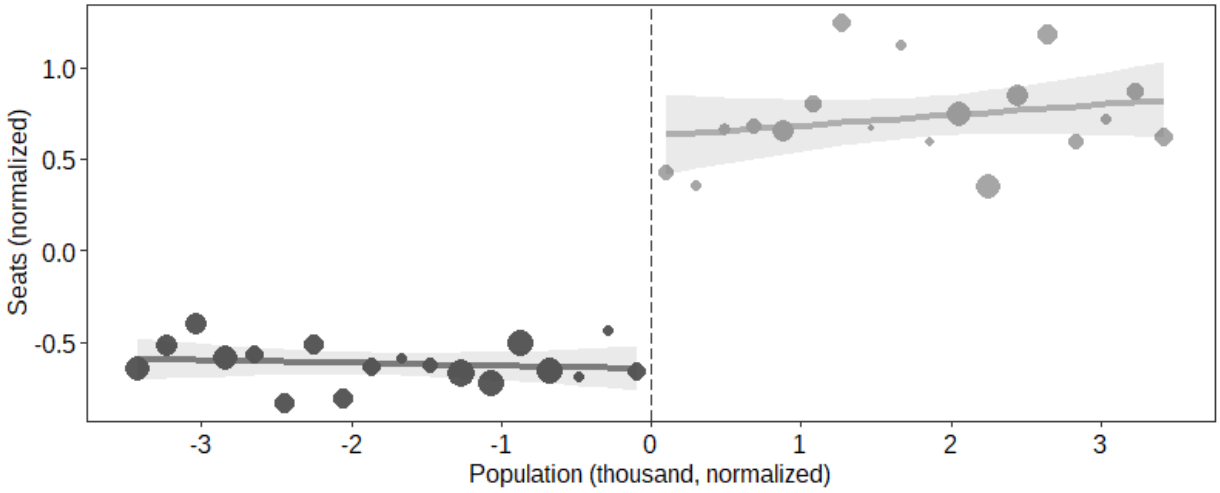
The plot splits the dependent variable into 10 bins of 10% each. The bars represent the percentage of all cases that fall within each bin.

Figure 2: Number of council seats in Brazilian municipalities



Each dot represents one municipality. The vertical lines show the population levels at which the cap on council size changes. The shaded area shows the density of the observations. For the purpose of presentation, the plot excludes 1% of all municipalities, which have population above 310 thousand. There is total of 5,428 municipalities in the plot.

Figure 3: Discontinuity in council size after 2012



Pooled data from the first seven population windows. The x-axis shows the population (in thousand inhabitants), normalized by value of each assignment threshold. The outcome variable in the y-axis is also demeaned by their average value in each assignment window. The optimal bandwidth is 3,520 and the line is a linear fit on each side of the discontinuity.

Table 1: Loss of electoral strength by the local incumbent party

Dependent variable: vote percentage	(1)	(2)	(3)
Vote Share Index	-4.674*	-4.761*	-4.218*
(aggregates the elections below)	(1.503)	(1.559)	(1.506)
Observations	1114	1114	1114
INDIVIDUAL ELECTION OUTCOMES			
Gubernatorial	-4.936*	-4.904*	-4.573*
(2014)	(2.266)	(2.324)	(2.278)
Observations	1305	1305	1305
Presidential	-4.648*	-4.181†	-3.918
(2014)	(2.005)	(2.492)	(2.465)
Observations	1307	1307	1307
Mayoral	-3.848*	-3.714*	-3.089†
(2016)	(1.877)	(1.892)	(1.836)
Observations	1116	1116	1116
Demographic covariates	Y	Y	N
Political Party covariates	Y	N	N

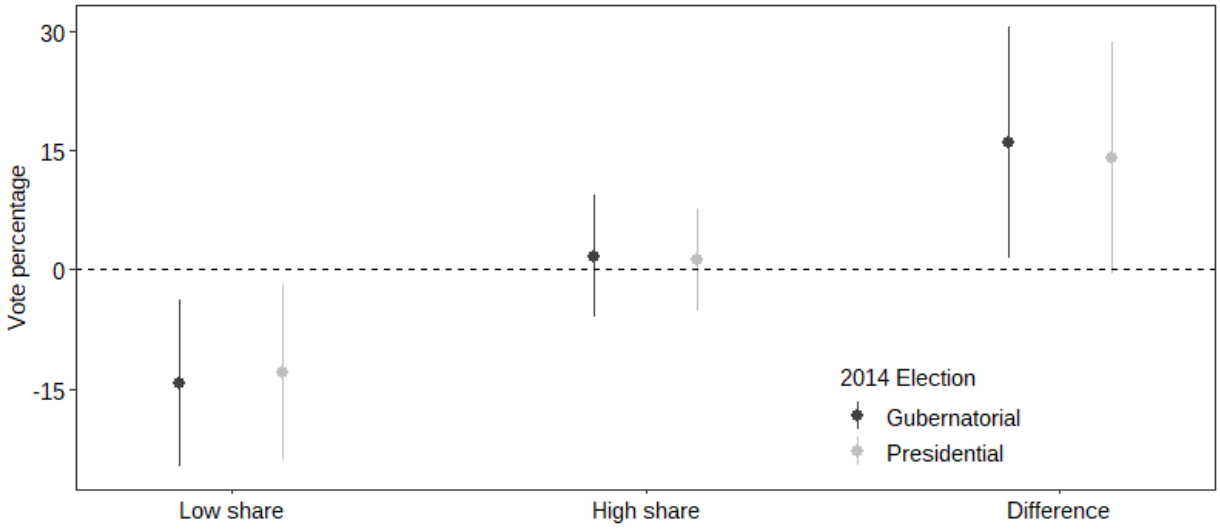
†p<0.1, *p<0.05. The dependent variable is the percentage of total votes in the municipality obtained by the candidate supported by the mayor's party in each election. Standard errors are heteroskedasticity robust and presented in parenthesis. The number of observations is shown right below. All regressions include fixed-effects for the assignment window, and state dummies. The covariates are listed in the appendix, Table A.3 and Table A.4. The bandwidth is 3,520 for all regressions, in line with the first stage shown in Figure 3.

Table 2: Effect of council size on the 2012 municipal election

	(1)	(2)	(3)
PRE-ELECTION OUTCOMES (2012)			
Total parties running	0.233	0.232	0.208
(number of parties)	(0.386)	(0.384)	(0.386)
Total candidates running	-0.143	-0.139	-0.157
(per seat)	(0.240)	(0.241)	(0.254)
Total parties in winning coalition	0.060	0.059	0.068
(log)	(0.055)	(0.055)	(0.055)
POST-ELECTION OUTCOMES (2012)			
Coalition parties elected	0.433*	0.430*	0.471*
(number of parties)	(0.159)	(0.159)	(0.159)
Coalition councilors elected	0.473*	0.478*	0.520*
(number of councilors)	(0.208)	(0.207)	(0.208)
Coalition share elected	-0.002	-0.002	0.002
(share of total seats)	(0.020)	(0.020)	(0.020)
ALIGNMENT IN PRE-ELECTORAL COALITIONS (Mayor in 2012 with State/National in 2014)			
Gubernatorial alignment	-0.027	-0.025	-0.024
(share of coincident coalition)	(0.026)	(0.026)	(0.025)
Presidential alignment	-0.003	-0.003	-0.004
(share of coincident coalition)	(0.019)	(0.022)	(0.022)
Observations	1305	1305	1305
Demographic covariates	Y	Y	N
Political Party covariates	Y	N	N

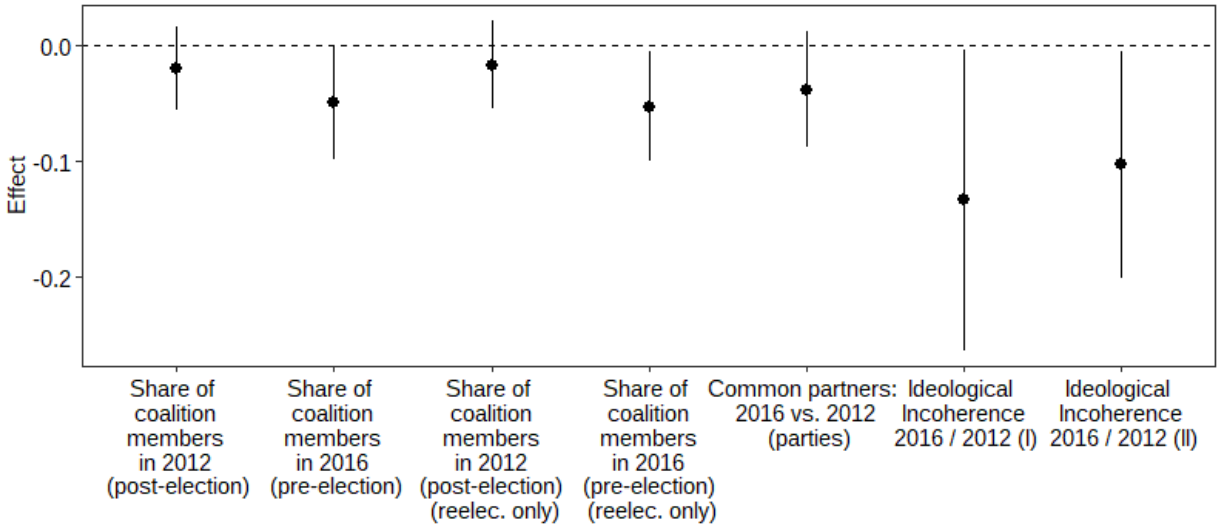
†p<0.1, *p<0.05. Dependent variables are explained in the text. Standard errors are heteroskedasticity robust and presented in parenthesis. All regressions include fixed-effects for the assignment window, and state dummies. The covariates are listed in the appendix, Table A.3 and Table A.4. The bandwidth is 3,520 for all regressions, in line with the first stage shown in Figure 3.

Figure 4: Heterogeneity in reverse coattails: the role of unaligned electoral incentives



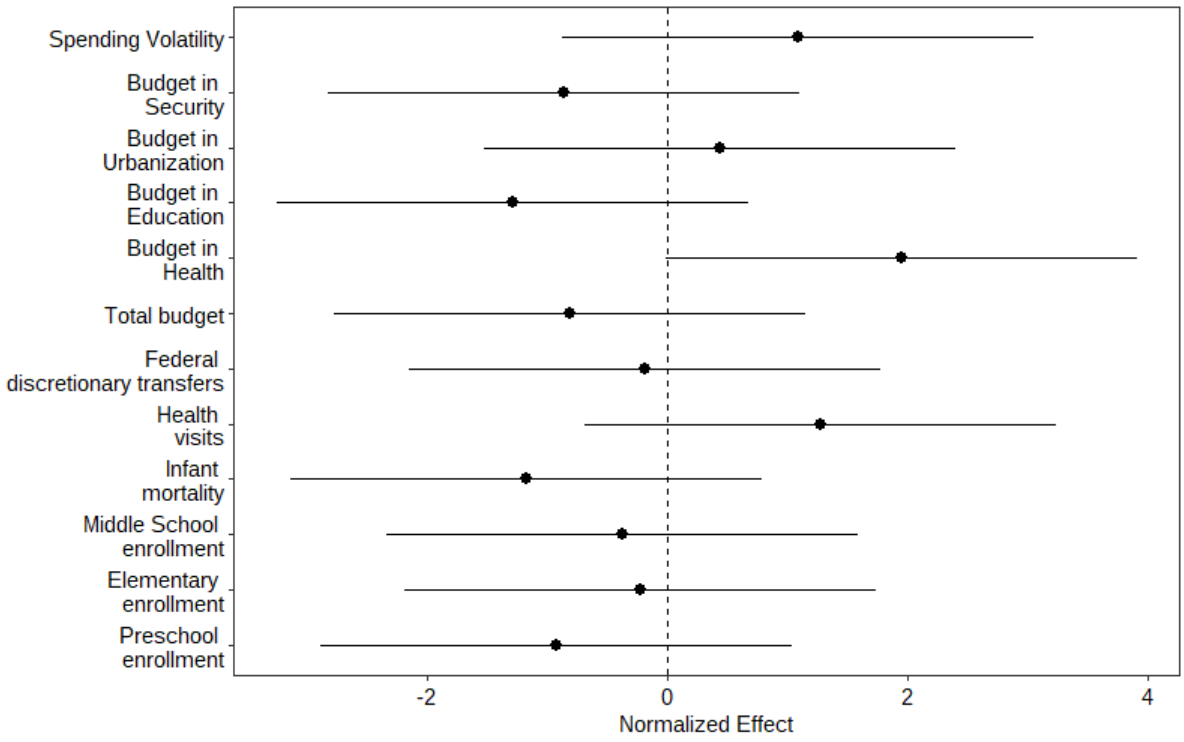
The coefficients represent the effect of council size on the vote shares of the candidates supported by the local incumbent's party in gubernatorial and presidential elections (2014). The two subsamples are described in the text. As it is standard, the estimation is done using a single regression where the independent variable that measures the council seat number ($SE\hat{A}TS_{iw}$ in equation 2) is also interacted with a dummy that indicates whether the observation belongs to the "high share" sample. Both these variables have now as instruments the treatment indicator T_{iw} (as before), and its interaction with the dummy described above. Standard errors are heteroskedasticity robust. The regressions include fixed-effects for the assignment window, state dummies, the covariates listed Table A.3 and Table A.4; and control for the number of parties in the 2012 mayoral coalition. The bandwidth is 3,520, in line with the first stage shown in Figure 3.

Figure 5: Change in winning mayoral coalitions between 2012 and 2016



The coefficients represent the effect of council size on each variable. The plots show the 95% confidence intervals. The first four variables are calculated as a share of the total council seats in the municipality. The construction of each variable is described in the text. Standard errors are heteroskedasticity robust. The regressions include fixed-effects for the assignment window, state dummies, the covariates listed Table A.3 and Table A.4; and control for the number of parties in the 2012 coalition. The bandwidth is 3,520, in line with the first stage shown in Figure 3.

Figure 6: Policy outcomes in 2013-2016



The coefficients represent the effect of council size on each variable. The plots show the 95% confidence intervals. School enrollment comes from the Brazilian school census of 2016 (INEP). The variables are coded as the number of students in each grade as a percentage of the local population.

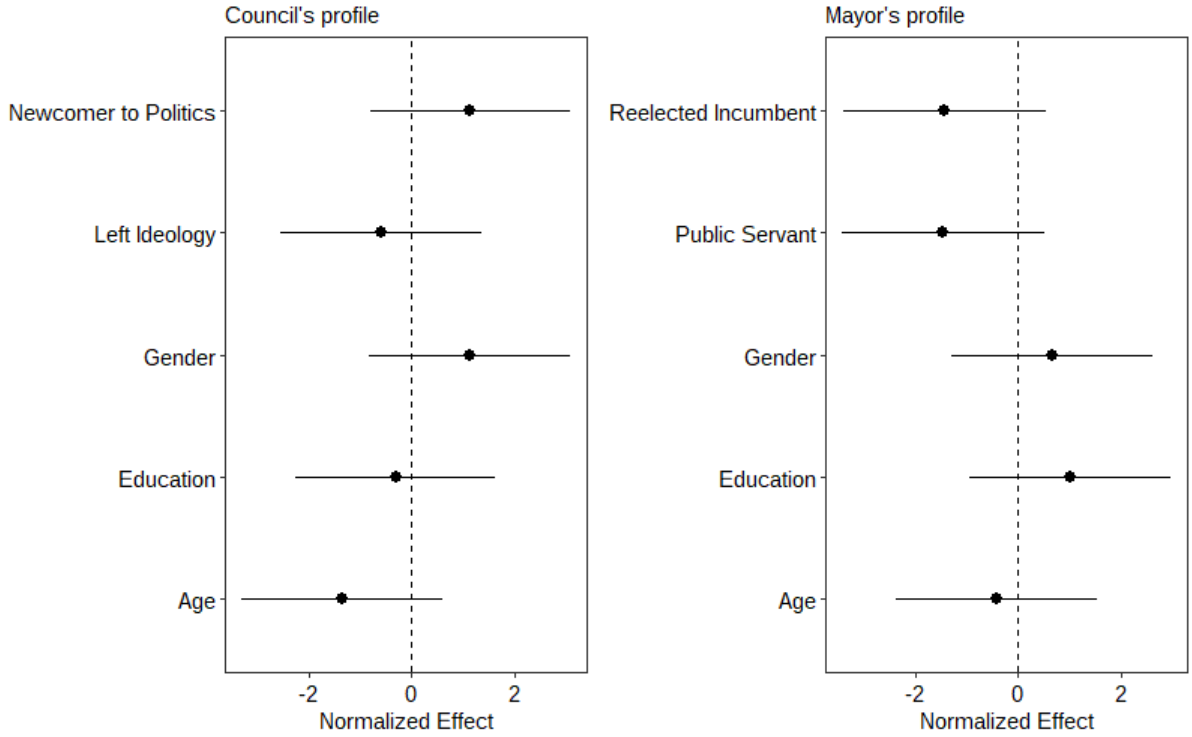
Budget data comes from the FINBRA database maintained by the National Treasure, for 2013-2016. Total budget is calculated in R$mn, and the shares are a percentage of the total spending. It only includes municipalities that reported at least two years of data.

Data on federal discretionary transfers comes from the SIAFI database for 2013-2016 (also in R$mn).

Infant mortality and health care visits come from http://tabnet.datasus.gov.br/. Mortality is calculated as the number of infant deaths per population, and it is available for 2013-2016, while health care visits only for 2013-2014 (calculated as the number of visits per covered household).

Spending volatility is measured as the absolute deviation in spending from the average within each group (treatment or control), within each treatment window.

Figure 7: Effects on the profile of elected politicians



The coefficients represent the effect of council size on each variable. The plots show the 95% confidence intervals. All coefficients are normalized by their standard deviation, for the purposes of presentation. The estimation here only includes municipalities where the incumbent's party formally supported a candidate in the 2016 election (89% of the full sample).

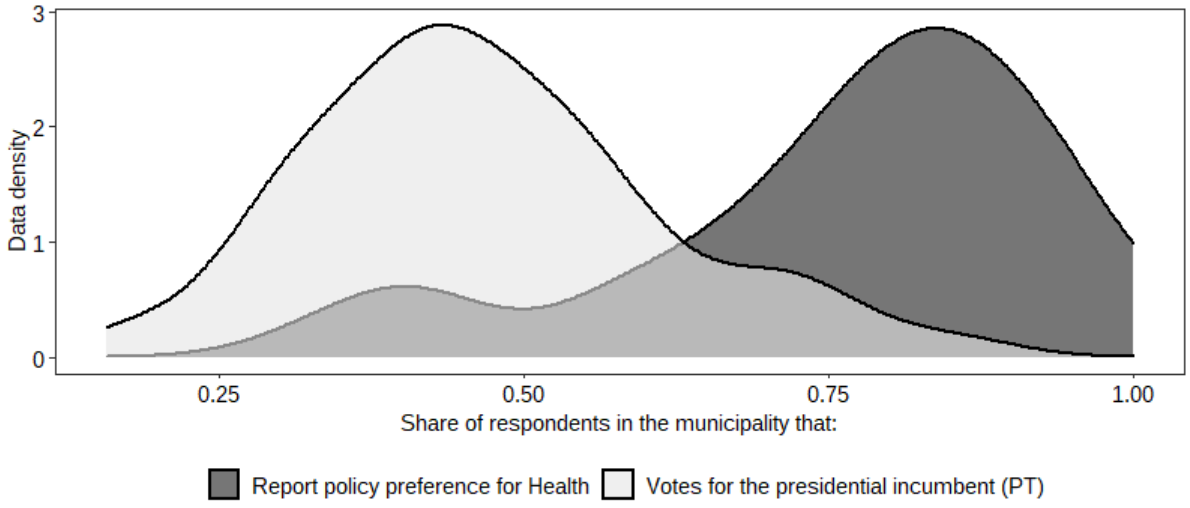
The left-side plot variables are defined as follows:

Gender: indicates whether the member is female; **Left ideology:** indicates whether the member belongs to a left-wing party; **Newcomer to politics:** indicates if the candidate registered as a party affiliated for the first time in 2011; **Education:** education level of the councilor; **Age:** councilor's age in 2012.

The right-side plot variables are defined as follows:

Gender: indicates whether the mayor is female; **Reelected incumbent:** indicates whether the recently elected mayor was also the mayor in 2009-12; **Public servant:** indicates whether the mayor was a former public servant; **Education:** education level of the mayor; **Age:** mayor's age in 2012.

Figure 8: Electoral and policy preferences of voters



The dark shade shows the distribution of the average preference for health policy across 106 municipalities surveyed in the LAPOP Brazil 2012. The light shade shows the distribution of the average vote for PT in the 2010 presidential election for the same 106 municipalities.

We thank the Latin American Public Opinion Project (LAPOP, www.lapopsurveys.org) and its major supporters (the United States Agency for International Development, the Inter-American Development Bank, and Vanderbilt University) for making the data available.

Larger Legislatures and the Cost of Political Brokerage: Evidence from Brazil

Appendix for Online Publication

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A Tables

Table A.1: Maximum number of council members, by population

Population Above... (in thousand)	Council Increase at the discontinuity	Maximum Council Size	Municipalities just below	Municipalities just above
15	22.2%	11	1269	702
30	18.2%	13	381	231
50	15.4%	15	105	85
80	13.3%	17	52	34
120	11.8%	19	20	10
160	10.5%	21	9	7
300	9.5%	23	6	1
450	8.7%	25	0	0
600	8.0%	27	1	0
750	7.4%	29	0	0
900	6.9%	31	0	0
1050	6.5%	33	0	0
1200	6.1%	35	0	0
1350	5.7%	37	0	0
1500	5.4%	39	0	0
1800	5.1%	41	0	0
2400	4.9%	43	0	0
3000	4.7%	45	0	0
4000	4.4%	47	0	0
5000	4.3%	49	0	0
6000	4.1%	51	0	0
7000	3.9%	53	0	0
8000	3.8%	55	0	0

For a population below 15,000 the council size is capped at 9 members. This is also the minimum for all municipalities. The Table includes all municipalities in the sample that have a population within 7,500 of one of the thresholds.

Table A.2: RD effects in the first stage

	(1)	(2)	(3)	(4)	(5)
RD Effect	1.169*	1.135*	0.919*	0.923*	0.799*
	(0.138)	(0.136)	(0.201)	(0.198)	(0.232)
Pre-Treatment Mean	9.920	9.920	10.221	10.149	10.266
Bandwidth	3.52	3.52	1.76	3.90	5.11
Observations	1308	1308	622	1453	2008
Bandwidth rule	optimal	optimal	optimal/2	optimal	optimal
Demographic covariates	N	Y	N	N	N
Polynomial	linear	linear	linear	quadratic	cubic

†p<0.1, *p<0.05. The dependent variable is the number of council seats in the municipality. Standard errors are heteroskedasticity robust and presented in parenthesis. Pre-treatment mean is the control average at the discontinuity.

Table A.3: Balance of covariates

Dependent variable	(1)	(2)	(3)
Gender share	-0.148	-0.212	-0.193
(2010 IBGE census)	(0.156)	(0.136)	(0.126)
Urban share	-0.133	1.014	0.212
(2010 IBGE census)	(2.307)	(1.861)	(1.134)
Past pc budget	-0.033	-0.015	-0.022
(log)	(0.027)	(0.022)	(0.017)
Health and Education spending	-0.002	-0.002	-0.002
(past share of budget)	(0.009)	(0.008)	(0.007)
Garbage collection	-0.938	0.519	-0.354
(2010 IBGE census)	(2.409)	(1.584)	(0.944)
Piped Water	-0.018	1.172	0.460
(2010 IBGE census)	(2.077)	(1.796)	(1.385)
Semi-arid location	0.018	0.011	0.010
(binary, 1=semi-arid)	(0.047)	(0.033)	(0.030)
2012 pc GDP	-0.019	-0.017	-0.020
(log)	(0.015)	(0.013)	(0.013)
Number of voters	0.005	0.028	0.057
(log)	(0.081)	(0.055)	(0.037)
Metropolitan area	0.053	0.032	0.034
(binary, 1=metropolitan)	(0.048)	(0.040)	(0.040)
Literacy rate	-0.005	-0.003	-0.005
(2010 census)	(0.010)	(0.005)	(0.004)
State fixed effects	N	Y	Y
Other covariates	N	N	Y

†p<0.1, *p<0.05. Standard errors are heteroskedasticity robust and presented in parenthesis. All regressions include fixed-effects for the assignment window. The bandwidth is 3,520 for all regressions, in line with the first stage shown in Figure 3. The specification in column (3) also every other covariate shown in this Table as a control, with the exception of the variable used as the outcome.

Gender share: share of male in the population (IBGE Census 2010); **Urban share:** share of urban population (IBGE Census 2010); **Past pc budget:** Local budget expenses per inhabitant (Finbra, average of 2009-2012). It only includes municipalities that report at least two years of data within the 4-year mayoral tenure (Finbra); **Health and Education spending:** Share of the above budget allocated to health and education (Finbra); **Garbage collection:** share of households with garbage collection (IBGE Census 2010); **Piped Water:** share of households with access to piped water (IBGE Census 2010); **Semi-arid location:** indicates whether the municipality belongs in the semi-arid region (IBGE); **2012 pc GDP:** per capita GDP in 2012 (IBGE); **Number of voters:** Number of registered voters in 2012 (TSE); **Metropolitan area:** Indicates whether municipality is part of a metro area (IBGE); **Literacy rate:** Share of adults that are literate (IBGE Census 2010).

Table A.4: Correlation between council size and mayors' partisanship at the discontinuity

Dependent variable	(1)	(2)	(3)
PT's federal coalition	0.032	0.001	0.019
	(0.052)	(0.052)	(0.026)
PT mayor	0.014	0.014	-0.007
	(0.038)	(0.041)	(0.025)
PMDB mayor	0.012	0.005	-0.011
	(0.042)	(0.043)	(0.025)
PSDB mayor	0.013	0.022	0.022
	(0.036)	(0.037)	(0.032)
PSD mayor	-0.015	-0.014	-0.017
	(0.029)	(0.029)	(0.022)
PSB mayor	-0.003	0.001	0.007
	(0.025)	(0.026)	(0.023)
PP mayor	-0.011	-0.019	-0.019
	(0.031)	(0.030)	(0.021)
PDT mayor	0.007	-0.003	-0.010
	(0.026)	(0.027)	(0.021)
State effects and demographic covariates	N	Y	Y
Other covariates	N	N	Y

†p<0.1, *p<0.05. The dependent variable is always a dummy that indicates whether the mayor elected in 2012 belongs to the party in question (or to PT's federal coalition, in the case of the first line). All regressions include fixed-effects for the assignment window. The bandwidth is 3,520 for all regressions, in line with the first stage shown in Figure 3. Standard errors are heteroskedasticity robust and presented in parenthesis. The demographic covariates are described in Table A.3. The specification in column (3) also every other variable shown in this Table as a control, with the exception of the variable used as the outcome. All data comes from TSE.

Table A.5: Loss of electoral strength by the local incumbent party (excludes: 50, 300 pop)

Dependent variable: vote percentage	(1)	(2)	(3)
Vote Share Index	-4.479*	-4.393*	-3.843*
(aggregates the elections below)	(1.473)	(1.529)	(1.480)
Observations	1032	1032	1032
INDIVIDUAL ELECTION OUTCOMES			
Gubernatorial	-4.769*	-4.511†	-4.143†
(2014)	(2.248)	(2.302)	(2.248)
Observations	1207	1207	1207
Presidential	-4.928*	-3.785	-3.649
(2014)	(1.999)	(2.439)	(2.416)
Observations	1209	1209	1209
Mayoral	-3.367†	-3.297†	-2.700
(2016)	(1.761)	(1.789)	(1.750)
Observations	1034	1034	1034
Demographic covariates	Y	Y	N
Political Party covariates	Y	N	N

†p<0.1, *p<0.05. The dependent variable is the percentage of total votes in the municipality obtained by the candidate supported by the mayor's party in each election. The index aggregates the three election in the Table. Standard errors are heteroskedasticity robust and presented in parenthesis. The number of observations is shown right below. The regressions include fixed-effects for the assignment window, state dummies, and the covariates listed Table A.3 and Table A.4. The bandwidth is 3,520, in line with the first stage shown in Figure 3. Excludes the assignment windows with population thresholds of 50,000 and 300,000.

Table A.6: Loss of electoral strength by the local incumbent party (includes: 15 pop)

Dependent variable: vote percentage	(1)	(2)	(3)
Vote Share Index	-5.624*	-5.715*	-5.184*
(aggregates the elections below)	(1.836)	(1.945)	(1.939)
Observations	735	735	735
INDIVIDUAL ELECTION OUTCOMES			
Gubernatorial	-5.471†	-5.415†	-5.281†
(2014)	(2.982)	(3.105)	(3.085)
Observations	873	873	873
Presidential	-5.297*	-3.817	-3.703
(2014)	(2.610)	(3.249)	(3.299)
Observations	875	875	875
Mayoral	-4.327*	-4.562*	-3.700†
(2016)	(2.194)	(2.255)	(2.242)
Observations	737	737	737
Demographic covariates	Y	Y	N
Political Party covariates	Y	N	N

†p<0.1, *p<0.05. The dependent variable is the percentage of total votes in the municipality obtained by the candidate supported by the mayor's party in each election. The index aggregates the three election in the Table. Standard errors are heteroskedasticity robust and presented in parenthesis. The number of observations is shown right below. The regressions include fixed-effects for the assignment window, state dummies, and the covariates listed Table A.3 and Table A.4. The bandwidth is 3,520, in line with the first stage shown in Figure 3. Includes only the assignment window with population threshold of 15,000.

Table A.7: Loss of electoral strength by the local incumbent party (placebo)

Dependent variable: vote pct.	(1)	(2)	(3)
Vote Share Index	-0.072	-0.155	-0.101
(aggregates the elections below)	(1.561)	(1.664)	(1.676)
Observations	883	883	883
INDIVIDUAL ELECTION OUTCOMES			
Gubernatorial	0.645	0.688	0.808
(2010)	(2.465)	(2.488)	(2.431)
Observations	1102	1102	1102
Presidential	0.310	0.396	0.300
(2010)	(2.512)	(2.874)	(2.906)
Observations	1146	1146	1146
Mayoral	-0.294	-0.319	0.042
(2012)	(1.806)	(1.842)	(1.823)
Observations	1144	1144	1144
Demographic covariates	Y	Y	N
Political Party covariates	Y	N	N

†p<0.1, *p<0.05. The dependent variable is the percentage of total votes in the municipality obtained by the candidate supported by the mayor's party in each election. Standard errors are heteroskedasticity robust and presented in parenthesis. The regressions include fixed-effects for the assignment window, state dummies, and the covariates listed Table A.3 and Table A.4, with the exception of the dummy for PP mayors, given that the party did not elect a single mayor in 2008 in the municipalities within the bandwidth. Accordingly, the value of these covariates is measured in the following periods: 2010 IBGE Census (Gender share, Urban share, Piped Water, Garbage collection, Literacy rate); 2008 by TSE (Number of voters, all variables in Table A.4); 2008 by IBGE (GDP); and 2005-2008 by FINBRA (Past pc budget and Health and Education spending). The bandwidth is 3,520, in line with the first stage shown in Figure 3.

Table A.8: Other political outcomes

Dependent variable	(1)	(2)	(3)
2012 ELECTION			
Mayoral candidates	0.014	0.048	0.073
(number)	(0.104)	(0.107)	(0.087)
Mayor's vote	-0.009	-0.010	-0.008
(pct)	(0.014)	(0.014)	(0.012)
Parties in the winning coalition	0.218	0.376	0.266
(log)	(0.318)	(0.326)	(0.295)
Share of elected coalition councilors aligned	-0.061*	-0.062†	-0.045
(with mayor's 2014 gubernatorial coalition)	(0.031)	(0.032)	(0.028)
Share of elected coalition councilors aligned	-0.040	-0.049	-0.018
(with mayor's 2014 presidential coalition)	(0.031)	(0.032)	(0.028)
2016 ELECTION			
Mayoral candidates	-0.054	-0.012	-0.075
(number)	(0.117)	(0.115)	(0.096)
Mayor's vote	-0.006	-0.006	-0.008
(pct)	(0.013)	(0.013)	(0.012)
Parties in the winning coalition	-0.062	0.017	-0.102
(log)	(0.349)	(0.363)	(0.344)
Share of councilors that run again in 2016	-0.022	-0.016	-0.014
(of all elected)	(0.019)	(0.019)	(0.018)
Share of reelected councilors	0.020	0.018	0.024
(of the ones that run in 2016)	(0.023)	(0.022)	(0.017)
Share of reelected coalition councilors	0.003	0.006	-0.019
(of the ones that run in 2016)	(0.032)	(0.033)	(0.027)
Incumbent Party does not participate	0.008	0.001	-0.003
(binary variable, 1=does not participate)	(0.031)	(0.033)	(0.032)
State effects and demographic covariates	N	Y	Y
Other covariates	N	N	Y

†p<0.1, *p<0.05. Standard errors are heteroskedasticity robust and presented in parenthesis. All regressions include fixed-effects for the assignment window. The demographic covariates are described in Table A.3. The specification in column (3) also every other covariate shown in this Table as a control, with the exception of the variable used as the outcome. The bandwidth is 3,520 for all regressions, in line with the first stage shown in Figure 3.

Continues...

Variable description (All data comes from TSE):

Mayoral candidates: Number of candidates in 2012 or 2016; **Mayor's vote:** vote share (in %) of the winning mayor in 2012 and 2016; **Share of elected coalition councilors aligned:** Share of the elected coalition councilors in 2012 from parties that also supports the same gubernatorial or presidential candidate as the mayor's party in 2014; **Parties in the winning coalition:** Number of parties in the pre-election coalition of the election winner; **Share of councilors that run again in 2016:** Share of all councilors elected in 2012 that decide to run for reelection in 2016; **Share of reelected councilors:** Share of all councilors running in 2016 that won reelection; **Share of reelected coalition councilors:** Share of all coalition councilors running in 2016 that won reelection; **Incumbent Party does not participate:** Indicates whether or not the incumbent party in the municipality supported any candidate in the 2016 mayoral race.

Table A.9: Loss of electoral strength by the local incumbent party (robustness)

Dep. variable: vote percentage	(1)	(2)	(3)	(4)
Vote Share Index	-5.284*	-4.674*	-4.056*	-4.734*
(aggregates the elections below)	(1.490)	(1.503)	(1.332)	(1.583)
Observations	1114	1114	1241	1716
INDIVIDUAL ELECTION OUTCOMES				
Gubernatorial	-5.592*	-4.936*	-4.540*	-5.526*
(2014)	(2.488)	(2.266)	(2.037)	(2.405)
Observations	1305	1305	1450	2004
Presidential	-5.274*	-4.648*	-4.016*	-4.715*
(2014)	(2.241)	(2.005)	(1.805)	(2.120)
Observations	1307	1307	1453	2008
Mayoral	-4.359*	-3.848*	-3.196†	-3.795†
(2016)	(1.976)	(1.877)	(1.674)	(1.958)
Observations	1116	1116	1244	1720
Bandwidth	3.52	3.52	3.90	5.11
Estimation	Reduced-form	FRD	FRD	FRD
Polynomial	linear	linear	quadratic	cubic

†p<0.1, *p<0.05. The dependent variable is the percentage of total votes in the municipality obtained by the candidate supported by the mayor's party in each election. Standard errors are heteroskedasticity robust and presented in parenthesis. All regressions include fixed-effects for the assignment window, as well as state dummies, and demographic and political party covariates described in Table A.3 and Table A.4. The reduced-form estimation corresponds to the sharp RD case, i.e., the direct effect of the treatment assignment on the outcome.

Table A.10: Loss of electoral strength by the local incumbent party (with congress)

Dependent variable: vote percentage	(1)	(2)	(3)
Vote Share Index	-4.605*	-4.690*	-4.178*
(aggregates the elections below)	(1.481)	(1.545)	(1.493)
Observations	1114	1114	1114
INDIVIDUAL ELECTION OUTCOMES			
Gubernatorial	-4.936*	-4.904*	-4.573*
(2014)	(2.266)	(2.324)	(2.278)
Observations	1305	1305	1305
Presidential	-4.648*	-4.181†	-3.918
(2014)	(2.005)	(2.492)	(2.465)
Observations	1307	1307	1307
Mayoral	-3.848*	-3.714*	-3.089†
(2016)	(1.877)	(1.892)	(1.836)
Observations	1116	1116	1116
Congressional	-4.038†	-3.690	-3.852
(2014)	(2.318)	(2.457)	(2.430)
Observations	1307	1307	1307
Demographic covariates	Y	Y	N
Political Party covariates	Y	N	N

†p<0.1, *p<0.05. The dependent variable is the percentage of total votes in the municipality obtained by the candidate supported by the mayor's party in each election. Standard errors are heteroskedasticity robust and presented in parenthesis. The number of observations is shown right below. The regressions include fixed-effects for the assignment window, state dummies, and the covariates listed Table A.3 and Table A.4. The bandwidth is 3,520, in line with the first stage shown in Figure 3.

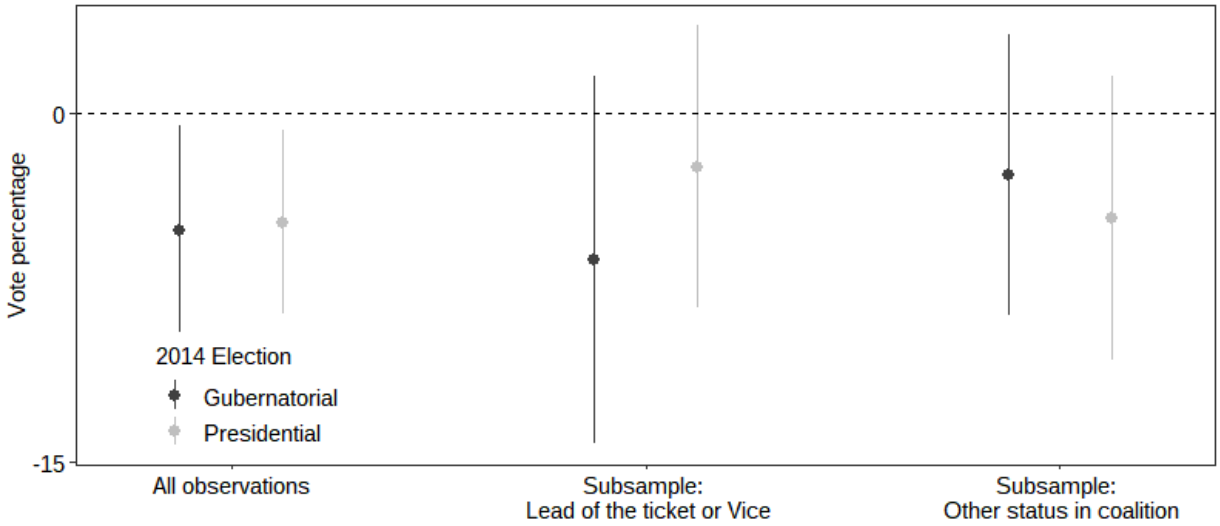
Table A.11: Heterogeneity of electoral effects, by budget

Sample split:	by Budget		by Alignment	
2014 Election:	Governor	President	Governor	President
Dependent variable: vote percentage of the candidate supported by the mayor's party				
Low Budget Sample	-7.450†	-8.622*	-7.010*	-6.419*
	(4.116)	(3.566)	(3.305)	(3.023)
Observations	649	650	961	961
High Budget Sample	-2.509	-0.904	-1.012	-1.182
	(3.109)	(2.955)	(3.146)	(2.604)
Observations	649	650	344	346

†p<0.1, *p<0.05. The coefficients are the effects of one additional seat for each sub-sample. Standard errors are heteroskedasticity robust and presented in parenthesis. The number of observations for each subsample is shown right below. The regressions include fixed-effects for the assignment window, state dummies, and the covariates listed Table A.3 and Table A.4. The bandwidth is 3,520, in line with the first stage shown in Figure 3. The first two columns have the sample split by the median value of the per capita municipal budget in 2013-2016. The last two columns have the sample split by the following proxy for access to budget resources: party alignment between the elected mayor and the governor and president in 2012 (i.e., the high budget sample has municipalities where the mayor's party is part of both the gubernatorial and presidential governing coalitions).

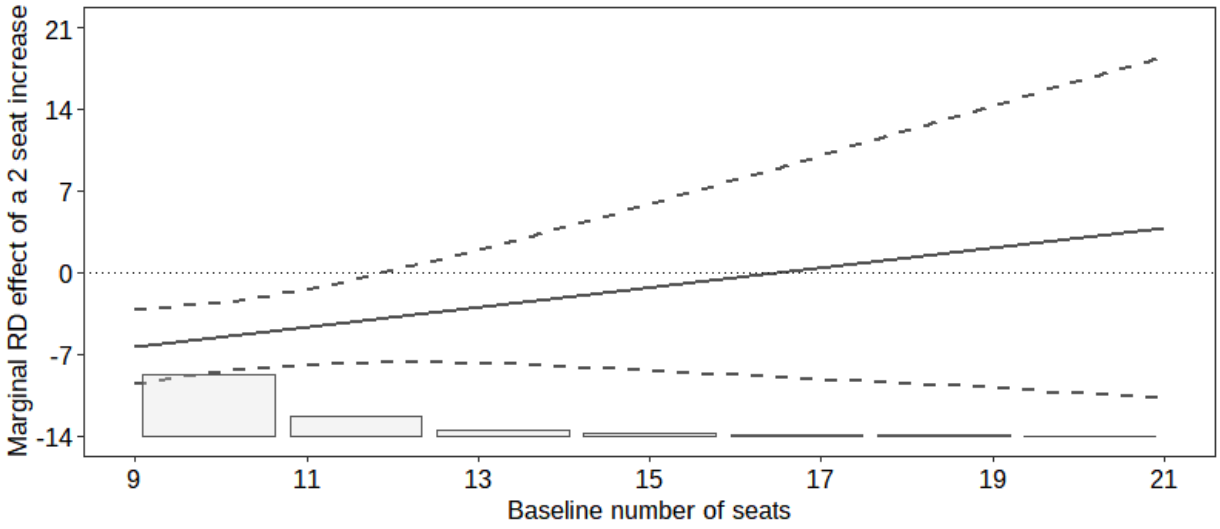
B Figures

Figure A.1: Heterogeneity in electoral losses, by status in higher coalitions



The coefficients represent the effect of council size on each election (outcomes as in Table 1). The plots show the 95% confidence intervals. As it is standard, the estimation is done using a single regression where the independent variable that measures the council seat number ($S\hat{E}\hat{A}TS_{iw}$ in equation 2) is also interacted with a dummy that indicates whether the observation belongs to the "high share" sample. As usual, both these variables have now as instruments the treatment indicator T_{iw} (as before), and its interaction with the dummy described above. Standard errors are heteroskedasticity robust. The first coefficient for each elections includes all observations; the second only captures cases where the mayor's party also occupied one of the top positions in the gubernatorial or presidential coalition that it supported (governor or vice-governor, for example); the third captures the cases where the mayor's party had any other status in the coalition. The regression includes fixed-effects for the assignment window, state dummies, and the covariates listed Table A.3 and Table A.4. The bandwidth is 3,520, in line with the first stage shown in Figure 3.

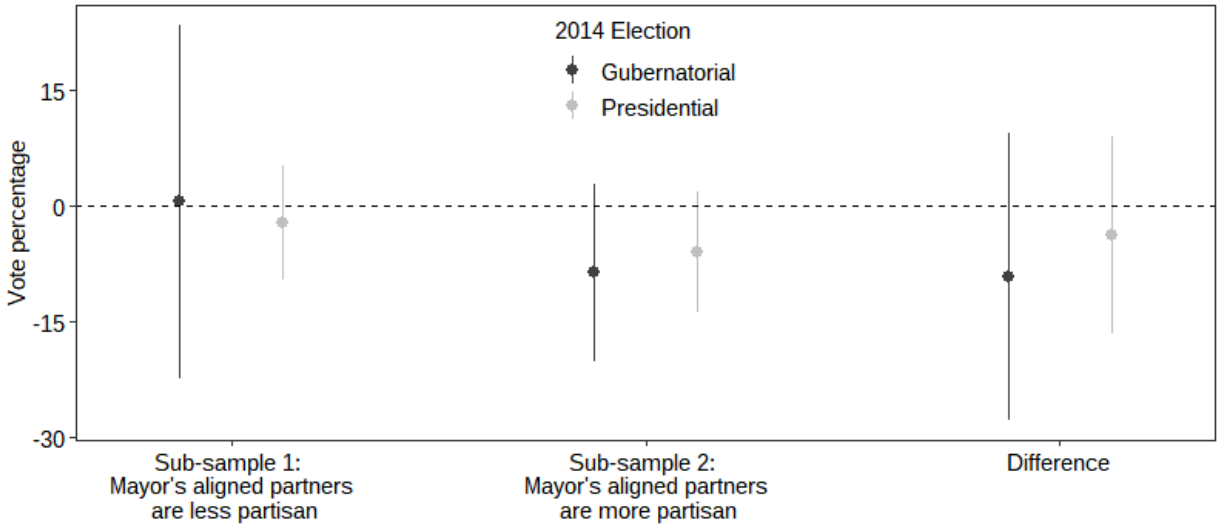
Figure A.2: Heterogeneity in electoral losses, by status in higher coalitions



The line represent the treatment effect at the discontinuity – an increase in 2 council seats – on the electoral results index, and how it changes as the baseline number of seats increases in the sample (these are shown in the x-axis). The dotted lines show the heteroskedasticity robust 95% confidence intervals. The columns are the share of the sample at each baseline number of seats shown in the x-axis.

The regression includes state fixed-effects and the covariates listed in Table A.3 and Table A.4. The bandwidth is 3,520, in line with the first stage shown in Figure 3. The estimation here is the reduced-form equation (equation 1), where the (i) treatment indicator T_{iw}, (ii) the running variable; and (iii) their interaction are all interacted with the baseline number of seats for each different assignment window (for example: for the 15,000 population assignment window, the baseline council size was 9. For the 30,000 window, it was eleven). The outcome is the electoral results index.

Figure A.3: Heterogeneity in electoral losses, by partisanship of aligned councilors



The coefficients represent the effect of council size on each election. The plots show the 95% confidence intervals. As it is standard, the estimation is done using a single regression where the independent variable that measures the council seat number ($\widehat{SEATS}_{iw}$ in equation 2) is also interacted with a dummy that indicates whether the observation belongs to the sub-sample 2. Both these variables have now as instruments the treatment indicator T_{iw} (as before), and its interaction with the dummy described above. Standard errors are heteroskedasticity robust. The regressions include fixed-effects for the assignment window, state dummies, and the covariates listed Table A.3 and Table A.4. The bandwidth is 3,520, in line with the first stage shown in Figure 3. The sub-samples are split by the median value of the share of the aligned coalition councilors elected in 2012 that belong to the mayor's party. Alignment is defined for each election separately (state or national), and the regression also controls for the total number of aligned councilors on each case.