The Size of Local Legislatures and Women's Political Representation. Evidence from Brazil

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Abstract

Exploiting exogenous changes in local legislature size at population thresholds in Brazil, this paper investigates whether the number of legislators can impact the political participation of women, a group that is extremely underrepresented in Brazilian politics. Results suggest that the number of seats in the legislatures have a significant positive impact on women's presence in the political sphere, and we show that these effects are direct consequences of changes in the local political competition. We also report that the increased women's representation in the decision-making process influences the municipal provision of public goods and services.

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Keywords: Legislature Size, Women's Political Representation, Regression Discontinuity Design.

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1 Introduction

For a better understanding of the public provision of services and goods, it is highly important to analyze the political context in which policy decisions are made.[1] In this sense, a substantial part of the recent political economy literature has been studying the relationship between the electorate representation and public policy in representative democracies.

The relevance of this relationship is better understood by analyzing the distinction between direct and representative democracies. In the first one, every enfranchised citizen is equally represented in the decision-making process, since all eligible voters directly vote on matters of economic importance. On the other hand, people in representative democracies elect officials to represent them in the decision process.[2] In this indirect type of democracy, it is possible that a part of the population ends up not electing any representative, and therefore hardly being the focus of policy platforms established by elected officials.

The empirical literature on political economy has been giving a great deal of attention to this debate. For example, Pande (2003), Chattopadhyay and Duflo (2004), and Iyer et al. (2011) show how the establishment of a mandate political reservation that guarantees a certain group in the decision making process affects policy outcomes. Miller (2008), Lott and Kenny (1999), and Cascio and Washington (2013) explore direct changes on the pool of eligible voters, evaluating the consequences of enfranchising a new group of people. Their common conclusion is that the new enfranchised citizens receive more resources and political attention after having been included in the voting process. Additionally, other important articles analyze changes in political institutions that indirectly affect the electorate representation, such as Fujiwara (2012) and Shue and Luttmer (2009). They both show the importance of the voting technology on the *de facto* enfranchisement, which ultimately affects policy decisions.

This paper contributes to this discussion about how political institutions relate to the

[1] See Persson and Tabellini (2000) and Besley (2006) for a modern treatment of political economy.

[2] See Hinnerich and Pettersson-Lidbom (2013) for a discussion on the difference between direct and representative democracies.

electorate representation and public policy. We focus on a specific mechanism that has not been extensively studied in the economic literature so far: the size of local legislatures. Our study analyzes how the number of city legislators can affect the political representation of under-represented groups in local politics and how these effects may impact the public provision of goods and services. At our knowledge, this is the first empirical attempt to study the relationship between council size and political representation in a representative democracy.[3]

In order to accomplish our goal, we use the Brazilian local political context, which allows us to overcome two significant obstacles frequently seen in the political economy empirical literature: (i) the difficulty to infer causality in a transparent identification strategy and (ii) availability of data. First, a federal legislation completely determined the municipal council size in the elections of 2004 and 2008 based on population thresholds, creating discontinuities in the number of legislators at the thresholds set by the law. We explore this quasi-experimental source of variation to make causal inference of the effects we are interested in, using the sharp Regression Discontinuity (RD) design. Second, we have a detailed set of electoral information on all the candidates for local legislatures in the elections we study.

Motivated by the unequal gender representation in Brazilian politics and taking advantage of the available information on the gender of all candidates, our focus in this article is on the women's participation in politics. We investigate how women's political representation is related to the number of local legislators in municipal councils. Therefore, this paper also directly relates to the discussion on female political participation, which is an important

[3]Other papers that focus on legislature size investigate its relation to government size or government spending. See Pettersson-Lidbom (2012) as an example of study that uses an RD design to estimate the causal effect of council size on government spending.

issue in many democracies (World Bank, 2012).[4]

The results of our estimations suggest that a rise in the number of legislators indeed changes the electorate representation, by increasing women's participation in politics. More specifically, it elevates the percentage of female legislators in the council and increases the chances of having at least one woman elected for the legislature. We explain these effects by showing that they are consequences of the impacts of the council size on the local political competition. First, our findings suggest that an increase in the number of seats in the legislature attracts only male candidates, a result consistent with theoretical models in which women face political barriers in their entry decision (Bhalotra et al., 2013 and Casas-Arce and Saiz, 2011). We also report that, despite this increase in the number of male candidates, the share of votes for the set of candidates of each gender is not altered by the council size. So there are more men competing for the same share of votes in those municipalities with a greater number of seats in the legislature. Our evidences thus indicate that male candidates "cannibalize" each other, augmenting the chances of elections for women. Therefore, the greater political participation of women that we observer in municipalities with a larger legislature size are consequences of these changes.

Our findings also suggest that the council size does not affect other observable characteristics of the elected officials, such as their age, educational degree, and chance of reelection.[5] Additionally, we report that the impacts of the council size in the women's presence in the political sphere are also present in the elections for mayor, which are held at the same time as the municipal legislative elections.

Finally, our empirical exercises also show that the changes on female participation in

[4]The economic literature has given considerable attention to the topic, specially by evaluating the impacts of affirmative actions implemented at various levels of politics in the world, such as specifying shares of legislative seats reserved for women and establishing mandated quotas for women in party lists. See Ford and Pande (2012) for a review of the impacts of political gender quotas on a range of outcomes. See also Chattopadhyay and Duflo (2004), Iyer et al. (2011), Pande (2003), Miller (2008), and Lott and Kenny (1999) for further articles on women's political representation.

[5]As we have already stated, we believe that an increase in the number of legislators may also raise the representation of other political minorities, such as racial minorities. However, we do not have data to empirically test it.

local politics translates into policy outcomes. The evidences show that a greater political representation of women is related to the public provision of goods and services that are most commonly associated with women's preferences (e.g. day care facilities, pre-natal health care). These results are in line with papers which show how the politician's gender affects public policy, such as Brollo and Troiano (2013) and Clots-Figueras (2012).[6,7]

This article also relates with Ferraz and Finan (2011), which uses similar data and the same political background (Brazilian local elections) to evaluate the effects of the local legislators' wages on competition for office, political entry, and political performance. Although the focus of our analysis is distinct from theirs, both papers study important issues of municipal politics in Brazil.

The remainder of this paper is organized as follows: Section 2 describes the Brazilian political context and institutional background for the elections we analyze. Section 3 discusses the data and the empirical strategy used. The empirical findings are reported in Section 4, and we perform robustness checks in Section 5. Finally, Section 6 presents the main conclusions of our work.

2 Institutional Background

2.1 Local politics in Brazil

Municipalities are the smallest national administrative units in Brazil and are responsible for the provision of important public services and goods, such as health care, local infrastructure, education, and local transportation. The country has over 5,000 municipalities in its 26 states.[8] They are governed autonomously by a mayor in conjunction with a legislative

[6]Ferreira and Gyourko (2013), on the other hand, find no effect of the gender of the mayor on policy outcomes in the context of U.S. cities.

[7]The already cited Chattopadhyay and Duflo (2004), Iyer et al. (2011), Pande (2003) also shed light on how policy preferences can be distinct between genders and how this differences can shape the decisions elected officials make.

[8]The number of municipalities in Brazil has increased recently. In 2014, Brazil has 5,570 municipalities. There were 5,565 municipalities in 2008 and 5,560 in 2004.

council, both directly elected by voters in elections held simultaneously at 4-year intervals and staggered by 2 years relative to state and federal elections.

The 1988 Federal Constitution (Article 14, Paragraph 3) sets the principal qualifications citizens must meet to be eligible to the local council. Among others requirements, a person must have a Brazilian nationality, be at least eighteen years old, and be affiliated with a political party for at least 1 year before the elections. A federal law[9] also states that each party must present its list of candidates, chosen among those eligible affiliates, four months before the elections. There is a maximum number of candidates per party of 1.5 times the number of seats in the municipal council.[10]

While the mayor of each municipality is elected from a plurality rule[11], the local council is selected in a multi-member election, through an open list, proportional representation system. In this voting system, each party announces a list of candidates before the elections. Each voter has one vote, and can cast it for a party or an individual candidate in a party's list. Voting is mandatory in Brazil, so citizens may also register an invalid vote.[12] After the election, the total number of votes received by each party is calculated, taking into account both the votes cast directly for the parties and the ones cast for their candidates. The seats in the legislature are allocated to the parties according to the proportion of total valid votes received by each one of them, and then parties fill their allocated seats with the most voted candidates in their lists.[13]

Once the legislature is formed, the elected body can influence public policy by (i) interfering in the elaboration of the city budget, (ii) proposing and voting municipal laws, (iii) making public services requests to the mayor, and (iv) monitoring the mayor's activities.

[9] Law Number 9.504, dated 30 September 1997.

[10] Parties may form a coalition before the elections. In this case, the maximum number of candidates per coalition is of 2 times the number of seats in the council.

[11] A simple plurality rule is used in municipalities with less than 200,000 voters, and a two-ballot system is mandatory for the others above that threshold.

[12] Invalid votes in Brazil are either "null votes" or "blank votes", and both of them mean that the voter is indifferent between candidates. "Blank vote" is an option in the voting electronic machines, while a "null vote" is registered when a voter presses a number not associated with any candidate.

[13] If a coalition of parties is formed before the elections, it is treated as one party. The only difference is the maximum number of candidates allowed to be in its list, as we discussed in the last paragraph.

2.2 The number of seats in the local councils

The rule setting the size of each municipal council has changed over time. Before the 2004 elections, the local legislators themselves set the legislature size, respecting caps defined by the federal Constitution.[14] These caps are defined as follows: municipalities with up to one million inhabitants must have between 9 and 21 legislators; in those with population between one and five million, the council size must be between 33 and 41 legislators; and localities with more than five million people must have from 42 to 55 legislators.

In 2004, the Brazilian Supreme Court (*Supremo Tribunal Federal* - STF) reinterpreted the law and set a principle of arithmetic proportionality to define the exact number of legislators a municipality should have, according to its population.[15] The rule respects the caps defined in the Constitution, but creates several intervals between these caps to determine the local council sizes in Brazil. The rule is exposed in Table 1. Municipalities with up to 47,619 inhabitants must have 9 legislators, those with population from 47,620 to 95,238 must have 10, and so on.[16] In 2008, after several judicial discussions on which would be the number of seats for each municipality in the coming elections, the federal electoral authorities established that the rule valid in 2004 would also be applicable to the 2008 local elections.[17]

It is important to notice that, although the 2004/2008 rule sets 36 population intervals to determine the council size, approximately 95% of the Brazilian municipalities have less than 95,000 inhabitants, being in the first 2 intervals of the rule (thus having 9 or 10 local legislators).

[14] Discussed in the 29th Article of the 1988 Federal Constitution.

[15] The Superior Electoral Court (*Tribunal Superior Eleitoral* - TSE) Resolution No 21.702/2004 instituted the new interpretation of the Supreme Court for the 2004 elections.

[16] The number of people that corresponds to 1 legislator, 47,619, was calculated based on the caps in the federal Constitution: dividing the population limit of the first interval (1 million) by the limit of the council size in this interval (21), it gives the value of 1 legislator per 47,619 inhabitants.

[17] The law changed again for the elections in 2012. A new resolution of the Superior Electoral Court gave back to the local councils the power to define its own number of legislators, respecting caps according to the municipalities' population. Although similar to the rule valid before 2004, the new one sets much more population intervals.

2.3 Women in Brazilian politics

Although some gender gaps, such as educational enrollment and life expectancy, have recently closed in several societies, the gender inequality in political representation remains an important issue in many countries.[18] According to Quota Project (2014), for example, women constitute 20.4% of the members of parliaments around the world. And World Bank (2012) states that the situation is particularly striking in the Middle East and North Africa, where only 1 parliamentarian in 10 is a woman.

In Brazil, women's political participation is also a critical issue. Despite the fact that the current president is a woman, less than 10% of the 513 federal deputies elected in 2010 are female. Furthermore, women represent 2 out of the 26 state governors elected in the same elections. In local politics, the gender gap is also high, as we show in Figure 1. First, the average percentage of female candidates in the last local elections was 12.9%, and only 11.5% of the municipalities elected a woman as mayor. For the municipal councils, it is worth noticing that the average percentage of women among the set of candidates has increased in the last elections. This is probably due to a greater enforcement of a 1997 law which states that each coalition's list of candidates shall contain a minimum of 30% and a maximum of 70% of candidates of each gender. Nonetheless, we show that the average percentage of seats held by women in local legislatures continues considerably low, and did not present an upward trend in the last years.

3 Data and Estimation Strategy

3.1 Electoral and Municipal Data

In order to evaluate how the number of local legislators affects the electorate representation in Brazilian municipalities, this paper uses as its main data source the microdata from

[18] See World Bank (2012) for a complete analysis of gender inequalities around the world.

the Superior Electoral Court (*Tribunal Superior Eleitoral* - TSE). It contains information about all the candidates running in the elections that we study, allowing us to analyze both the pool of candidates and the pool of politicians elected. It also contains other important electoral data, such as information on citizens' party affiliation, the number of votes each candidate has received, and the abstention rate in each municipality.

Since the number of seats in local councils in the elections of 2004 and 2008 was defined based on the municipal populations of 2003 and 2007, this information is also very relevant for our analysis. This data is provided by the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatistica* - IBGE), an independent national institute. IBGE annually reports the population size of Brazilian municipalities, although population counts are not performed every year. When IBGE does not perform population counts, it reports population estimates based on information contained in the previous count and in the most recent reports on births, mortality, and immigration rates.[19] It is important to reinforce that these estimates are calculated by IBGE, and not by each municipality individually, making its manipulation very unlikely.[20] For our study, we obtain the information on population sizes in the 2007 Population Count and in the 2003 inter-census Population Estimates.

Lastly, since our main result is a significant increase in women's political representation, we gather data from several additional sources to analyze how these changes in the electorate representation impact public policy decisions. Therefore, the data sets we use provide information on policies related to feminine preference for the municipal administration mandates considered in this study (2005-2008 and 2009-2012). First, for the analysis on municipal public finance indicators, we use the National Secretary of Treasury's database (FINBRA),

[19] Population counts in Brazil are performed in the IBGE Demographic Census, conducted every ten years, and in the IBGE Population Count, conducted in between census years. The last two waves of the Demographic Census were performed in 2010 and 2000, and the last two Population Counts happened in 2007 and 1996. The population estimates are reported every year since 1991, excepting those years when Demographic Census or Population Counts are performed. Methodological notes on the population estimates can be found in http://www.ibge.gov.br/english/.

[20] We return to this issue in subsection 3.3, where we discuss some concerns for our identification strategy.

which contains annual data on municipal spending and revenues by categories. We also use the information on the number and gender of all local councils' servers, provided by the 2005 Census of Brazil's Municipal Councils. Collected by a sub-secretary of the Brazilian Senate (*Interlegis*), this is the only official census of municipal councils in Brazil. Another policy outcome that we analyze is children's enrollment in day care centers, since we believe it could be affected by the increase in women's participation in politics. Thus we gather data from the 2007 and 2011 waves of the Annual School Census, which is collected by the Ministry of Education and includes all schools in Brazil. We also investigate the impacts on prenatal health services, whose data is provided by the information systems of the Data Processing Department of the Unified Health System (DATASUS), from the Ministry of Health. The Information System on Live Births (SINASC) annually provides pregnant health outcomes data, such as the number of prenatal medical visits and the number of births considered premature, while the Information System on Mortality (SIM) provides the yearly number of fetal and infant deaths in each municipality. Additionally, the Hospital Information System (SIH) contains information on the number of women admitted to hospital for treatment of injuries from aggression. For the examination on the participation of women in the formal workforce, we obtained the data from the Annual List of Social Information (RAIS), a data collection instrument from the Brazilian Ministry of Labour and Employment which provides information of occupation by gender in each Brazilian municipality. Finally, the 2006 and 2011 waves of the IBGE survey on public administration (MUNIC) provide information on various aspects of municipal administration that could be related to a greater representation of women, such as the existence of maternity hospitals in the municipalities and the gender of the municipal health secretary.

3.2 Identification Strategy

The focus of this paper is on the analysis of how the legislature size impacts the electorate representation, and how it affects public policy. Obtaining these effects is a challenging task,

because of the difficulty of identifying a causal relation between the size of local legislatures and the variables we are interested in. The endogeneity of political institutions is always an important concern in the empirical research in political economy.[21]

For a better explanation of the endogeneity issues in our context, we use the counterfactual framework pioneered by Rubin (1974).[22] We are interested in the causal effect of a binary intervention: an increase by one in the number of local legislators.[23]

Define $Y_i(0)$ and $Y_i(1)$ as the pair of potential outcomes for municipality i: $Y_i(0)$ is the outcome without treatment and $Y_i(1)$ is the outcome of municipality i with an additional legislator. Although our interest is in estimating the average difference in potential outcomes, i.e. $E(Y_i(1) - Y_i(0))$, we can never observe both $Y_i(0)$ and $Y_i(1)$ for a certain municipality. If $W_i \in \{0, 1\}$ defines whether the treatment is received or not, with $W_i = 1$ if municipality i received an additional legislator and $W_i = 0$ otherwise, we can write the outcome observed as $Y_i = (1 - W_i) \cdot Y_i(0) + W_i \cdot Y_i(1)$.

A simple comparison between municipalities with different number of legislators, i.e. $E(Y_i(1)|W_i = 1) - E(Y_i(0)|W_i = 0)$, would generate unbiased estimates of $E(Y_i(1) - Y_i(0))$ only if the treatment indicator W was statistically independent of $(Y(0), Y(1))$. In our case, however, the treatment is given to municipalities with larger population, which could be correlated to the potential outcomes $(Y(0), Y(1))$. Therefore, we need a different approach to our estimations.

To properly address the endogeneity concerns, we exploit the credibly exogenous source of variation on the size of local legislatures in the elections of 2004 and 2008 in Brazil. As explained in Section 2 and exposed in Table 1, the number of legislators of each city in these two elections was a deterministic and discontinuous function of the municipal population size, enabling the use of a sharp Regression Discontinuity (RD) approach. Since more than

[21] See Acemoglu (2005) for a discussion on problems and challenges facing empirical work in political economy.

[22] See Imbens and Wooldridge (2009) for a survey on the use of Rubin Causal Model (RCM) in the economic literature.

[23] The following explanation is based on Imbens and Lemieux (2008).

95% of Brazilian municipalities have less than 95,000 inhabitants, the focus of our analysis is on the discrete and discontinuous change from 9 to 10 local legislators, which happens at the cutoff point of 47,619 inhabitants.

The basic idea behind this design is that assignment to treatment is completely determined by the municipality's population being on either side of a fixed threshold (47,619 inhabitants). That is, W is a deterministic function of the treatment-determining variable X, defined as the number of inhabitants. Therefore, we can formalize the assignment to treatment as:

$$W_i = 1[X_i \geq 47,619] \tag{1}$$

Municipalities with population of at least 47,619 receive the treatment (1 additional seat in the legislative), and those with population lower than 47,619 are assigned to the control group. To estimate an average causal effect of the treatment, we look at the discontinuity in the conditional expectation of Y given X: $\lim_{x \downarrow 47,619} E(Y_i|X_i = x) - \lim_{x \uparrow 47,619} E(Y_i|X_i = x)$. This is interpreted as the Local Average Treatment Effect (LATE) at the discontinuity point, which we call τ:

$$\tau = E[Y_i(1) - Y_i(0)|X_i = 47,619] \tag{2}$$

This approach addresses the endogeneity problems we discussed, and our empirical strategy estimates τ. Potential concerns of this strategy are discussed in the following subsection.

3.3 Estimation

The most direct way to estimate τ for a series of outcomes of interest would be comparing the values of the dependent variables of observations in small intervals on either side of the threshold. However, due to the limited number of observations in those small intervals, this non-parametric approach would present a low statistical power.

In order to overcome this issue, we use as our main specification a parametric strategy consisting of estimating two separate regressions on each side of the threshold and comparing the predicted value of their dependent variable at the cutoff point.[24] The most direct way of doing this is to run a pooled Ordinary Least Square regression on both sides of the cutoff point, as suggested by Lee and Lemieux (2010) and represented by the following equation:

$$Y_i = \beta_0 + \tau W_i + g_1(X_i - \overline{c}) + W_i g_2(X_i - \overline{c}) + \epsilon_i \tag{3}$$

where W_i is a dummy variable indicating whether the observation i is on the left ($W_i = 0$) or on the right side ($W_i = 1$) of the cutoff, X_i is the population of municipality i, $\overline{c}$ is the first threshold set by the rule ($\overline{c} = 47,619$), and $g_1(\cdot)$ and $g_2(\cdot)$ are third order polynomials. The parameter of interest is τ, which in our case gives the causal effect on Y_i of increasing the number of local legislators from 9 to 10.

As we only focus on the first discontinuity set by the rule, we restrict our sample to municipalities with population up to 95,238 inhabitants (the second threshold). Also, as the rule was valid in the elections of 2004 and 2008, we pool the observations from those years to run the regressions, and cluster the standard errors at the municipal level.

A relevant concern for our empirical strategy is whether there are other policies determined by the same threshold in the population, or determined by cutoff points close to the one we are focusing on. The existence of these other policies could lead us to false conclusions about the impacts of the number of local legislators. The first issue is not a problem in our context, since the population cutoff we analyze only defines the local council sizes. Nevertheless, two other policies are determined following rules based on the municipalities' population, although there are reasons to believe that they do not drive our results.

First, the wages of local legislators are determined following a rule based on some popu-

[24] Results from the non-parametric approach and from further specifications are presented as robustness checks in Section 5 .

lation cutoffs. The law specifies caps for the salary that the legislators define for themselves, as we show in Panel A of Table 2.[25] Although the cutoff points are not the same from the ones we are studying, the first 2 thresholds in the wage's rule are in the interval of cities that we consider, and one of them (50,000) is close to the one we are examining (of 47,619 inhabitants). In Panel B of Table 2, we present population intervals according to both the law defining the number of legislators and the one defining the caps on salaries, in order to clearly expose the discontinuities caused by these rules. For each population interval, we report the number of legislators established by the law, the limits on legislators' salaries and the number of municipalities in our sample. Since the legislators' income could have some effects on variables that we analyze and we are doing a parametric estimation fitting polynomials on both sides of the discontinuity point, we only use in our sample municipalities with more than 10,000 inhabitants, the first threshold of the wage's rule.[26] Our sample thus consists of municipalities with population from 10,000 to 95,238 inhabitants, in the elections of 2004 and 2008, giving a total number of observations of 5,282.[27] Furthermore, the robustness check section argues that the effects we find are indeed in the threshold that we analyze, and not in the one set by the rule which determines salaries limits.

Second, federal transfers to municipal governments also vary according to various population cutoffs, and two of these thresholds (of 44,148 and 50,940 inhabitants) are close to the one we analyze (of 47,619). However, we believe this is of less concern. As shown by Ferraz and Finan (2011), due to misassignments around the population thresholds and the possibility of manipulation, the block grant actually received by each city is much more continuous across cutoffs than it would be expected. Furthermore, in a paper studying this specific type of transfer, Brollo et al. (2013) finds no visible jump in observed transfers at the

[25] The already cited work by Ferraz and Finan (2011) uses the discontinuities generated by this rule to estimate with a Fuzzy Regression Discontinuity approach how local legislators' wages affect competition for office, political entry, and political performance.

[26] Results for the complete sample are shown in the validity tests in Section 5.

[27] For some variables that we use as dependent variables, we have missing data for some municipalities. Because of that, the number of observations may vary slightly from one regression to another.

44,148 threshold.[28] Therefore, we are confident that the cutoff points of 44,148 and 50,940 inhabitants in the law defining federal transfers to municipal governments do not confound our results. Even so, it is important to say that in Section 5 we perform a non-parametric estimation using only municipalities just around the cutoff point of 47,619, thus isolating our results from the effects of these other discontinuities.

Another potential concern for our strategy is whether the rule determining the number of legislators was actually respected by Brazilian municipalities. In Figure 2, we plot the council size against the population for all the observations in our sample to show that the electoral law was indeed respected and created a sharp discontinuity in the legislature size. We can notice that the probability of treatment jumps from 0 to 1 at the cutoff point.[29]

The possibility of auto-selection around the threshold is also an important issue in regression discontinuity designs. Nonetheless, auto-selection is highly implausible in the political context we analyze, since municipal populations were not self-declared, but estimated by the independent national institute IBGE, as explained in subsection 3.1. Furthermore, as we have already stated, the electoral authorities established the rule valid in the 2004 and 2008 elections only in the respective years of the elections. Since the number of seats in each local legislature in those elections was based on the 2003 and 2007 municipal populations, municipalities did not know the rule which defined the council sizes before the publication of the population estimates. Manipulation is, therefore, very unlikely. Even so, we perform a statistical test to check for this possibility. Following McCrary (2008), we plot in Figure 3 the density of the population of municipalities in our sample. If the density was not continuous at the cutoff point, municipalities could be manipulating their population counts to benefit from a larger legislature. However, the density appears continuous at the threshold, show-

[28] The authors restrict their sample to municipalities with less than 50,940 inhabitants.

[29] 0,6% of the total number of observations in our sample did not respected the law. This happened specifically in the election of 2008. Those municipalities were prosecuted by electoral authorities and, in some cases, had to adapt their number of legislators after the election. Important to say that some of them elected more legislators than foreseen by the law, while others elected less. As it was a judiciary issue and the number of observations is almost irrelevant, we simply ignored those municipalities in our regressions. Results do not change when we include them, and are available upon request.

ing no evidence of non-random sorting. Additionally, in order to complement this analysis, Section 5 also presents the results of some tests that indicate that our sample is balanced around the threshold.

To sum up, we are confident that our empirical strategy indeed estimates the causal effects of interest: the impacts of increasing the number of seats in the local councils from 9 to 10.

4 Main Results

This section reports and discusses the main findings of the empirical specification presented in the last section, and it is divided in four subsections. The first subsection presents the effects of the number of seats in the local council on the candidates' entry in elections and on the pool of candidates running for office. Then we report the estimates for elections results and the pool of elected officials, where our main result is the increase in women's participation in politics. In a third stage, we show that the council size also affects the election for mayor, which occurs simultaneously to the legislative one. Finally, we present evidences that the greater representation of women has effects on policy outcomes.

4.1 Political Entry

Since the focus of this study is on the relationship between the local councils' size and electorate representation, the first step of the analysis is to examine how the number of seats in the legislatures affects the candidates' entry in municipal elections. Table 3 reports the results of our main estimation (Equation 3) for this entry stage. We begin by investigating whether the increase in the number of seats in the local council influences the number of citizens affiliated with a political party and the formation of parties or coalitions in the municipalities. It is important to reinforce, however, that the rule determining the number of legislators in each municipality was confirmed close to the elections of 2004 and 2008, as

discussed in Section 2. Therefore, the affiliation of citizens and the formation of parties to run in the municipal elections of 2004 and 2008 happened before the establishment of the rule which redefined the number of legislator of each locality, so they should not be affected in our context. Results for these estimations are shown in columns 1 to 3 of Panel A (Table 3) and indicate no discontinuous jump in these variables at the cutoff point, as expected.[30,31]

The stage where parties choose their set of candidates among their affiliates, on the other hand, happens only four months before the elections in Brazil, meaning that parties could adjust their set of candidates in response to the establishment of the law defining the number of seats in each council. There are two main reasons why the number of candidates running for office might be affected by the legislature size. First, as local legislators are selected under a proportional representation system, a greater number of seats in the council mean that each candidate needs a lower proportion of votes to be elected. This may increase the number of affiliated citizens motivated to run for office, since they can see greater chances of being elected. Second, as we discussed in Section 2, the cap on the number of candidates for each party or coalition is defined according to the council size. Therefore, an increase in the number of seats elevates the maximum number of candidates that each party or coalition may include in its list.[32]

We investigate whether the legislature size affects the number of candidates running for office and report the result in column 4 of Panel A (Table 3) . The estimation suggests that an increase in the number of seats in the legislature from 9 to 10 elevates the number of candidates running in the elections. Although this estimate is not statistically different from zero in our main specification, the increase in the total number of candidates is statistically

[30] A significant result in these estimations could mean that citizens and political parties anticipated the establishment of the new rule determining the council size by distinct population thresholds.

[31] We also checked if there is an asymmetric effect between genders in the number of citizens affiliated with political parties before and after the elections. The estimates were not statistically different from zero and are available upon request.

[32] We have checked that these limits are indeed binding for some parties or coalitions in municipalities whose populations are in a small interval on the left of the threshold. In average, those municipalities present 2.65 parties or coalitions that have offered the maximum number of candidates allowed. Additionally, there is no discontinuous change on this value at the cutoff point.

significant in the other functional forms we use, as will be better discussed in Section 5 and is reported in Table 9. An interesting observation is that the proportional increase in the number of candidates running is of 11%[33], equal to the proportional increase in the number of seats (11.1%). This means that the number of candidates per seat does not change at the cutoff point, as we expose in column 5 of the same Panel.

As our main interest in this article is in the effects of the council size on the electoral representation of women, we also investigate if the reported increase in the number of candidates is asymmetric between genders. This is consistent with conceptual frameworks in which women face some political barriers in their entry decision, as in the theoretical models of Bhalotra et al. (2013) and Casas-Arce and Saiz (2011). The estimates of this analysis are reported in columns 6 and 7 of Panel A (Table 3) and show that, while the number of male candidates jumps 12.4% at the cutoff point (column 5), the number of female candidates is not significantly altered by the increase in the council size (column 6). We further examine these findings by showing that the larger number of male candidates is driven by the entry of citizens who did not participate in the previous election (column 1 - Panel B), whereas the number of female candidates who did not participate in the previous election is not affected by the increase in the number of seats (column 2 - Panel B). This means that the set of female candidates does not change with the increase in the council size, but the set of male candidates is enlarged with the entry of new competitors.[34]

Additionally, we look at the pool of legislators at the time of the elections in order to check if the number of seats to be filled in the elections has any effects on the percentage of legislators running for reelection.[35] This variable may be affected by the council size, since candidates know they need to attract a lower proportion of votes to be elected when the

[33] This is the marginal increase, 11.29, divided by the average at the cutoff point, indicated in the table.

[34] Another possibility is to use as dependent variables the percentages of candidates of each gender who did not participate in the last election, instead of using their absolute number. When we do it, we see an increase of 3.9 p.p. in the percentage of male candidates who are new entrants (from 59.8% at the cutoff point), while we find a negative but non-significant coefficient of -2.2 p.p. for female candidates (from 76.1% at the cutoff point).

[35] There is no term-limit for local legislators in Brazil.

number of seats being disputed is larger. The results are presented in columns 3 and 4 of Panel B (still in Table 3). First, it is interesting to notice that municipalities just before the cutoff point have, in average, 75% of their local legislators trying to be reelected, regardless of the politician's gender. Our estimations suggest no significant impact of the council size in these rates, although it is worth noticing the distinct coefficients for male and female legislators.

Continuing to expose the results for the political entry, we use a set of available electoral information to check other possible effects of the council size on the pool of candidates. Columns 5, 6, and 7 of Panel B present, respectively, no significant effect in the share of candidates from the incumbent mayor's party, the average age, and the average level of schooling for the pool of candidates.[36]

Therefore, with the data available, our estimations suggest that the number of seats affects the pool of candidates only in the gender dimension, increasing the number of male candidates while not altering the number of female candidates.[37]

4.2 The Elections Results and the Pool of Elected Legislators

After showing how the number of seats for the local council affects the entry of citizens in politics, we now turn to the effects on the elections results. We present them in Table 4.

The first investigation is on the participation of citizens in elections, by verifying whether municipalities in each side of the cutoff point present different abstention rates. This analysis is motivated by the fact that the greater number of candidates in those municipalities with larger legislatures may foster the political debate and increase the chances of citizens feeling represented by candidates, thus attracting more people to participate in the elections. The estimate reported in column 1 of Panel A (Table 4) is consistent with this hypothesis, since

[36] We also constructed different measures for the candidates' age and education, such as percentage of candidates with more than 60 years old and the percentage of illiterate candidates. We found no effect for those variables as well. Results are available upon request.

[37] It is possible that the council size affects the entry decision of candidates from other under-represented groups, but we do not have the necessary data to test it.

it shows that the number of seats in the local council is negatively related to the abstention rate in elections. Unfortunately, however, our data does not allow us to differentiate between the abstention of men and women, to check there is an asymmetric effect in those rates.

Beyond the abstention rate, we also investigate if the share of invalid votes has a discontinuous jump at the cutoff point.[38] The result reported in column 2 shows that the council size has no impact in this variable. This means that, despite the fact that more citizens decide to participate in politics, the share of the electorate who actually chooses a candidate or party does not change.

Next, we start to analyze the possible different impacts of the council size on the election results for men and women. It is important to remember a relevant result presented in the last subsection: the increase in the number of seats in the council elevates the number of male candidates, while not altering the number of female candidates. That said, we begin the analysis by separately calculating the percentage of total valid votes cast for candidates of each gender and reporting in columns 3 and 4 of Panel A (Table 4) that they show no discontinuous change at the cutoff point. This indicates that a group of voters is not attracted by the new male entrants and keep voting for women despite the greater number of male candidates. Therefore, the evidences presented mean that a greater number of male candidates compete for the same share of votes when the number of seats in the legislature is increased by one, suggesting a greater competition among men.

In order to show that the male candidates indeed face a greater competition when the number of seats in the legislature is increased, we first present in columns 5 and 6 of Panel A that the average number of votes individually received by male candidates is reduced by approximately 16% at the cutoff point, while there is no significant effect on the average number of votes individually received by women. More importantly still, we calculate the Herfindahl-Hirschman Index (HHI) for the votes received by men and women, to evaluate what happens with the concentration of votes on candidates of each gender at the cutoff

[38] Refer to Section 2 for the definition of invalid votes in Brazilian elections.

point.[39] The impacts on these variables are reported in columns 7 and 8 of Panel A, which show a discontinuous decrease in the concentration of votes among male candidates, and no effect on the concentration of votes among female candidates. We interpret these findings as evidences that, in our context, the increase in the number of seats in the legislature boosts only the competition among men. Therefore, male candidates "cannibalize" votes from each other, which raises the chances of women being elected to the council.

In Panel B of Table 4, we show how these electoral results influence the pool of elected legislators. The first column shows that there are, on average, more parties elected in municipalities with more legislators, suggesting a more diverse representation of society. Results reported in columns 2 and 3 indicate that there is no change in the elected officials average age and months of education at the cutoff point.[40].

The remainder of Panel B reports our main findings: women's participation in politics is elevated by a larger council size. First, it can be noticed in columns 4 and 5 that the estimates for the reelection rates of male and female politicians are quite different, although both are not statistically significant.[41] We view this result as a first evidence of the increased chance of election for female candidates, already explained above. Most importantly, with the rise in the number of seats in the local legislature, the average number of women elected increases almost 50% (column 6), in a political context where female officials are a minority group[42]. This means a significant increase in the percentage of the legislature filled by women (column 7). We also show, using a Linear Probability Model[43], that the probability of electing at least 1 woman to the council increases 20 percentage points (or 44%) at the cutoff point (column 8).

[39] The Herfindahl–Hirschman Index is an statistical indicator of concentration, used to measure competition in a variety of contexts. In this paper, the HHI is used as a measure of political competition among candidates. The index was calculated separately by gender, by summing the squares of each candidate's individual vote share based on the total votes received by candidates of the respective gender.

[40] Again, we checked other measures of education and age of the legislators elected, and found no impact of the council size on these dimensions. Results are available upon request.

[41] The reelection rate is calculated as the percentage of candidates trying reelection who got reelected.

[42] Subsection 2.3 contextualizes the participation of women in Brazilian politics.

[43] We use as the dependent variable a dummy indicating whether there is at least one woman as a legislator in the municipality.

Our results thus indicate that the number of local legislators affects the participation of women in the legislatures, suggesting a greater representation of the feminine electorate. This is an extremely important finding for the discussion on how to enlarge the participation of under-represented groups in the decision-making processes.

Next, we report that the increase in legislature sizes has indirect effects on the elections for the local executive power, which occurs simultaneously to the legislative elections.

4.3 The Mayor's Elections

As the elections for mayor are held at the same time as the elections for the legislature, we use our empirical strategy to verify if the council size has any impact on the political competition for the executive power and on the characteristics of the elected mayor. This investigation is motivated by possible indirect effects: changes on electoral abstention, on the pool of candidates, campaign spending, and parties' strategies in the legislative election might affect the simultaneous elections for mayor.

Table 5 presents our estimations. We report, in column 1, that the number of candidates running for mayor is increased by approximately 10% when the number of seats in the legislature goes from 9 to 10, indicating that citizens have more options for whom to vote in those municipalities with a larger council. In order to confirm that this result indicates an increase in the electorate's representation, we show in column 2 that the HHI of votes on candidates for mayor is reduced at the threshold, meaning that those new mayor's candidates indeed cause an impact on the distribution of votes.

The most interesting result of Table 5, however, is that the increased feminine participation in politics caused by the larger number of legislators also exist for the mayor's elections, reinforcing our results of a change on the women's political representation. Columns 3 and 4 report a significant effect on the entry of female candidates running for mayor, which we didn't observe in the legislative election (shown in Table 3). The other columns present the results for the selected official. In column 5 we show that the probability of having a woman

elected as a mayor is increased by 13 percentage points at the cutoff point when we do not control for the presence of a female candidate, and this elevation is of 22 percentage points when we do control for it (column 6).

In conclusion, these results reinforce the evidences that the number of legislators in a municipality affects the electorate representation, augmenting the female participation in the decision-making process.

4.4 Policy Outcomes

Based on the results reported so far, a natural investigation is to check whether the increase in women's participation in politics impacts policy outcomes. This is motivated by theoretical models in which male and female politicians have distinct preferences over policies, as in Chattopadhyay and Duflo (2004), and by empirical articles that reinforce these ideas, such as Brollo and Troiano (2013), Miller (2008), Iyer et al. (2011), and Clots-Figueras (2012).

We begin by examining the effects of a larger council size on local public finance outcomes, and report them in Table 6. In those estimations, our dependent variable is the logarithm of the expenditure or revenue analyzed for the 3 years following the elections. As indicated in the table, we include as control variables in some regressions the logarithm of the total municipal revenue and total municipal expenses for the 3 years following the elections, in order to have a clear *ceteris paribus* interpretation of our effects. Moreover, the different number of observations across the columns of Table 6 is due to data availability, since FINBRA, the data source for fiscal variables, does not provide information for all municipalities.[44]

Panel A of Table 6 shows that the council size has no effect on total expenditure or total revenue (columns 1 to 4). These results contrast with those presented by Pettersson-Lidbom (2012), which shows that the number of local legislators in Sweden and Finland decreases the size of local governments. In the same Panel, columns 5 to 7 show that the increase in the

[44] Our main results reported so far are not sensitive to the inclusion/exclusion of observations whose information on public finance are not provided by FINBRA.

number of seats in the councils from 9 to 10 has no impact on the expenditures specific to the legislature. This is a very interesting finding, since it would be expected that the additional legislator would require additional expenses. We believe this result is a consequence of a Constitutional Amendment which established, for municipalities with population up to 100,000 inhabitants, a limit of 8% of the total revenue to be spent in the local legislatures. Therefore, it seems that the rule is being enforced. In order to complement this analysis, we use data from the 2005 Census of Brazil's Municipal Councils to investigate a possible channel through which the local councils might adjust their expenditures to respect the law. We do it by checking if the number of council servers presents a discontinuous change at the cutoff point. Column 8 of Panel A shows that this effect indeed exists: the number of people working in the legislatures decreases by 7.1 at the cutoff point, from a mean of 19.9 in the municipalities in a small interval on the left of the threshold.

Panel B of Table 6 reports estimations showing that variables that could be related to women's preferences are significantly affected by the number of local legislators. These findings, together with some results presented in following tables, suggest that the increased participation of women in the decision-making process, induced by larger legislatures, impacts policy outcomes in the municipalities. Still using the legislative census of 2005, we show in column 2 that the ratio of female servers to male servers in the legislature is increased at the cutoff point. In columns 3 to 8, we continue the investigation on the impacts on municipal public finance and report the estimates for two expenditures which are frequently associated with female preferences: columns 3, 4, and 5 show an approximate increase of 70% in the expenditures on childcare and preschool (education of children from birth to 5 years old), while columns 6, 7, and 8 show an increase of around 38% in the expenditures on community assistance.[45]

Table 7 continues the analysis for policy outcomes associated with women's preferences. First, motivated by the increase in the expenses on daycare and preschool, we show in the

[45]Each of these 2 expenditures correspond to approximately 2% of the total expenditures.

first column of Panel A that the number of children enrolled in day care centers in the third year following the elections presents a large discontinuous jump at the cutoff point. We believe this is closely related to the increase in the political representation of women. Female governors may emphasize early childhood education, since it can be considered a critical issue to the participation of women in the workforce and to equality of genders.[46]

Another set of public policies intuitively associated with women's preferences are health services related to prenatal care. Therefore, we investigate whether the greater women's political representation as a consequence of a larger council size impacts the provision of these services. The first outcome we examine is the number of births in the three years following the elections, which could be affected by an increase in birth control programs.[47] Column 3 shows that this variable presents a significant discontinuous decline of 9.2% at the cutoff point, indicating that a larger female participation in policy making can foster contraception and fertility controls. Continuing with the investigation, the estimate in column 4 suggests a larger share of pregnant women receiving 4 or more prenatal visits from public authorities in the three years following the elections, and columns 5 and 6 indicate a lower number of births in which the child was born premature and with less than 2,500g.[48] Although these estimates are not statistically significant, it is important to notice that they all point in the same direction, indicating improvements on prenatal care services. Moreover, we show in the first four columns of Panel B (still in Table 7) a relevant decrease at the threshold in the number of fetal and infant deaths in the 3 years following the elections, which we also associate with better pregnancy and post-partum services provided.[49] While columns 1 and

[46] Our estimations, however, show no impact on the women's share of the workforce in the years following the elections (column 2 of Panel A).

[47] The number of births could also be affected by an increase in the participation of women in the workforce, but we have already shown in column 2 that we find no effect on this variable.

[48] We consider the number of premature live births and the number of live births in which the child was born with less than 2,500 g as outcomes which are hard to change in the short-run. For this reason, we use the value for the third year after the elections, instead of the total of the 3 years following them. Furthermore, we use the *Number of live births* as a control variable in these 2 regressions, in order to obtain a ceteris paribus interpretation of our results.

[49] Fetal death refers to the death of a fetus at any time during pregnancy, and infant death is the death of a child less than one year of age.

2 report the result for the absolute number of fetal and infant deaths, columns 3 and 4 show the treatment effect estimate for the ratio between the number of fetal or infant deaths and the number of births.[50]

We also examine whether the violence against women is affected by their increased political representation. This analysis is motivated by Iyer et al. (2011), which investigates the relationship between female representation in Indian local governments and crime outcomes. The result is presented in column 3, which shows a negative (but non-significant) effect on the number of women admitted to hospital for treatment of injuries from aggression in the three years following the elections. Although not statistically different from zero, the magnitude of the coefficient is considerable: it indicates a decrease of 4.16, from an average of 4.6 in a small interval on the left of the threshold.

Finally, we use information available in the IBGE survey about municipal administration (MUNIC) to analyze other possible effects of the increased women's representation.[51] They are presented in the remainder of Panel B, Table 7. Column 4 reports an increase in the probability of the local administration considering, in 2006, the expansion of care services for students with special needs as one of its five main goals. In column 5, we show that the probability of the municipal health secretary being a woman rises discontinuously at the cutoff point, indicating that an increase in the number of female politicians may also influence the appointment of women to other key positions in the community. And the last column of Panel B shows an increase in the probability of a municipality having a maternity hospital, a result consistent with the already reported findings of improves in prenatal care.[52]

To summarize, our RDD estimates present evidences that the number of local legislators

[50] As we have shown a decrease in the number of births (column 3 in Panel A), the estimations for the ratio between fetal or infant deaths and the number of births are important to prove our result. This is because the absolute number of fetal or infant deaths could be related to the decrease in the number of women pregnant.

[51] This survey does not contain the same set of information every year, so we use the available information in our estimations.

[52] In columns 5 and 6, the results are for the 2011 survey and they only consider the municipalities that have elected at least one woman as a local legislator. Furthermore, both regressions control for the percentage of women in the population.

affects policy decisions, particularly in those outcomes that may be associated with feminine preferences. We believe this result is caused by the impacts of the legislature size on the participation of women in local politics, both in the executive and legislative powers, as showed in subsections 4.2 and 4.3.

The final step of our empirical exercise is to show that our results are robust and consistent.

5 Robustness checks

In this section, we perform some tests to validate our parametric RDD estimations presented in Section 4. We begin with a visual inspection of our main findings, in Figures 4 and 5. In each graph, the outcome of interest is plotted against the estimated population of the municipalities, centered in the threshold of 47,619 inhabitants. Scatter points represent the mean of the outcome for municipalities within bins of 1,666 inhabitants (3.5% of 47,619), and a third order polynomial is fitted on the original data at each side of the vertical threshold. As expected, the scatterplots and the fitted third-order polynomial exhibit clear discontinuities at the cutoff point.

A first concern with our empirical strategy is whether there are, besides the number of legislators, other determinants of women's participation in politics and policy outcomes that are also discontinuous at the cutoff point of 47,619 inhabitants. In Section 3, we stated that no other policy is determined by this threshold, we discussed other policies defined by population cutoffs, and we reported that the density of municipal population in our sample is continuous at the threshold of 47,619 inhabitants (Figure 3). Now, we complement this analysis by testing if some observed baseline variables are "locally balanced" on either side of the threshold. In case of unbalance, the difference in these baseline varibales could be driving our results, thereby weakening our conclusions. In order to test for it, we use a vast

set of municipal characteristics for the year of 2000 and estimate Equation 3.[53] However, as our empirical strategy consists in a pooled OLS estimation with data from the same municipalities for 2004 and 2008, we cannot use our entire sample in those regressions. Otherwise, municipalities would appear twice in the database, with the same information from 2000. To account for that, we separately regress Equation 3 using both the estimated population from 2004 and from 2008. Results are reported in Table 8 and suggest that our sample is well-balanced across the cutoff point for the distinct municipal characteristics and previous participation of women in politics. These results reinforce that the findings we presented in this article are direct consequences of the increase in the size of local legislatures.

Another relevant test to validate our results is to check whether they are also present when different functional forms are used in the estimations. This is important to guarantee that our conclusions are not particular to the choice of an arbitrary specification. As explained in Section 3, we obtained our baseline estimates using a third order polynomial in either sides of the threshold, with a sample consisting of municipalities with population from 10,000 to 95,238 inhabitants (which we call a limited sample). In order to validate this strategy, we also regress Equation 3 with a third order polynomial using a complete sample (municipalities from 0 to 95,238 inhabitants), and with a second order polynomial using both the limited and the complete sample. Additionally, we perform a simple t-test of the means of our outcomes in a small interval around the threshold.[54] This non-parametric exercise, although presenting lower statistical power, is very important for RDD estimations, because it is not affected by observations far from the threshold. It also isolates our results from possible confounding factors from policies determined by other population thresholds, such as the federal transfers to municipalities and caps on local legislators' salaries (both discussed in Section 3). The results for the most relevant outcomes are shown in Tables 9 and 10, which

[53] Most of the variables in this balance test comes from the 2000 Population Census. We also use some information provided by TSE from 2000 to check the balance in women's participation in politics. The only variable that is not from 2000 is the *Existence of a Radio Station*, which comes from the 2006 and 2011 waves of the IBGE survey on public administration (MUNIC).

[54] The interval used was of 2,380 inhabitants, equivalent to 5% of the cutoff point (47,619).

report similar estimates for a large part of those functional forms.

We also check if our results are not driven by the threshold set by the rule that defines the limits of legislators' salaries, which is 50,000 inhabitants. As discussed in Section 3, the existence of this other threshold close to the one we analyze could influence our estimations if the variables we study are also affected by the legislators' salaries. In order to account for that, we first run our main specification (third order polynomial) considering the cutoff point as being 50,000, instead of 47,619. We also perform a simple t-test of the means in a closed interval around the fictitious cutoff of 50,000 inhabitants. Table 11 presents these estimates. As can be clearly noticed, the effects of the council size that we find in our regressions do not appear in the estimations considering the threshold of the salary rule, confirming that our results are not affected by this other policy.

Lastly, we perform several placebo regressions in false thresholds in order to rule out the possibility that the effects we found in the threshold defining the council size are spurious. We begin by running our main specification in false cutoffs close to the the one we analyze (between 90% and 110% of the true cutoff value of 47,619). As Figures 6 and 7 show, the magnitude and statistical significance of the treatment effect for our most relevant outcomes are indeed maximized at the true threshold, which increases the confidence in our results. We complement this analysis with Figures 8 and 9. They report the t-statistics of our main regression (vertical line), together with the cumulative density function of the t-statistics from several RDD estimations at false discontinuities between 50% and 150% of the cutoff value, using increments of 0.1 percentage points.[55] We see these placebo regressions as an additional confirmation that our results are robust and consistent.

[55] This empirical exercise was based on falsification tests made by Della Vigna and La Ferrara (2010). In our case, we exclude the regressions ran in false thresholds in the interval between 90% and 110% of the cutoff value, since they are treated in Figures 6 and 7.

6 Conclusion

There is a growing literature on political economics studying how distinct institutions affect the electorate representation and influence the politicians' decisions. We contribute to this debate by empirically analyzing a specific institutional mechanism: the number of local legislators.

Our empirical strategy is based on a quasi-experimental source of variation in the council size of Brazilian municipalities in the elections of 2004 and 2008, when a constitutional amendment determined the legislature sizes as a deterministic and discontinuous function of the cities' population. The econometric evidences show that a larger number of local legislators affect the electorate representation by increasing the participation of women in local politics. Results also show, as a consequence of these effects on women's participation, impacts on the public provision of goods and services that could be considered to be preferred by women.

We believe this article contributes to two central discussions. First, deciding the optimum size of legislatures is extremely relevant in representative democracies, since it defines the number of politicians who represent the people. A low number of representatives may be associated with a low number of groups being represented in the political process, facilitating *pork-barrel* policies and corruption, and hindering the efficient allocation of resources. On the other hand, electing a large number of legislators might be very costly.[56] Our findings shed light on this debate by reporting evidences of a change on the electorate representation as a consequence of an increase in the number of legislators. Due to data availability, we only focused on the gender dimension, although other minorities may also have its representation in politics elevated by enlarging the local council. People tend to ignore these arguments when debating political representation in representative democracies. In our opinion, the size of legislatures should be included in the pool of institutional mechanisms believed to increase the participation of minority groups in the political process.

[56] The extreme limiting case is direct democracy, as discussed in Section 1.

The second important topic to which this paper contributes is the representation of women in politics. Several countries have been adopting institutional innovations to guarantee the equal gender political representation, and a set of articles have discussed this topic. As we show that women's participation in the decision-making process is affected by the legislature size and it impacts public policy, our results add to this literature, especially by analyzing an institutional mechanism not studied so far. Furthermore, the investigation of women's participation in politics in Brazil is interesting per se, because the country presents a considerably low feminine political representation.

Lastly, our evidences are also considerably relevant for the current discussion about Brazilian local politics, since the rule defining the council size has changed 3 times in the last 4 elections and it continues to be discussed. But more studies are needed to better evaluate the relationship between the legislature sizes, electorate representation and public policy, especially in other political contexts and for other underrepresented groups.

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Table 1: The number of local legislators - 2004 and 2008 elections

Population Intervals			No of Legislators	Population Intervals			No of Legislators
0	to	47,619	9	1,609,757	to	1,731,707	38
47,620	to	95,238	10	1,731,708	to	1,853,658	39
95,239	to	142,857	11	1,853,659	to	1,975,609	40
142,858	to	190,476	12	1,975,610	to	4,999,999	41
190,477	to	238,095	13	5,000,000	to	5,119,047	42
238,096	to	285,714	14	5,119,048	to	5,238,094	43
285,715	to	333,333	15	5,238,095	to	5,357,141	44
333,334	to	380,952	16	5,357,142	to	5,476,188	45
380,953	to	428,571	17	5,476,189	to	5,595,235	46
428,572	to	476,190	18	5,595,236	to	5,714,282	47
476,191	to	523,809	19	5,714,283	to	5,833,329	48
523,810	to	571,428	20	5,833,330	to	5,952,376	49
571,429	to	1,000,000	21	5,952,377	to	6,071,423	50
1,000,001	to	1,121,952	33	6,071,424	to	6,190,470	51
1,121,953	to	1,243,903	34	6,190,471	to	6,309,517	52
1,243,904	to	1,365,854	35	6,309,518	to	6,428,564	53
1,365,855	to	1,487,805	36	6,428,565	to	6,547,611	54
1,487,806	to	1,609,756	37	6,547,612		plus	55

Notes: This table exposes the rule defining the legislature size in Brazilian municipalities for the 2004 and 2008 elections. As can be noticed, the number of legislators varies according to 36 intervals in the municipalities' population.

Table 2: Cap on local legislators' salary

Panel A

Population	Cap on salary as a percentage of state legislators salary
0 to 10,000	20%
10,001 to 50,000	30%
50,001 to 100,000	40%
100,001 to 300,000	50%
300,001 to 500,000	60%
500,000 plus	75%

Panel B

Population Intervals	Number of local legislators	Cap on salary as a percentage of state legislators salary	Number of observations
0 to 10,000	9	20%	5,279
10,001 to 47,619	**9**	**30%**	**4,659**
47,620 to 50,000	**10**	**30%**	**45**
50,001 to 95,238	**10**	**40%**	**578**

Notes: Panel A of this table exposes the rule defining caps on the salaries of local legislators (Constitutional Amendment No. 25, 2000). The caps are defined as a percentage of state legislators' salary, which are defined as a percentage of the salary of federal deputies. In Panel B, we present population intervals according to both the law defining the number of legislators and the one defining the caps on salaries. For each population interval, we report the number of legislators established by the law, the caps on legislators' salaries and the number of municipalites (pooled for 2004 and 2008) in the respective interval.

Table 3: The Political Entry Game

Panel A	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Number of citizens affiliated to parties	Number of parties running	Number of coalitions running	Total number of candidates	Number of candidates per seat	Number of male candidates	Number of female candidates
Treatment effect	-27.87	-0.614	0.633	11.29	0.070	9.650*	1.644
	(0.599)	(0.455)	(0.260)	(0.110)	(0.925)	(0.056)	(0.462)
average at the cutoff	594.2	16.6	9.9	103.0	11.4	77.8	25.2
Observations	5,282	5,282	5,282	5,282	5,282	5,282	5,282
Panel B	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Number of male candidates not in previous elections	Number of Female candidates not in previous elections	% of male incumbents trying reelection	% of female incumbents trying reelection	% of candidates from the mayor's party	Average age of candidates (months)	Average educ of candidates (years)
Treatment effect	8.660**	0.619	-0.015	0.086	0.563	4.755	-0.031
	(0.020)	(0.729)	(0.594)	(0.242)	(0.656)	(0.260)	(0.896)
average at the cutoff	48	19.4	0.75	0.75	9.3	512.3	10.5
Observations	5,282	5,282	5,026	3,646	5,282	5,282	5,282

Notes: This table reports RDD estimates of the effects of the council size on political competition and the entry of citizens in politics. RDD specification with a third order polynomial in either sides of the cutoff point using a sample of municipalities with population from 10,000 to 95,238. *Number of citizens affiliated to parties* represents the number of citizens in the municipalities who became affiliated with a political party in the year before the elections. The 'average at the cutoff point' is calculated using 20 municipalities with population from 46,620 up to the threshold (47,619). Robust p-value in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level and *** at the 1% level.

Table 4: Elections Results and the Pool of Elected Legislators

Panel A	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Electoral abstention rate (%)	Invalid votes (%)	% votes received by male candidates	% votes received by female candidates	Average No.of votes on male candidates	Average No.of votes on female candidates	HHI of votes on male candidates	HHI of votes on female candidates
Treatment effect	-1.739**	0.020	-0.559	0.570	-47.96**	-11.38	-0.004*	0.005
	(0.025)	(0.950)	(0.615)	(0.608)	(0.056)	(0.577)	(0.095)	(0.758)
average at the cutoff	16.4	4.7	84.8	15.2	306.9	177.1	0.03	0.13
Observations	5,281	5,281	5,274	5,274	5,282	5,278	5,274	5,268

Panel B	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Number of parties elected	Average age of elected legislators (months)	Avg. level of education of elected legislators (months)	Reelection rate of male candidates (%)	Reelection rate of female candidates (%)	Number of women elected	% of seats filled by women	Elected at least 1 woman to the council
Treatment effect	0.604**	7.624	-1.687	-2.768	16.42	0.434**	3.356*	0.203**
	(0.025)	(0.356)	(0.708)	(0.447)	(0.103)	(0.025)	(0.095)	(0.016)
average at the cutoff	5.4	498.8	141.1	43	20.4	0.9	9.9	0.45
Observations	5,282	5,275	5,275	5,276	3,178	5,184	5,184	5,282

Notes: This table reports RDD estimates of the effects of the council size on elections results and on the pool of elected legislators. RDD specification with a third order polynomial in either sides of the cutoff point using a sample of municipalities with population from 10,000 to 95,238. The *Electoral abstention rate* represents the fraction of the registered electorate that abstained from voting. *Invalid votes* is the percentage of votes which did not go to a candidate or party (either blank or null vote). *HHI of votes on male (female) candidates* is the Herfindahl-Hirschman Index measuring the concentration of votes to the candidates of each gender. The *reelection rates* represent the reelection rate of candidates of each gender who ran for reelection. The 'average at the cutoff point' is calculated using 20 municipalities with population from 46,620 up to the threshold (47,619). Robust p-value in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level and *** at the 1% level.

Table 5: The mayor's election

	(1)	(2)	(3)	(4)	(5)	(6)
	Number of candidates for mayor	HHI of votes on candidates for mayor	Number of female candidates	Have at least one woman as candidate	Elected a female mayor (not conditional)	Elected a female mayor (conditional)
Treatment effect	0.342*	-0.041*	0.222**	0.180*	0.130**	0.223*
	(0.067)	(0.071)	(0.046)	(0.051)	(0.034)	(0.100)
average at the cutoff	3.3	0.46	0.30	0.26	0.09	0.33
Observations	5,316	5,316	5,316	5,316	5,316	1,473

Notes: This table reports RDD estimates of the effects of the council size on the Mayor's elections, which occur simultaneously to the legislative elections. RDD specification with a third order polynomial in either sides of the cutoff point using a sample of municipalities with population from 10,000 to 95,238. *HHI of votes on candidates for mayor* is the Herfindahl Hirschman Index measuring the concentration of votes to the candidates for mayor. The difference between columns 5 and 6 is that the estimation of column 6 only uses the municipalities which had female candidates for mayor. The 'average at the cutoff point' is calculated using 23 municipalities with population from 46,620 up to the threshold (47,619). Robust p-value in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level and *** at the 1% level.

Table 6: Impacts on policy outcomes - fiscal variables

Panel A	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log of Total revenue	Log of Current revenue	Log of Total Expenses (1)	Log of Total Expenses (2)	Log of Expenses on the legislative (1)	Log of Expenses on the legislative (2)	Log of Expenses on the legislative (3)	Number of servers in the council
Treatment effect	0.019	0.012	0.007	-0.012	-0.046	-0.074	-0.069	-7.078**
	(0.794)	(0.869)	(0.920)	(0.273)	(0.729)	(0.515)	(0.541)	(0.040)
Total revenue	*No*	*No*	*No*	*Yes*	*No*	*No*	*Yes*	*No*
Total expenses	*No*	*No*	*No*	*No*	*No*	*Yes*	*Yes*	*No*
Observations	4,681	4,681	4,681	4,681	4,162	4,162	4,162	2,067

Panel B	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	% of women among council servers	Council servers: ratio of female over male servers	Log of Expenses on childcare & preschool (1)	Log of Expenses on childcare & preschool (2)	Log of Expenses on childcare & preschool (3)	Log of Expenses on community assistance (1)	Log of Expenses on community assistance (2)	Log of Expenses on community assistance (3)
Treatment effect	4.067	0.923**	0.697*	0.712**	0.648*	0.393*	0.377*	0.367*
	(0.385)	(0.036)	(0.069)	(0.044)	(0.056)	(0.068)	(0.069)	(0.076)
Total revenue	*No*	*No*	*No*	*No*	*Yes*	*No*	*No*	*Yes*
Total expenses	*No*	*No*	*No*	*Yes*	*Yes*	*No*	*Yes*	*Yes*
Observations	1,989	1,934	4,357	4,357	4,357	4,520	4,520	4,520

Notes: This table reports RDD estimates of the effects of the council size on some fiscal variables. RDD specification with a third order polynomial in either sides of the cutoff point using a sample of municipalities with population from 10,000 to 95,238. The public finance variables *Log of Total Revenue*, *Log of Current Revenue*, *Log of Total Expenses*, *Log of Expenses on the Legislative*, *Log of Expenses on childcare & preschool*, and *Log of Expenses on Community Assistance* represent the aggregated value for the 3 years following the elections. Information on the council servers are available only for 2005. Robust p-value in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level and *** at the 1% level.

Table 7: Impacts on policy outcomes

Panel A	(1)	(2)	(3)	(4)	(5)	(6)
	Number of Children in day care centers	% of the workforce represented by women	Number of live births	% pregnant which received 4 or more pre-natal visits	Number of premature live births	Number of live births <2500 g
Treatment effect	126.7**	1.01	-217.8*	0.03	-5.25	-2.03
	(0.044)	(0.609)	(0.085)	(0.122)	(0.304)	(0.468)
average at the cutoff	338.9	43.4	2554.4	0.88	65.3	63.1
No of births 3 years after elections	*No*	*No*	*No*	*No*	*Yes*	*Yes*
Observations	5,282	5,274	5,282	5,274	5,268	5,274

Panel B	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Absolute number of fetal deaths	Absolute number of infant deaths	Fetal deaths over total births	Infant deaths over total births	Women admitted to hospital for aggression	Focus on special need students as main goal	Woman as health secretary in 2011	Have a maternity hospital in 2011
Treatment effect	-6.80***	-7.95**	-0.17**	-0.20**	-4.16	0.243**	0.222	0.234*
	(0.009)	(0.025)	(0.036)	(0.019)	(0.128)	(0.047)	(0.147)	(0.070)
average at the cutoff	34.0	43.9	1.32	1.7	4.6	0.46	0.25	0.5
% female pop.	*No*	*No*	*No*	*No*	*No*	*No*	*Yes*	*Yes*
Observations	5,282	5,282	5,282	5,282	5,282	2,622	1,864	1,864

Notes: This table reports RDD estimates of the effects of the council size on policy variables associated with women's preferences. RDD specification with a third order polynomial in either sides of the cutoff point using a sample of municipalities with population from 10,000 to 95,238. The variables represent the aggregated value for the 3 years following the elections, with some exceptions. *Number of premature live births* and *No of live births <2500g* are the values for the third year following the elections, since they are variables only changeable in the long run. *Focus on special need students as main goal* is available only in 2006 (for the mandate of 2005-2008), while *Have a maternity hospital* and *Woman as health secretary* are only available in 2011. The regressions for these last 2 variables (last 2 columns of Panel B) use only municipalities in each at least one woman was elected. The 'average at the cutoff point' is calculated using 20 municipalities with population from 46,620 up to the threshold (47,619). Robust p-value in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level and *** at the 1% level.

Table 8: Balance test

Panel A	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Average monthly nominal salary	Unempl. rate	% of people living in urban areas	% of men in the population	Average number of children per woman	% of houses w/ limited access to Sewer and water	% of houses with bathroom and water supply	% of houses w/ access to garbage collection system
Effect at the cutoff point (population of 2004)	49.99 (0.227)	-1.067 (0.418)	-0.485 (0.920)	-0.392 (0.121)	-0.012 (0.950)	1.002 (0.819)	1.197 (0.874)	-2.083 (0.656)
Observations	2,618	2,622	2,618	2,618	2,622	2,622	2,622	2,622
Effect at the cutoff point (population of 2008)	64.55 (0.102)	-0.749 (0.558)	-2.241 (0.688)	-0.344 (0.203)	-0.206 (0.343)	-4.413 (0.315)	12.62 (0.101)	4.610 (0.326)
Observations	2,656	2,660	2,656	2,656	2,660	2,660	2,660	2,660

Panel B	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Existence of a radio station	No access to electricity	Number of legislators in 2000	% of female candidates in 2000	Number of female legislators in 2000	% of female legislators in 2000	Elected at least 1 woman to the council in 2000
Effect at the cutoff point (population of 2004)	-0.029 (0.621)	1.751 (0.629)	0.027 (0.958)	1.907 (0.106)	0.239 (0.408)	1.406 (0.526)	0.168 (0.118)
Observations	2,622	2,622	2,622	2,445	2,445	2,445	2,445
Effect at the cutoff point (population of 2008)	-0.013 (0.895)	0.275 (0.950)	0.474 (0.399)	-0.082 (0.950)	0.248 (0.389)	1.398 (0.515)	0.004 (0.969)
Observations	2,660	2,660	2,660	2,480	2,480	2,480	2,480

Notes: This table reports a balance test of municipal characteristics at the cut-off point of 47,619 inhabitants. RDD specification with a third order polynomial in either sides of the cutoff point using a sample of municipalities with population from 10,000 to 95,238. Estimations presented using the municipal population of 2004 and 2008 separately. *Average monthly nominal salary* is calculated for individuals who were 10 years old or older, and *Average number of children per woman* is counted only after the reproductive period (15 to 49 years old). The variable *Existence of a radio station* was only available in 2005 and 2009, so we used the information of 2005 for the 2004 elections and the information of 2009 for the 2008 elections. Robust p-value in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level and *** at the 1% level.

Table 9: Validity test - Further functional forms - Political outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Total number of candidates	Number of male candidates	Average number of votes on male cand	HHI of votes on male candidates	Number of women elected	% of seats filled by women	Elected at least 1 woman to the council	Elected a female mayor (not condit.)
Main specification	11.29	9.650*	-47.96**	-0.004*	0.434**	3.356*	0.203**	0.130**
	(0.110)	(0.056)	(0.056)	(0.095)	(0.025)	(0.095)	(0.016)	(0.034)
mean comparison	13.97**	11.02**	-29.55	-0.0056***	0.393**	2.979*	0.133*	0.132**
5% interval	(0.026)	(0.015)	(0.136)	(0.003)	(0.027)	(0.082)	(0.089)	(0.016)
Ha:	diff > 0	diff > 0	diff < 0	diff < 0	diff > 0	diff > 0	diff > 0	diff > 0
3rd order - complete	9.885	8.099*	-55.54**	0.0009	0.508***	4.192**	0.219***	0.105*
	(0.135)	(0.087)	(0.018)	(0.646)	(0.005)	(0.027)	(0.005)	(0.081)
2nd order - limited	10.37*	9.599**	-24.58	-0.0035**	0.331**	2.360	0.161**	0.052
	(0.050)	(0.011)	(0.200)	(0.029)	(0.027)	(0.129)	(0.010)	(0.249)
2nd order - complete	14.03***	12.62***	-9.901	-0.009***	0.287**	1.868	0.126**	0.058
	(0.005)	(0.001)	(0.583)	(0.000)	(0.046)	(0.208)	(0.032)	(0.184)
Obs.: complete	10,561	10,561	10,561	10,552	10,561	10,561	10,561	10,595
limited	5,282	5,282	5,282	5,274	5,282	5,282	5,282	5,316

Notes: This table presents a validity test of our main specification, by reporting RDD estimates of the effects of the council size on political outcomes in different functional forms. The dependent variables (in the columns) were already specified in previous tables. The *mean comparison* is a simple t-test of the means of the outcomes in a small interval around the threshold. *Ha* reports the alternative hypothesis used in the test and the interval used was of 2,380 inhabitants, equivalent to 5% of the cutoff point (47,619). *3rd order* and *2nd order* indicate the order of the polynomial fitted either sides of the cutoff point, while *limited* and *complete* indicate the sample used: *limited* is the sample used in our main specification (municipalities with population from 10,000 to 95,238) and *complete* is a sample of municipalities with population from 0 to 95,238. Robust p-value in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level and *** at the 1% level.

Table 10: Validity test - Further functional forms - Policy outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log of Expenses on childcare & preschool	Log of Expenses on community assistance	Number of Children in day care centers	Number of live births	% pregnant which received 4 or more pre-natal visits	Absolute number of fetal deaths	Focus on special need students as main goal	Have a maternity hospital in 2011
Main specification	0.697*	0.393*	126.7**	-217.8*	0.03	-6.80***	0.243**	0.234*
	(0.069)	(0.068)	(0.044)	(0.085)	(0.122)	(0.009)	(0.047)	(0.070)
mean comparison	1.303***	0.328*	251.9***	-170.4*	0.041*	-6.548***	0.046	0.286*
5% interval	(0.002)	(0.069)	(0.000)	(0.070)	(0.051)	(0.004)	(0.368)	(0.051)
Ha:	diff > 0	diff > 0	diff > 0	diff < 0	diff > 0	diff < 0	diff > 0	diff > 0
3rd order - complete	0.301	0.360*	89.50	-170.2	0.033*	-5.650**	0.184	0.267**
	(0.403)	(0.078)	(0.136)	(0.153)	(0.095)	(0.022)	(0.109)	(0.022)
2nd order - limited	-0.002	0.321**	23.73	-274.9***	0.008	-5.762***	-0.022	0.199**
	(0.995)	(0.044)	(0.641)	(0.004)	(0.629)	(0.005)	(0.805)	(0.024)
2nd order - complete	0.170	0.391***	19.31	-292.8***	-0.011	-5.880***	-0.107	0.212***
	(0.532)	(0.009)	(0.691)	(0.001)	(0.471)	(0.003)	(0.214)	(0.007)
Obs.: complete	8,618	9,023	10,558	10,561	10,561	10,561	5,301	5,204
limited	4,357	4,520	5,282	5,282	5,282	5,282	2,622	2,656

Notes: This table presents a validity test of our main specification, by reporting RDD estimates of the effects of the council size on policy outcomes in different functional forms. The dependent variables (in the columns) were already specified in previous tables. The *mean comparison* is a simple t-test of the means of the outcomes in a small interval around the threshold. *Ha* reports the alternative hypothesis used in the test and the interval used was of 2,380 inhabitants, equivalent to 5% of the cutoff point (47,619). *3rd order* and *2nd order* indicate the order of the polynomial fitted either sides of the cutoff point, while *limited* and *complete* indicate the sample used: *limited* is the sample used in our main specification (municipalities with population from 10,000 to 95,238) and *complete* is a sample of municipalities with population from 0 to 95,238. Robust p-value in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level and *** at the 1% level.

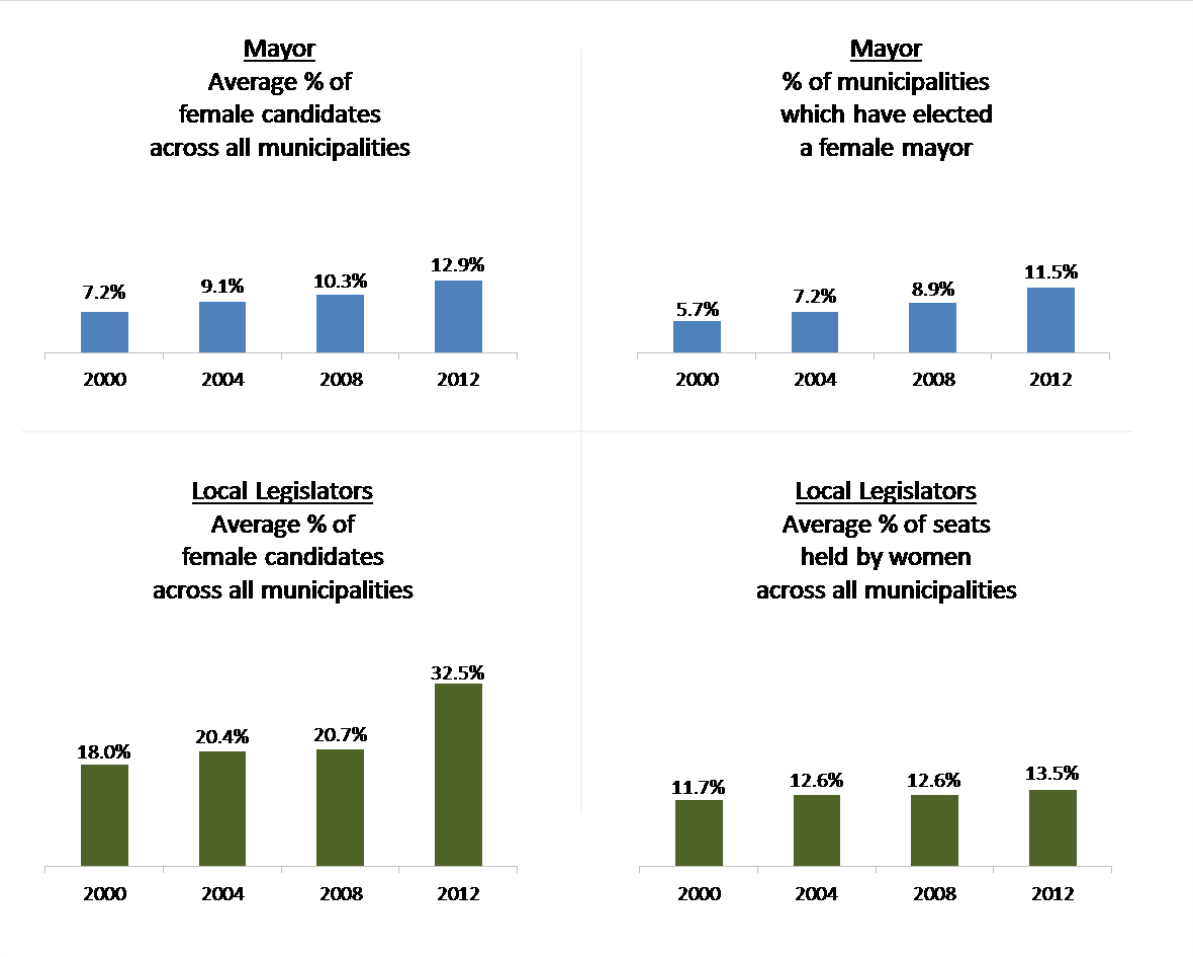
Table 11: Validity test - Estimations in the threshold set by the salary rule

Panel A	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Total number of candidates	Number of male candidates	Average number of votes on male cand	HHI of votes on male candidates	Number of women elected	% of seats filled by women	Elected at least 1 woman to the council	Elected a female mayor (not conditional)
3rd order polynomial	0.078	0.605	-12.19	0.001	0.225	1.850	0.198**	0.019
	(0.992)	(0.910)	(0.643)	(0.696)	(0.247)	(0.353)	(0.021)	(0.750)
mean comparison	-7.16	-5.54	40.32	0.003	-0.137	-1.373	0.097	-0.078
5% interval	(0.841)	(0.862)	(0.950)	(0.960)	(0.771)	(0.771)	(0.137)	(0.874)
Ha:	diff > 0	diff > 0	diff < 0	diff < 0	diff > 0	diff > 0	diff > 0	diff > 0
Observations	5,282	5,282	5,282	5,274	5,282	5,282	5,282	5,316

Panel B	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log of Expenses on childcare & preschool	Log of Expenses on community assistance	Number of Children in day care centers	Number of live births	Absolute number of fetal deaths	Absolute number of infant deaths	Focus on special need students as main goal	Have a maternity hospital in 2011
3rd order polynomial	0.470	0.253	37.95	-46.23	-2.633	-2.056	0.260**	0.124
	(0.248)	(0.217)	(0.583)	(0.732)	(0.339)	(0.587)	(0.040)	(0.268)
mean comparison	-0.398	-0.018	-52.25	213.9	3.616	5.367	0.077	0.092
5% interval	(0.832)	(0.536)	(0.805)	(0.968)	(0.940)	(0.937)	(0.288)	(0.181)
Ha:	diff > 0	diff > 0	diff > 0	diff < 0	diff < 0	diff < 0	diff > 0	diff > 0
Observations	4,357	4,520	5,282	5,282	5,282	5,282	2,622	1,864

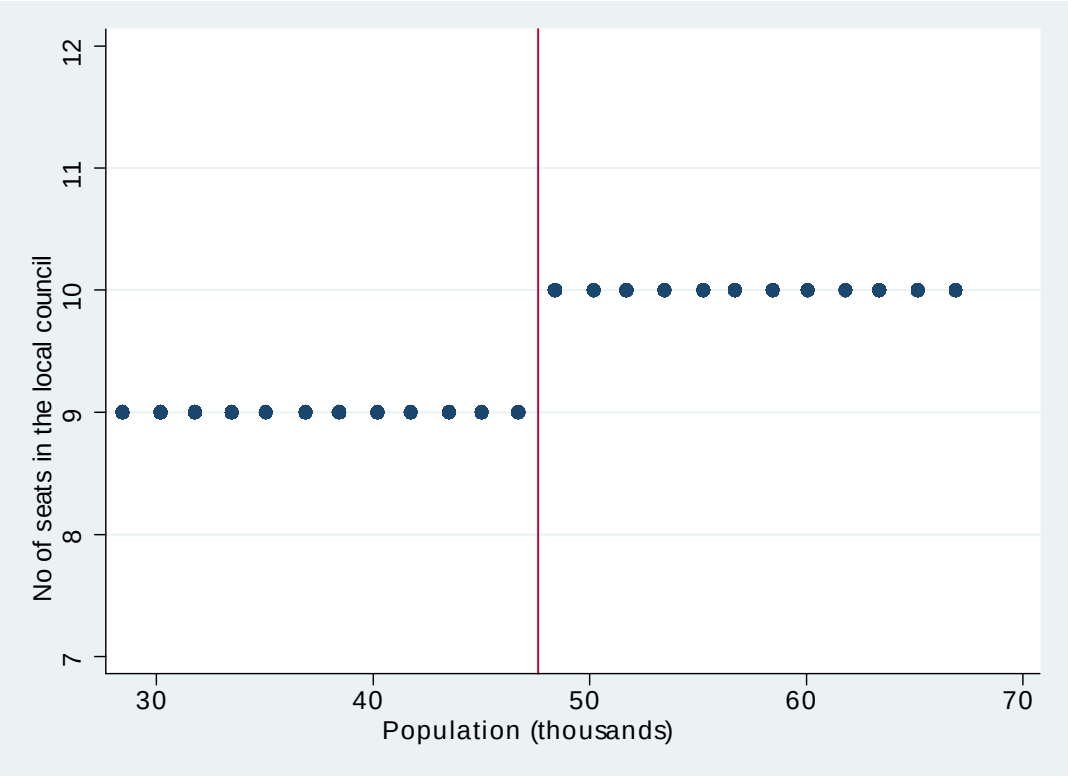
Notes: This table reports a validity test comparing our RDD results (cutoff point at 47,619) with RDD estimates in threshold set by the rule that defines the limits of legislators' salaries, which is 50,000 inhabitants. RDD specification with a third order polynomial in either sides of the cutoff point using a sample of municipalities with population from 10,000 to 95,238. The *mean comparison* is a simple t-test of the means of the outcomes in a small interval around the threshold. *Ha* reports the alternative hypothesis used in the test and the interval used was of 2,380 inhabitants, equivalent to 5% of 47,619. The dependent variables (in the columns) were already specified in previous tables. Robust p-value in parentheses. * indicates statistical significance at the 10% level, ** at the 5% level and *** at the 1% level.

Figure 1: Women's participation in local politics



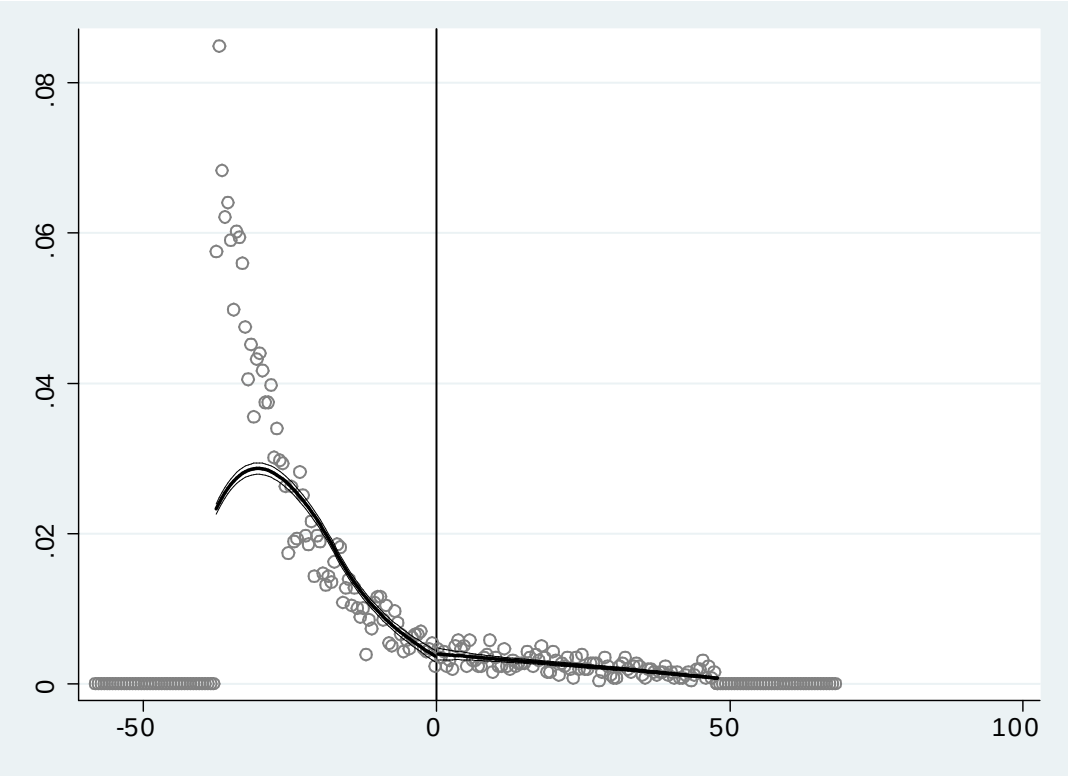
Notes: This figure presents information on the political participation of women in the last municipal elections in Brazil.

Figure 2: Sharp RD - Probability of treatment jumping from 0 to 1 at the cutoff point



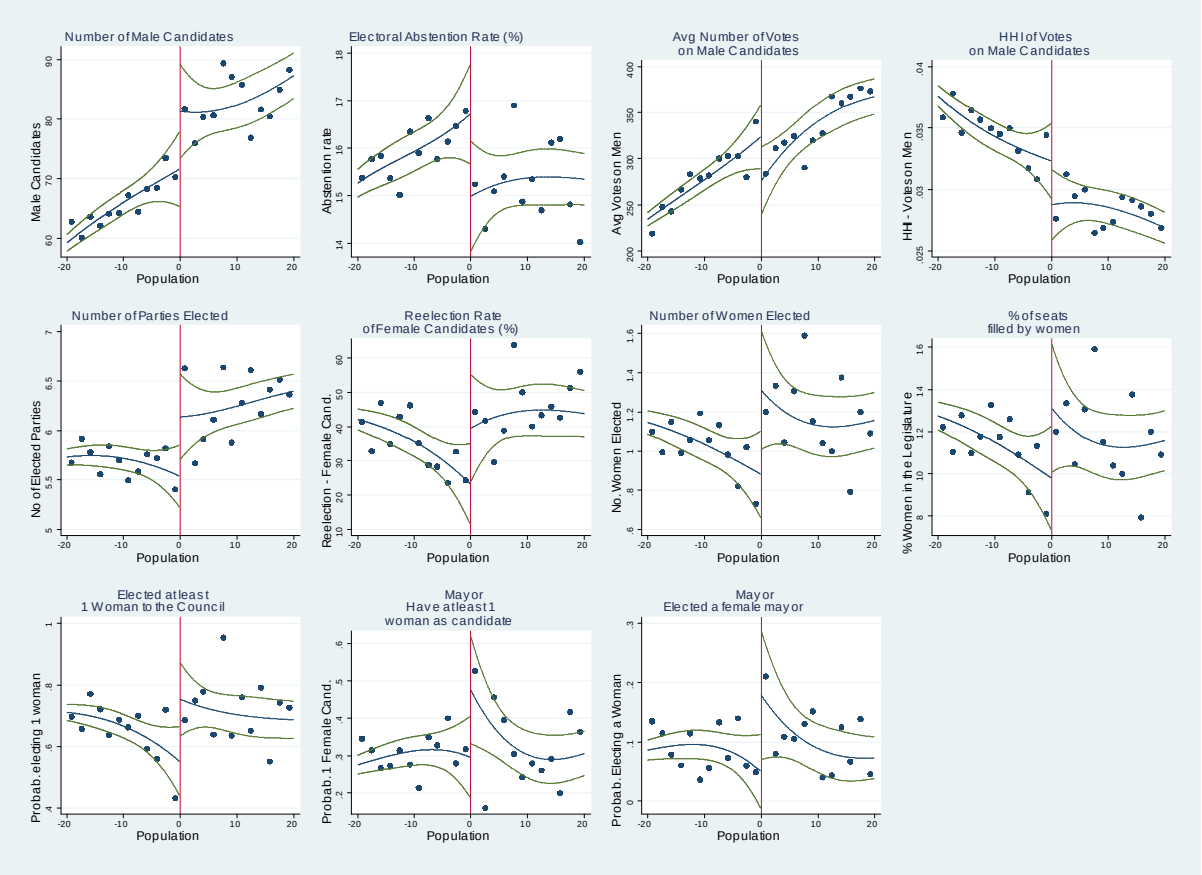
Notes: This figure shows the number of legislator by population. The vertical line denotes the threshold of the rule and the scatter points are averaged over 1,666 inhabitants, which is 3.5% of the cutoff point (47,619 inhabitants).

Figure 3: McCrary Test - Distribution of municipal population



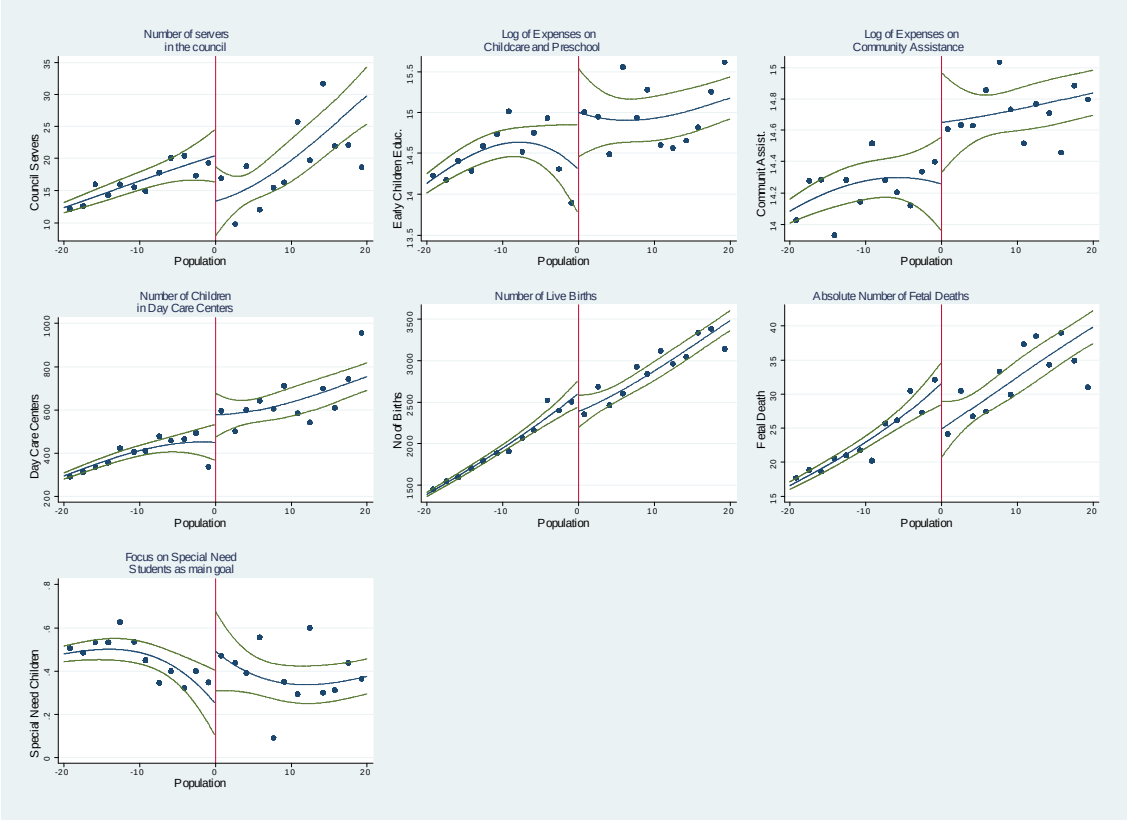
Notes: This figure is based on McCrary (2008), and shows the distribution of the population of municipalities in our sample. The population of each municipality is centered at the threshold we analyze, of 47,619 inhabitants, so the cutoff point is represented by the vertical line (=0).

Figure 4: Graphical Representation of the Discontinuities - Political Outcomes



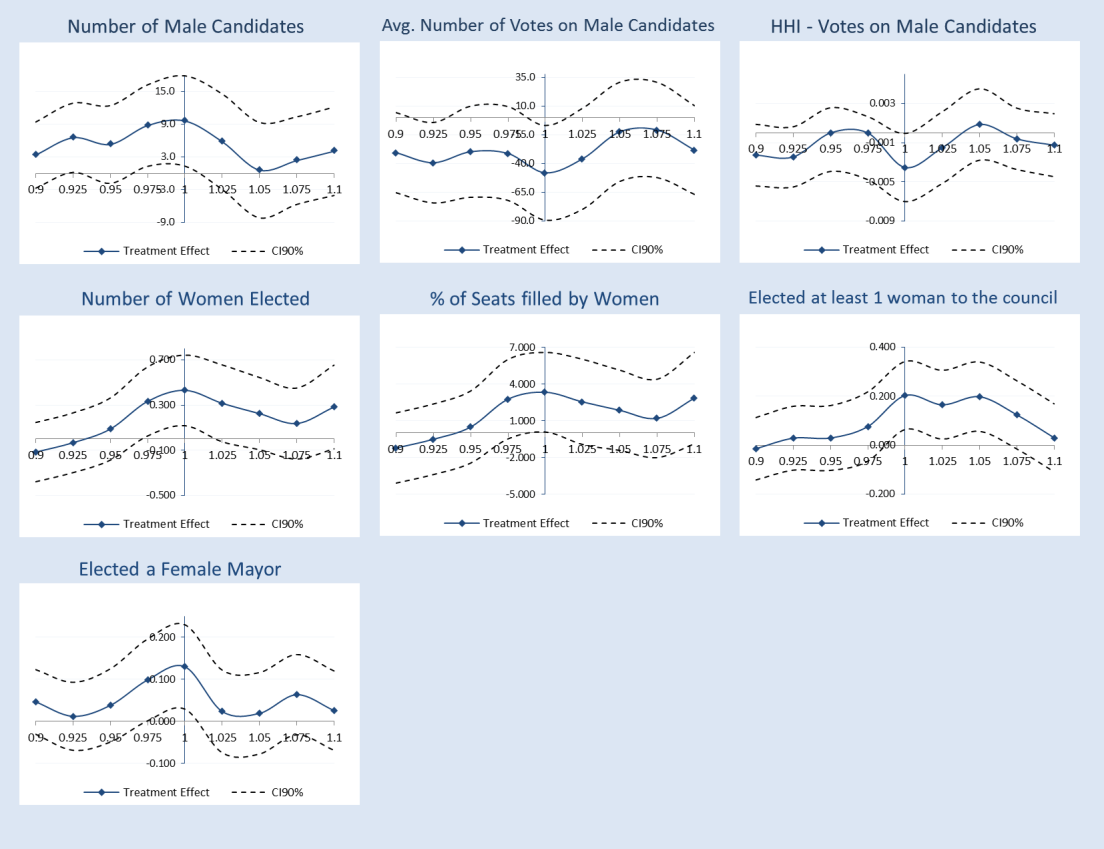
Notes: This figure shows the graphical representation of our main results for political outcomes. The population of each municipality in our sample in centered in the cutoff point. The vertical line indicates the threshold, the blue line is a third order polynomial fitted separately on each side of the threshold, and the green lines are the 95% confidence interval of the polynomial. Scatter points are averaged over 1,666 inhabitants, which is 3.5% of the cutoff point (47,619 inhabitants).

Figure 5: Graphical Representation of the Discontinuities - Policy Outcomes



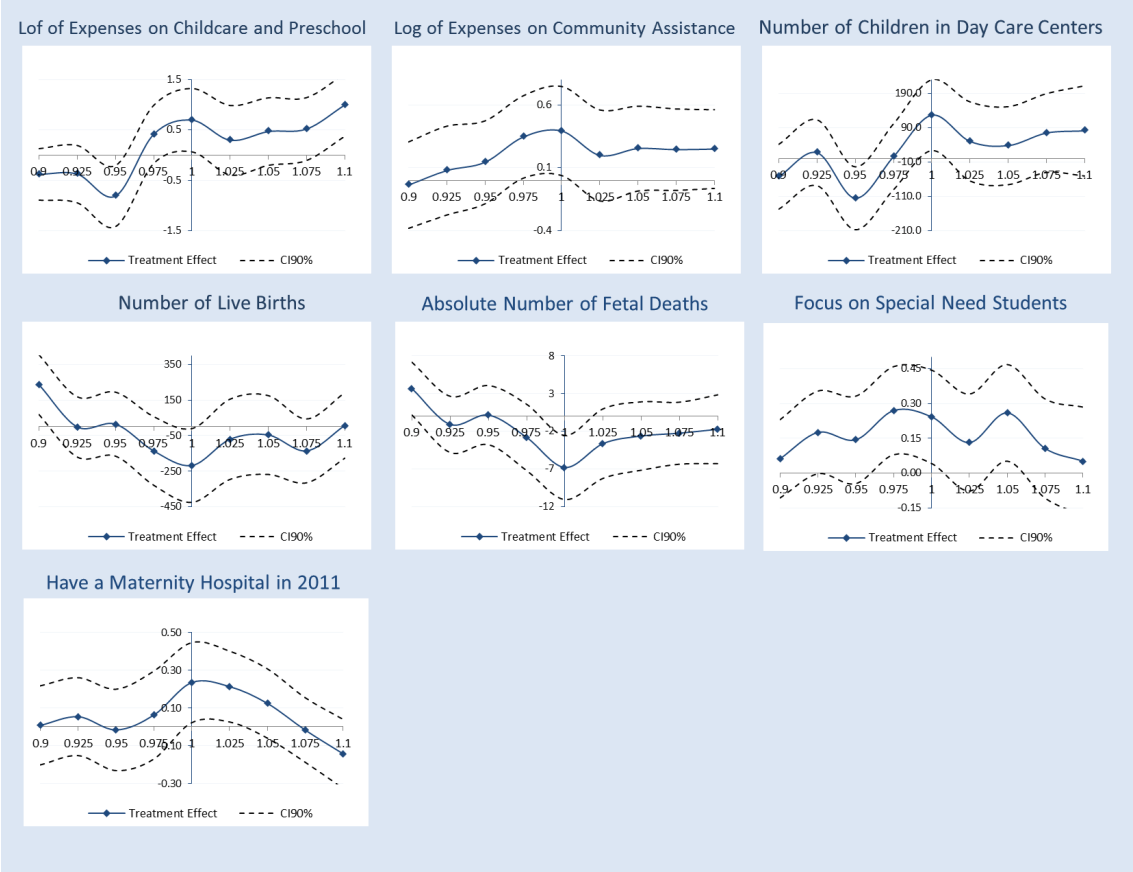
Notes: This figure shows the graphical representation of our main results for policy outcomes. The population of each municipality in our sample in centered in the cutoff point. The vertical line indicates the threshold, the blue line is a third order polynomial fitted separately on each side of the threshold, and the green lines are the 95% confidence interval of the polynomial. Scatter points are averaged over 1,666 inhabitants, which is 3.5% of the cutoff point (47,619 inhabitants).

Figure 6: Estimations in false thresholds closed to the cut-off point - Political outcomes



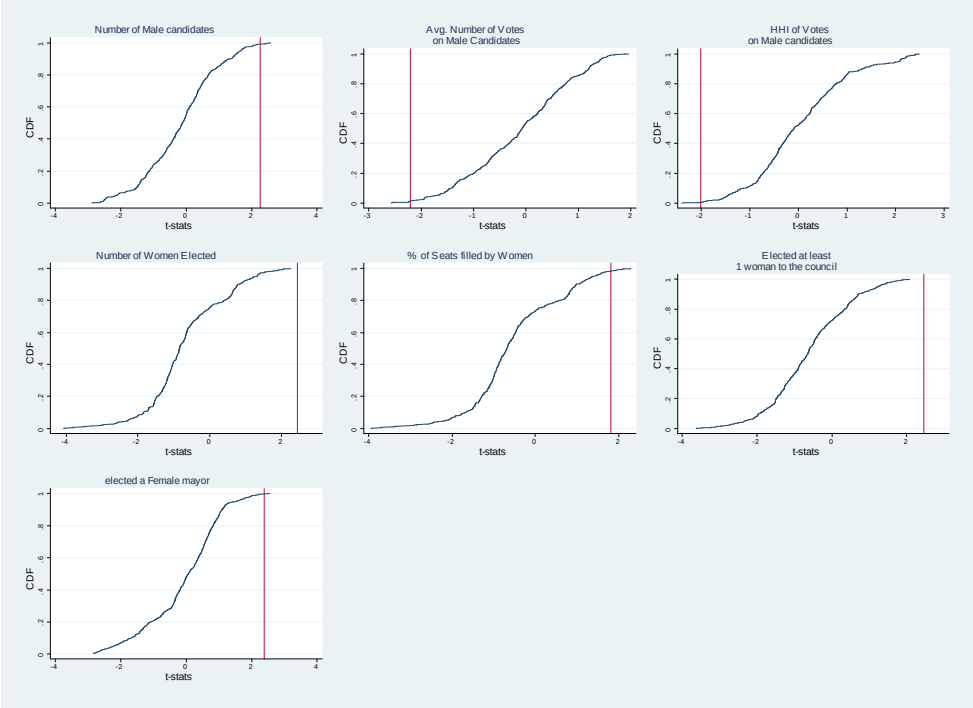
Notes: This figure shows the results of our main RDD specification for political outcomes in false thresholds closed to the true cutoff point. The x axis represents how far the false threshold is from the true one, and the y axis reports the estimates of the regression using the respective threshold. The vertical line is the cutoff point of 47,619 inhabitants, and dotted lines represent the 95% confidence interval of the estimates.

Figure 7: Estimations in false thresholds closed to the cut-off point - Policy outcomes



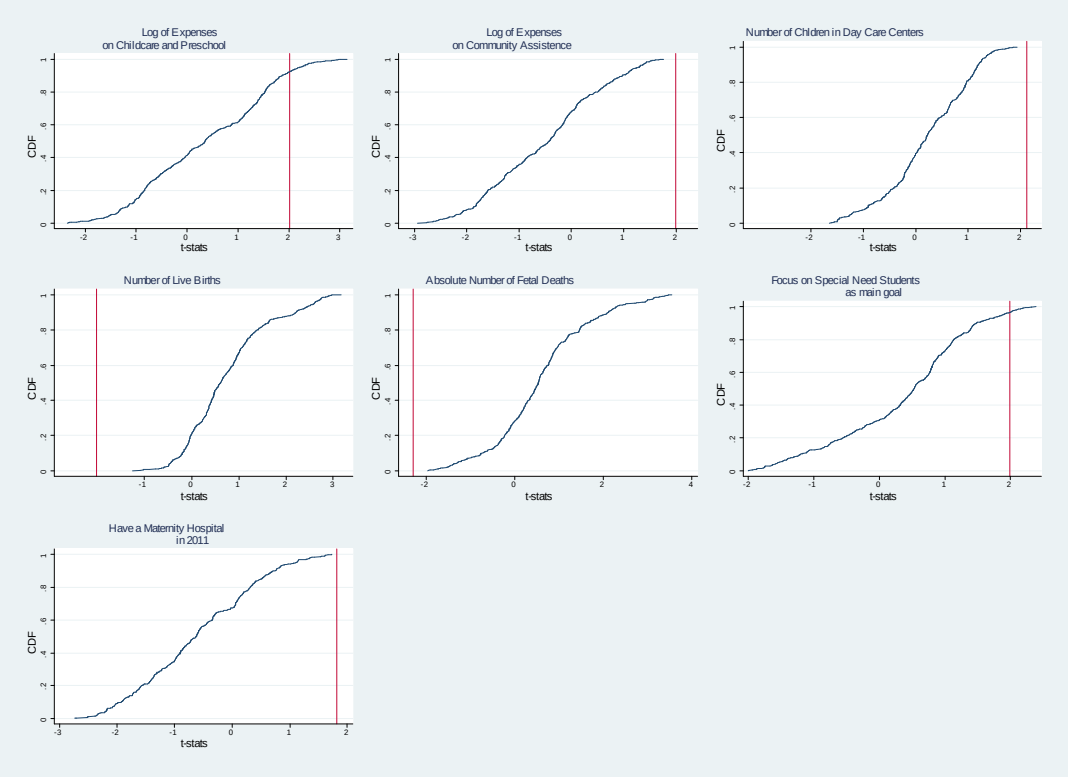
Notes: This figure shows the results of our main RDD specification for political outcomes in false thresholds closed to the true cutoff point. The x axis represents how far the false threshold is from the true one, and the y axis reports the estimates of the regression using the respective threshold. The vertical line is the cutoff point of 47,619 inhabitants, and dotted lines represent the 95% confidence interval of the estimates.

Figure 8: Estimations in false thresholds closed to the cut-off point - Political outcomes



Notes: This figure reports the cumulative density function of the t-statistics from RDD estimations at 800 false discontinuities between 50% and 150% of the cutoff point of 47,619 inhabitants, using increments of 0.1 p.p. and excluding the interval between 90% and 110% of the cut-off. The vertical line represents the t-statistic of our main specification in the true threshold.

Figure 9: Estimations in false thresholds closed to the cut-off point - Policy outcomes



Notes: This figure reports the cumulative density function of the t-statistics from RDD estimations at 800 false discontinuities between 50% and 150% of the cutoff point of 47,619 inhabitants, using increments of 0.1 p.p. and excluding the interval between 90% and 110% of the cut-off. The vertical line represents the t-statistic of our main specification in the true threshold.