

What Happens When a Woman Wins an Election? Evidence from Close Races in Brazil*

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Abstract

This paper presents evidence regarding the effect of female leadership on policy outcomes in close races utilizing a rich dataset on Brazilian municipalities. Cities ruled by female mayors have better health outcomes, are awarded more federal discretionary transfers, and are less likely to have administrative irregularities in public procurement practices. Additionally, male mayors are 20 percentage points more likely to be re-elected than female mayors and are more likely to hire temporary public employees during the electoral year compared to their female counterparts. Our results are consistent with political patronage and electoral competition having an important role in explaining gender differences in competitive political situations.

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1 Introduction

In recent years, a great deal of attention has been focused on the role of women as policymakers.¹ Several empirical studies have supported the hypothesis that the gender of the policymaker affects policy decisions and policy outcomes (among others, Chattopadhyay and Duflo (2004), Rehavi (2007), Ferreira and Gyourko (2010), Bhalotra and Clots-Figueras (2012), Gagliarducci and Paserman (2012)). However, the mechanism through which gender matters is still debated.² In this paper, we provide new evidence on the link between the gender of the policymaker and the type of policies implemented, highlighting the role of electoral competition in explaining gender differences.

The empirical literature has analyzed the effect of gender of the policymaker using two alternative institutional settings. One set of papers focuses on female politicians elected as a result of policies that establish minimum quotas of political positions reserved for women. The other one focuses on open contested election between candidates of different genders. The seminal contribution of Chattopadhyay and Duflo (2004) finds that the reservation of political positions for women affects the types of public goods provided. Beaman et al. (2009) argue that prior exposure to a female chief councilor elected because of a quota affects female attitudes and the gender composition of the future political leaders. Several papers also find that the gender of the politician matters in a setting without quotas (among others: Rehavi (2007); Ferreira and Gyourko (2010); Bhalotra and Clots-Figueras (2012)). A key difference between elections with quotas and without is that in the latter there is competition across genders. This competition by itself could generate gender differences in campaign strategies and policies if men and women respond differently to a competitive environment. Experimental evidence suggest that women may be less effective than men in competitive environments (Gneezy, Niederle and Rustichini (2003)) and women shy away from competition (Niederle and Vesterlund (2007)). In this paper we contribute to this debate by analyzing gender differences following open contested elections and finding new

¹A broader related literature analyzes women's empowerment and economic development, see Doepke, Tertilt and Voena (2011) and Duflo (2011) for recent reviews.

²A family of theoretical models that would be consistent with finding gender differences in policies would be one in which male and female politicians have different policy preferences (Alesina, 1988). For instance, the experimental literature finds evidence that, under some circumstances, the choices women make are more socially oriented than men's (see, for instance, Nowell and Tinkler (1994), Andreoni and Vesterlund (2001), Eckel and Grossman (2008)).

evidence suggesting that men and women may respond differently to electoral competition.

We analyze the effect of the gender of the policymaker on several policies and outcomes and whether these gender differences vary according to the level of electoral competition using a rich micro dataset from municipalities in Brazil. In order to control for municipality-specific confounding factors we adopt a Regression Discontinuity (RD) design in close electoral races.³ Our identification comes from comparing municipalities where a female candidate barely won an election with municipalities where a female candidate barely lost.

Our results show that there are significant gender differences in terms of policies and other outcomes. First, we find that female mayors attract more discretionary transfers from the federal government than male mayors. Municipalities need to apply for these transfers and the effort of the mayor is an important determinant of the transfers the municipalities receive. Second, our results show that having a female mayor leads to better health outcomes. In particular, municipalities with a female mayor present a lower percentage of women without pre-natal medical visits and a higher percentage of births that are not pre-mature. These effects are concentrated on less educated mothers which are more dependent on public health provision. Note that the allocation of health resources is decided mostly by the municipal administration. Third, we find that female mayors tend to engage less in corruption episodes. To do this, we use data from random audits of municipal governments that allow us to construct an administrative measure of corruption, instead of relying on measures of corruptions based on surveys as most papers. Finally we find that male mayors hire more temporary employees to work directly in the municipal administration. However, we do not find any significant difference for permanent public employees.

We also analyze whether these gender differences vary according to the level of electoral competition, and find that men seem to be more responsive to electoral competition. First, we study re-election incentives and find that gender differences in the number of temporary public employees are driven by mayors in their first term, who are allowed to run for re-election. Increases in temporary public sector employees are a widely used political patronage instrument in Brazil (Engerman and Sokoloff (2002); Weyland (1996); Mainwaring (2002);

³See also Lee, Moretti, and Butler (2004), Lee (2008), Pettersson-Lidbom (2008), Vogl (2012) or Brollo and Nannicini (2012) for other examples of RDD in close elections. This strategy has been adapted to study gender differences in politics by Rehavi (2007), Ferreira and Gyourko (2012), Gagliarducci and Paserman (2012) and Bhalotra and Clots-Figueras (2012).

Ames (1995)), so this finding could suggest that male mayors might be promoting more political patronage to get re-elected than their female counterparts. Second, we analyze electoral cycles and find that male mayors tend to hire more temporary public employees (relative to female mayors) when elections are approaching. These results suggests that men and women may respond differently to electoral competition.

In addition, we analyze whether the decision to run for re-election and the probability of re-election differ between male and female mayors. We find no differences across genders in the probability of running for re-election. Our results show that female candidates elected after a contested mixed election have a lower probability of being re-elected compared to their male counterparts.

The paper proceeds as follows. Section 2 describes the Brazilian institutional framework. Section 3 lays out our identification and estimation strategy. Section 4 discusses the empirical results and validity tests. Section 5 concludes.

2 Institutions and Data

2.1 The Brazilian federal system, the allocation of infrastructure transfers and electoral data

The Brazilian presidential federal system takes place in a context of a multi-party system.⁴ The layers of political and administrative organization in Brazil are the federal government, the states, the federal district and the municipalities. Municipalities are minor federative units with an autonomous local government, ruled by a mayor, directly elected by citizens to a four-year mandate, and a legislative body, also directly elected by voters. Mayors of municipalities above 200,000 voters are directly elected by a majority runoff rule, while mayors of municipalities below 200,000 voters are directly elected with plurality rule.⁵

The elections of the President, governors, and members of Congress all take place at the same time every four years, while municipal elections are staggered by two years and also take place every four years. Before 1998 Brazilian mayors could not run for re-election, but after 1998, mayors were allowed to run for a second term. In our study we are considering

⁴This subsection relies heavily upon Brollo and Nannicini (2012).

⁵See Fujiwara (2011) for an analysis of the effects of the electoral rule in Brazilian municipalities.

two municipal administration mandates in municipalities below 200,000 voters: 2001-2004 and 2005-2008. Electoral data come from *Tribunal Superior Eleitoral*.

Municipal administrators are responsible for delivering a relevant share of public services and goods related to education, health, and infrastructure projects. The fact that mayors have the veto power over the budget, make them the most important actors in deciding the allocation of public goods and services. However, municipal administrations are highly financially constrained. Apart from some big cities, such as Brazilian state capitals, municipalities strongly rely on state and federal transfers as their sources of revenue (tax revenue represents only 5.5 percent of the municipal total revenues, on average). The most important source of municipal revenues are federal transfers (on average amount to 65 percent of the municipal budget). There are two different types of these transfers: constitutional automatic transfers (i.e. Fundo de Participação do Município - FPM and “*Transferências Fundo a Fundo*”); and (2) discretionary transfers – *CONVENIO* agreements.⁶ Most of them (82 percent) are earmarked for infrastructure projects.⁷

This study focuses on discretionary transfers devoted to infrastructure projects, which amount to about 15 percent of total municipal expenditure in infrastructures. These transfers are related to budget items that involve the construction of buildings and bridges, the paving of roads, the improvement of water and sewer systems, the purchase of ambulances, and so on. We focus on this type of federal transfers because the bulk of the other revenues are largely non-discretionary and hard to manipulate.⁸

Both mayors and president are important actors in determining the allocation of discretionary transfers. As the budget law is not mandatory in Brazil, the President has a major role in deciding the allocation of the discretionary transfers and can thus use them to make deputies follow the guidelines of the government coalition. On the other hand, municipal gov-

⁶The allocation mechanism of FPM transfers (which corresponds to 75% of federal transfers) depends on the population size and the state in which the municipality is located. From this total amount of federal transfers received by each municipality, there are also fixed coefficients that establish the amount of funds. 70 percent of FPM transfers are unrestricted and 30 percent to be converted into education and health expenditures: 15 percent in education and 15 percent in health. Another type of constitutional transfers are “*Transferências Fundo a Fundo*”. These transfers can be targeted to different areas (education, health, social assistance, etc) and their allocation is based on income per-capita or number of children enrolled in school.

⁷We calculate these percentages with data from FINBRA. See the subsection below where we give detailed information on our data.

⁸As a falsification test, we also performed RDD estimations on constitutional automatic transfers (FPM), detecting no effect of gender on their allocation (results available upon request).

ernments must exert effort in applying for these transfers, because the budget law regarding these transfers can be accomplished only when an agreement between the municipality and the central government is signed. Therefore, a municipality will receive discretionary infrastructure transfers depending on three factors: (i) the effort of their municipal administration in applying for transfers; (ii) the interest of a federal deputy in supporting the improvement of the budget law that refers to these transfers; and (iii) the interest of the President in executing the budget amendment (i.e., send the money exactly to that municipality).

Data on infrastructure transfers self-reported by municipal administration and are obtained on the Brazilian National Treasure Website (*Tesouro Nacional*) –*FINBRA* dataset.⁹ These data provide information from municipal and state annual balance sheets.¹⁰

2.2 The Health Care System in Brazil

One of the most important characteristics of the public health system in Brazil is decentralization. Spending is mostly financed by the federal government, but the municipalities are responsible for all decisions regarding resource allocation (Collins et al., 2000). Transfers are directly sent from the central government to the municipalities. The amounts are defined by constitution, being automatic and on a monthly basis (*Transferências de Fundo a Fundo*) and are mostly intend to finance primary care.

In addition, another source of primary health care is the Family Health Program (*Programa Saúde na Família*), introduced by the municipal health secretariats in collaboration with the states and the Ministry of Public Health. This program finances health education, immunization, nutritional care, consultation with the doctor in basic specialities, dentist

⁹Only since 2002 has it been possible to distinguish discretionary from constitutional transfers that finance infrastructure projects. For consistency, the period of analysis (2001-2008) considers the overall amount of federal infrastructure transfers (*Transferências de Capital*). On average, 78 percent of the total amount of infrastructure transfers is discretionary (*CONVÊNIO*). Note that after year 2002 *FINBRA* brings information on discretionary (*CONVÊNIO*) and constitutional infrastructure transfers. The percentage of discretionary transfers in the total amount of infrastructure transfers is calculated by using the average for these years (2003-2008).

¹⁰The variable used in the first part of the analysis is the log of total amount of the per-capita infrastructure transfers. We choose the log specification given the skewness of the transfers received by the municipalities. Municipalities that do not receive infrastructure transfers, are not dropped when we run the log specification. For the log transformation we considered a reported amount of R\$ 1,00, then, the log amount is zero. All budget variables are in real values, base year 2006 (IPCA - FGV deflator). Alternatively, we estimate a Poisson regression considering as an outcome the transfers per capita, and our results are unchanged. Results are available upon request.

basic care, home visits by nurse or community health worker, basic emergencies, minor operations in addition to pre-natal care, family planning activities and birth at home by a family doctor. The federal government supplies technical support and finances the program. Federal funding includes a fixed component based on population and income per capita, and the central government can also make discretionary allocations based on requests from the municipalities. As municipal administrations are responsible for the allocation of these resources, municipal policies are a relevant determinant of health outcomes.

To analyze health outcomes, we use data from the Information System on Live Births (SINASC). This system is managed by the Secretariat of Health Surveillance, in conjunction with state and municipal health departments. Each state health department collects data on live birth certificates in healthcare facilities and on the registries (for home births) and input all the information into the SINASC. The Ministry of Health which assembles the data. This dataset contains monthly information on number of pre-natal medical visits and on period of pregnancy (weeks). The variables we are employing for this analysis is the share of pregnant women without pre-natal medical visits and births that are not considered as pre-mature (at least 37 weeks).

2.3 Measuring corruption

The data on corruption comes from the randomly allocated audit reports in Brazil which is coded for Brollo et al. (2013). The main categories of irregularities described in the audit reports are: 1) *illegal procurement practices*, occurring when one of these episodes are reported: a) competition has been limited, for example, when associates of the mayor's family or friends receive non-public information related to the value of the project, b) manipulation of the bid value, c) irregular firm wins the bid process, d) the minimum number of bids is not attained, or e) the required procurement procedure is not executed; 2) *fraud*; 3) *over-invoicing*, occurring when there is evidence that public goods or services are purchased for a value above the market price; and 4) *diversion of funds*. Our definition of corruption is a dummy variable that indicates whether at least one episode of any irregularity described above is detected by auditors (similar to Brollo et al, 2012).

3 Empirical Strategy

3.1 Identification: Regression Discontinuity

Identifying the effects of gender on policy outcomes is a daunting task. A comparison between municipalities with a female mayor and those with a male mayor will probably generate biased estimates due to endogeneity issues. For instance, local policies might be correlated with municipalities specific characteristics such as attitudes towards women or demographic characteristics and all of which could drive the results. Define $\tau_{i,t}(1)$ as the potential outcome of municipality i if the mayor is a woman, and $\tau_{j,t}(0)$ as the potential outcome of the same municipality if the mayor is a man, in a specific time period t .¹¹ We are interested in estimating the difference in *potential* outcome in mixed-gender race, i.e. $E(\tau_{i,t}(1) - \tau_{i,t}(0) | j \in \Omega)$. The problem of causal inference is that, at a given point in time, we cannot observe both potential outcomes. That is, it is impossible to know the outcomes a city that has a female mayor would have had with a male mayor. The intuition of our identification strategy is that cities in which a woman won against a man by a narrow margin can be a good counterfactual for those places in which the opposite occurred (a man won against a woman by a narrow margin). The identification comes from the assumption that in close races random factors are crucial to decide the election. Therefore the probability of winning is the same for both female and male candidates.

The variable F_{it} defines the treatment status: $F_{it} = 1$ if the mayor is a woman, and $F_{it} = 0$ otherwise. The observed outcome is thus: $\tau_{it} = F_{it} \cdot \tau_{it}(1) + (1 - F_{it}) \cdot \tau_{it}(0)$. The estimand of interest is the ATE, $E[\tau_{it}(1) - \tau_{it}(0)]$, defined over some sub-population of interest.

Specifically, we define the *treatment group* as the municipalities that have a mayor who is woman in a mixed-gender race. Assignment to treatment can be formalized as:

$$Female_{it} = 1[MV_{it} \geq 0] \tag{1}$$

where MV_{it} is the female candidate margin of victory in municipality i during term t and $1[\cdot]$ the indicator function. It is specified as the difference between the vote for the female candidate *minus* the vote share of the male candidate, meaning it will have positive values if the mixed-gender electoral race resulted in a female mayor. This measure is thus greater than

¹¹In our equations, t is year or term depending on whether we have data for our outcome at the year or at the term level.

zero in municipalities where the mayor is woman, and lower than zero otherwise. At the zero threshold, $MV_{it} = 0$, the gender of the mayor F_{it} sharply changes from zero to one. MV_{it} can be seen as a random variable depending on observable and unobservable variables, as well as on random events on election day. The standard RDD assumption is that potential outcomes must be a continuous function of the running variable at the threshold (Hahn, Todd, and Van der Klaauw, 2001). We will test this assumption in section 4.4.¹²

The ATE in close elections is thus:

$$\gamma \equiv E[\tau_{it}(1) - \tau_{it}(0)|MV_{it} = 0] = \lim_{MV_{it} \downarrow 0} Y_{it} - \lim_{MV_{it} \uparrow 0} Y_{it} \quad (2)$$

γ is defined as local effects, because it captures the impact of the gender of the mayor on the outcome only for towns around the threshold $MV = 0$ (i.e. for the elections that were decided for a margin that is tiny enough).

3.2 Estimation

We first describe whether gender is correlated to our outcomes by estimating the following OLS equations:

$$\tau_{it} = \rho_0 + \rho_1 F_{it} + \mu_t + \eta_{it} \quad (3)$$

where τ_{it} is the outcome of interest in municipality i in time period t , F_{it} is a dummy that is one when the mayor of the municipality is female, μ_t are year fixed effects and standard errors are clustered at the municipality level because the same city may be observed in repeated mayoral terms.¹³ We report coefficient $\hat{\rho}_1$, that does not have a causal interpretation because the gender of the politician might be correlated with the error term.¹⁴

We then use two different methods to estimate the ATE expressed in equation (2). First, we fit a p -order polynomial in MV_{it} on either side of the threshold $MV_{it} = 0$:

$$\tau_{it} = \sum_{k=0}^p (\rho_k MV_{it}^k) + F_{it} \sum_{k=0}^p (\pi_k MV_{it}^k) + \mu_t + \eta_{it}, \quad (4)$$

¹²It should be noted that the assumptions refer to the *potential* outcomes. The actual outcome will be only one, of course, and if gender plays a role in affecting outcomes it will also be discontinuous at $MV = 0$.

¹³It should be noted that we can include year fixed-effects only when we have yearly data for the outcome of interest.

¹⁴For example, this would happen if places that are more tolerant toward women are more likely to elect female mayors.

where MV_{it} is the margin of victory in municipality i in time period t and standard errors are clustered at the city level. The estimated coefficient $\hat{\pi}_0$ identifies the ATE at the threshold $MV_{it} = 0$.¹⁵

We then follow Imbens and Lemieux (2008) and use a local linear regression approach, which restricts the sample to municipalities in the interval $MV_{it} \in [-h, +h]$ and estimates the model:

$$\tau_{it} = \rho_0 + \rho_1 MV_{it} + \delta_0 F_{it} + \delta_1 F_{it} \cdot MV_{it} + \mu_t + \eta_{it} \quad (5)$$

where standard errors are clustered at the town level, and $\hat{\delta}_0$ identifies the ATE at the threshold $MV_{it} = 0$.

Finally we check for treatment effect heterogeneity in separate sub-samples. The intuition for this test is simple. Assume that D_{it} captures a given heterogeneity dimension. We are considering two dimensions that aim to capture whether electoral competition per se exacerbate gender differences in policies: 1) whether the mayor is eligible for re-elections, and 2) last two years of the mayoral mandate (when elections are approaching). We estimate:

$$\begin{aligned} \tau_{it} = & \sum_{k=0}^p (\rho_k MV_{it}^k) + F_{it} \sum_{k=0}^p (\pi_k MV_{it}^k) + \\ & + D_{it} \cdot \left[\sum_{k=0}^p (\alpha_k MV_{it}^k) + F_{it} \sum_{k=0}^p (\beta_k MV_{it}^k) \right] + \xi_{it}. \end{aligned} \quad (6)$$

As a result, $\hat{\pi}_0$ identifies the treatment effect in $D_{it} = 0$, $\hat{\pi}_0 + \hat{\beta}_0$ in $D_{it} = 1$, and $\hat{\beta}_0$ the difference between the two. The interpretation of the difference between the two sub-samples should not be interpreted as causal.

4 Results

4.1 Sample selection and descriptive statistics

Brazil has currently 5,567 municipalities. Our study encompasses all municipalities for which we have non missing outcomes data and with mixed gender races in two elections: October

¹⁵While the benefit of this estimation strategy is the possibility of keeping the whole sample, the cost is that results might potentially be sensitive to outcome values for observations far away from the threshold (see Imbens and Lemieux, 2008). We follow the standard procedure of fitting a third order polynomial. We computed our results with lower or higher order polynomials (i.e. identifying the effect on observations respectively farther and closer to the threshold) and our results are robust to different specifications. Results are available upon request).

2000 and October 2004.¹⁶ During those terms, mayors are in office for four years, i.e. from 2001 to 2004 and from 2005 to 2008, respectively.

In order to implement our identification strategy in the Brazilian multi-party system we restrict our sample to races with two candidates where one candidate is a woman and the other is a man. We only consider two candidates elections because the majority of candidates are men. This gender ration in close elections generates a discontinuity of the density of the running variable when considering close elections with more than two candidates, where a male candidate will be more likely to win. As a result, the assumption of the continuity of the density is not satisfied in any other sub-sample of our data.¹⁷

The races with only two candidates amount to 51 percent of the total. If we further restrict the sample to elections where we have two candidates of different gender, we end up with a sample of two-candidate races that covers 7 percent of the races in each term.

There are 723 elections that match our definition of mixed gender races and for which we do not have missing data for health and transfers outcomes. To evaluate the external validity with the RDD sample selection, we can look at how the above sample differ from the rest of the Brazilian municipalities. Table 2 and Table 1 compare municipal and mayoral characteristics between our sample and the rest of the Brazilian elections. As we can see, in our sample, among other things, races are more likely to happen in smaller and poorer cities. In Table 3 presents the results of a similar exercise for our outcomes. In our sample municipalities receive more discretionary infrastructure transfers.

Our estimation strategy controls for city observable and unobservable time varying or invariant characteristics. Therefore we should not expect any difference in municipal characteristics between treatment and control groups around the cut-off $MV_{it} = 0$. Our dataset allows to test for a vast array of observable municipal characteristics, including geographic location of the city (first row of the Table), income and population. The results of balance tests for municipal characteristics are reported in Table 4.¹⁸ It's particularly interesting that

¹⁶For each outcome of interest we have checked that missing values are balanced around the threshold (available upon request).

¹⁷For example, the discontinuity of the log-density of our running variable for the elections with three candidates is estimated in -0.094 with a standard error of 0.054. In the Appendix Figure A1 we provide the density of the samples of elections with three candidates and election with more than three candidates.

¹⁸Note that we perform these balance tests by applying a polynomial approximation. We also did the same check by applying a local linear regression and we find nearly identical results. Results are available upon request.

even the gender city level wage gap is balanced across our threshold.¹⁹ Additionally, Table 4 reports the results of balance tests for several mayoral characteristics. If, for example, men were more likely to face a binding term limit, this would imply that our estimates could potentially reflect the effect of this difference. We can see that all of our observable covariates are balanced in close elections, suggesting that men and women’s observable characteristics converge in close elections. Our dataset also allows to test for many individual level covariates such as party affiliation, political experience and education.

The credibility of these balance tests is reinforced by visual inspection. Figures 1, 2, 3, and 4 illustrate scatterplots of the mean of these variables. In these graphs we plot respectively the average of our municipal and mayoral characteristics for cities in which women won (at the right of cut-off $MV_{it} = 0$) and in those where men won (at the left of cut-off $MV_{it} = 0$). The variable on the x-axis is the margin of victory, and the observations are averaged within bins of 2.5 percent of margin of victory. Given the density of the margin of victory is concentrated in close elections, it should be noted that points closer to the zero are both more relevant for our strategy and contain more information compared to those far from the zero margin of victory.²⁰ As these variables are pre-determined with respect to the gender of the mayor, we should observe no discontinuity, as long as there is no manipulative sorting around the zero threshold. This is indeed the case, as all of the variables are balanced around the threshold.²¹

4.2 The Consequences of a Female Candidate Winning a Mixed Gender Close Election

Our main results are reported in Panel A and B of Table 5. For all outcomes we report OLS results and two different specifications for the RDD estimates. In particular, we show

¹⁹This variable is computed using micro data from the 2000 Brazilian demographic census. We estimate, for each Brazilian municipality, whether the log of the hourly wage is affected by observable characteristics (gender, age, residence region, education, occupation and race). The gender coefficient obtained in these regressions is our measure of gender gap.

²⁰See Figure 7.

²¹It is particularly interesting to note that we find convergence in close elections also for the observables that don’t seem to be balanced for elections that are not close. For example, as can be seen from the graphs of both age and the educational variables, female mayors are on average substantially more educated and younger than their male counterparts. The fact that female leaders are more educated than male ones is consistent with what Gagliarducci and Paserman (2012) find for Italian politicians, and the result is also consistent with what Goldin, Katz and Kuziemko (2009) find recently for American college women. However, in close elections even those educational variables, or the age one, do converge together and the jump is not statistically significant.

our baseline results from a split third order polynomial specification which considers the entire mixed gender sample and also report results for local linear regressions with optimal bandwidth.^{22,23} In Panel A of the Table 5 we report the results for total, discretionary and non-discretionary infrastructure transfers, health outcomes and corruption, respectively. According to our estimates, women attract significantly higher infrastructure transfers for their municipalities. Note that the results on total infrastructure transfers are driven from discretionary infrastructure transfers. As a falsification test, in column 3 we estimate our equations for non-discretionary infrastructure transfers. It is reassuring that gender does not seem to be related to the non-discretionary component of transfers. According to our baseline results (third order polynomial specification), female mayors attract around two times the amount of transfers attracted by their male counterparts, although the size depends on the empirical specifications.²⁴

Columns 4 and 5 report the results for our health care outcomes: percentage of women who did not attend any pre-natal visits and percentage of births in which the baby was not born pre-mature.²⁵ Our RDD estimates show us that in municipalities headed by female mayors, the percentage of women without any pre-natal visits is lower. Moreover, in these municipalities, the probability of a pre-mature birth is relatively lower. According to our split polynomial specification, we find that the share of pregnant women without any pre-natal visits decreases by 1.6 percent (or 61 percent of the baseline mean) and regular births (i.e. the not pre-mature ones) increase by 1.2 percent (or 1.3 percent of the baseline mean) when a female candidate wins a close election against a man.²⁶ One potential interpretation for these findings is that women mayors are monitoring closer the (given) health resources allocated to a municipality, assuring that pre-natal medical visits provided as effectively as possible. An alternative interpretation is that women attract more spending and this makes easier

²²The results are robust to the use of a second-order or fourth-order polynomial (available upon request).

²³We compute optimal bandwidth with the algorithm by Calonico, Cattaneo and Titiunik (2012).

²⁴For evidence about developed countries see Anzia and Berry (2011) who, analyzing changes within US districts over time, find that congresswomen are associated with attracting roughly 9 percent more spending from federal discretionary programs than congressmen and sponsor and co-sponsor significantly more bills than their male colleagues.

²⁵Bhalotra and Clots-Figueras (2012) is a paper contemporaneous and independently started from ours that looks at the relationship between child mortality and gender of the politician. See also Clots-Figueras (2012) on the relationship between education and the gender of the politician.

²⁶A third outcome that can be analyzed from our dataset is babies' birthweight. We find that this outcome is not affected by the gender of the policymaker. Results are available upon request.

to provide health care for all the pregnant women. Ideally, in order to distinguish between these two alternative channels, we would need to obtain data on the quality of the public health spending, and on the proportion of discretionary transfers that are allocated to health infrastructure. To the best of our knowledge, for the period of the analysis, there are no data on quality of public health spending or proportion of infrastructure transfers allocated to health infrastructure projects. Distinguishing between these two possible channels is beyond the scope of this paper, and it is left for future research.

The outcome for the regression reported in column 6 comes from the audit reports. The relationship between the gender of the policymaker and irregularities in public policymaking received considerable attention in the literature.²⁷ Our main contribution is to analyze this relationship with administrative data regarding such irregularities. The dependent variable in column 6 is whether the mayor is found to be involved in any irregularity classified as corruption (*overall corruption*). Note that for these regressions we can use only the sample of audit municipalities. The intersection between the audited sample and the mixed gender elections will reduce the sample size for this part of the analysis.

According to the results women seem to grab relatively less rents than men, on average. The size of the effect ranges from 33 percent to 28 percent. Despite the limited sample size, note that we obtain similar magnitudes of coefficients in the RDD specifications. It is also reassuring that this data is obtained from a random sampling procedure, given that the Brazilian Audit Reports Program randomizes the auditing process. These results are potentially consistent with the view that female mayors affect our health outcomes of interest not only through attracting more resources or spending more on health, but also through better managing at a given amount of resources by implementing more transparent and legal policies. Visual inspection of the outcomes in Figure 5 corroborates the previously discussed results. In the figure we average our outcome into bins of intervals of the margin of victory. It should be noted that the bins closer to our threshold contain more observations, given that the density of elections is concentrated around close ones.

In the first two columns of Panel B of Table 5, we analyze data on public employees hired

²⁷For example, Swamy et al. (2001) use micro data to show that women are less involved in bribery. Dollar et al. (2001) show that corruption is less severe in the countries where women constitute a majority of parliamentary seats, senior positions in the government bureaucracy, and the labor force. Beaman et al. (2009), by using random assignment of gender quotas in India, find that female leaders accept less bribes than their male counterparts do.

to work directly in the public administration. We look at two dependent variables, i.e. the temporary public employees hired by the local administration, and the permanent public employees.²⁸

We find that woman that win a mixed gender close election hire around 50 percent less temporary public employees as those hired by men. We don't find a statistically significant difference for permanent public employees. It should be noted that hiring more temporary public employees might be a policy more related to special-interest groups and political patronage in Brazilian municipalities. If this were the case, we would expect this outcome to be sensitive to changes in the political environment of the city. We will provide more evidence regarding the link between temporary public employment in Brazilian municipalities and politics in the next section.

In the last two columns of Panel B we look at the effect of gender in close elections on the probability of re-election and the probability of re-running. We find that a woman who wins a close election against a man is around 20 percentage points less likely to be re-elected, out of a baseline mean of 38 percent. In the last column of the table we show that the decision of re-running is not affected by the gender, in a close election.²⁹ This finding is corroborated by visual inspection of Figure 6. This effect is particularly surprising, especially in light of the previously discussed findings, where we showed that women provide better outcomes and attract more resources.³⁰

Overall, for most of our empirical results, the size of the effect of gender in the RDD estimations is larger, and more likely to be statistically different than zero, than the effect reported in the OLS estimation. The reason could be at least twofold: on the one hand, the

²⁸Data on the number of public employees hired to work directly in the municipal administration comes from the survey *Perfil dos Municípios Brasileiros 2005 and 2008*. Unfortunately we were not able to obtain this outcome for more years. This implies that we are considering for one term both the first and last year of the mandate.

²⁹It is important to note that, even if female mayors after a mixed gender close election are less likely to be re-elected, this does not imply that female mayors that were elected during a close election are less likely to be in a second term. Our outcome "Probability of re-election" refers to the election subsequent to the mixed gender close election. This means that the margin of victory of the incumbent mayor in the subsequent elections or the gender of the opponent are most likely different. On the other hand, the variable on which we implement the balance test refers on a second term during the current election. The latter is balanced, as shown in the graph in the bottom right of Figure 3 .

³⁰It is also interesting to note that, contrary to the experimental literature cited in the introduction, that found that the competitiveness of a contest might affect female propensity to participate, we find that electoral competition seems to affect policy decisions but not the extensive margin measure by the decision to run again for re-election.

RD design controls for unobservables city-specific confounding factors, which can attenuate the true effect; on the other hand, the RD coefficient is identified off close elections, where politicians of different gender might have different incentives to implement particular policies compared to cities without closely contested races, and competition might exacerbate *per se* gender differences, as noted by Niederle and Vesterlund (2007).³¹

4.3 Heterogeneities

Thanks to our rich dataset, we are allowed to decompose our health outcomes by the educational level of the mother. Panel A and B in Table 6 repeat our analysis for each separate educational category respectively for the fraction of pregnant women with any pre-natal medical visits and the fraction of pre-mature births. We find that the effect of policies on health outcomes are concentrated on less educated mothers.³² Note that these health policies are target to lower income layers of the society which are also less educated.

In order to shed light on mechanisms that might explain our results on gender differences in policies, we analyze two heterogeneity dimensions for our treatment by exploiting both term limits for mayors in Brazil, and whether our treatment effects are driven by the first or last years of the term. See the specification in equation (6) and results are displayed in Table 7. Column 1, 2 and 3 report the results when the dependent variables are discretionary infrastructure transfers, no pre-natal visits and temporary public employee, respectively.³³ Female local politicians hire less temporary public employees than their male counterparts only in their first term. Additionally, cities governed by female politicians are characterized by less pregnant women who do not attend any pre-natal visit only when local governors are in their second term. The results for temporary public employment and pre-natal visits

³¹Our empirical strategy is able to control for unobservable city-specific confounding factors, but it is still possible that some individual level characteristics are correlated with the gender of the mayor. While we acknowledge the limitation, that is probably the challenge for this literature, we believe that is reassuring that all of our individual level observable variables converge in close elections, as confirmed by visual inspection of Figures 3, and 4.

³²Fujiwara (2010) studies the effect of voting technology on health outcomes, and finds that the effects of this policy are concentrated on uneducated mothers as well. Taken as a whole, these results suggest that the outcomes that are more sensitive to those policy changes are those of the disenfranchised part of the constituency.

³³Re-election outcomes are by construction available only for mayors in their first term, because of the Brazilian two-term-limit legislation. Hence we can't perform this exercise on those outcomes. Additionally, we did not include the heterogeneity for the non pre-mature births outcome, given that coefficients are too imprecisely estimated and are not significant in both sub-samples. Results available upon request.

suggest that policy responses to electoral competition might be gender differentiated. Note that this set of results, and in particular the hiring of public employees before the election, might potentially rationalize the finding that in close races, men who win against a woman are more likely to be re-elected. First, there is the direct channel of rewarding a politician providing public jobs. Second, these new public employees might be directly involved in tasks related to electoral campaign of the incumbent. The results for pre-natal visits seem to be driven by lame duck mayors, suggesting that men deliver worst outcomes compared to women particularly when male mayors are not allowed to run again for election. On the other hand we find that female mayors receive relatively more infrastructure transfers in both first and second term.

In the bottom panel of the table we investigate whether our outcomes vary depending on the electoral cycles. We divide the sample in pre-electoral years (two last years of the municipal administration mandate) versus first years of the mandate. While the transfers and the health results seem to be independent from the electoral cycles, we find that male mayors hire relatively more temporary public employees before the election. This last finding is potentially consistent with political patronage and re-election incentives having a role in explaining gender differences in politicians' behavior, while it is inconsistent with an explanation purely based on differential preferences over public good provision.

We are aware that the causal interpretation of their difference rests on an additional conditional independence assumption. For example, politicians who are able to be reelected might be different than those in their first term, and those differences might be correlated with gender. Thus, in the spirit of Grembi, Nannicini and Troiano (2012) and Brollo et al (2013), we perform an additional robustness check by checking whether this difference is robust to a specification including a full set of interactions with covariates at the municipality level and individual level, and the results are virtually unchanged.³⁴

4.4 Validity tests

The validity of our RDD relies on the fact that political candidates should not be able to manipulate electoral outcomes in close elections. If, for example, men are able to manipulate the results of close elections in their favor, selection would still alter our estimates. First,

³⁴Results are available upon request.

we can check for nonrandom sorting by visually inspecting the histogram of the margin of victory (see Figure 7). We can see that there are no clear spikes at the right or the left hand side of the discontinuity. Additionally, we address the concern of non-random sorting by formally testing the continuity of the density of the margin of victory, following McCrary (2008), in Figure 8. This procedure tests the null hypothesis of continuity of the density of the margin of victory at the zero threshold, and it is implemented by running kernel local linear regressions of the log of the density separately on both sides of zero.

One additional concerns when performing a regression discontinuity design is that results are driven by the specific functional forms considered.

To address the concerns about the sensitivity of our results to functional form assumptions, we also repeated the analysis implementing a simple t-test of the means of all of our outcomes in closed intervals around the threshold (with intervals getting smaller and smaller) and we almost always obtained a difference statistically different from zero, as shown in the Appendix Table A1. Finally, we perform a set of placebo tests to rule out the possibility that our results arise from random chance rather than a true underlining causal relationship. In the Appendix Figure A2, in the spirit of DellaVigna and La Ferrara (2012), we implement for all of our outcomes a set of RDD estimations at false thresholds of the margin of victory below and above the zero threshold (namely, 290 RDD equations that consider a fake margin of victory between -30 percent and -1 percent and 290 from 1 percent to 30 percent). We plot the cumulative density function of the t-statistics of the coefficients of the fake gender of the mayor. At these false thresholds, we expect to find no systematic evidence of treatment effects similar to our baseline results, i.e. a sharp increase of the slope of the cumulative density function at zero.³⁵ It should be noted that the plotted cumulative density functions always have a sharp increase in their slope at zero, and only rarely they represent statistically significant coefficients. On the whole, these placebo tests provide strong support to the robustness of our main results.

³⁵The figure report the t-test using a specification with 3rd-order polynomial; results are virtually unchanged with a local linear specification in an optimal bandwidth.

5 Conclusion

In this paper, we analyze the effect of the gender of the policymaker on policies and outcomes, and present new evidence suggesting that men and women may respond differently to electoral competition. Analyzing a rich micro dataset from municipalities in Brazil and using a Regression Discontinuity (RD) design in close electoral races we find that municipalities ruled by female mayors receive more discretionary transfers and have better health outcomes. Male mayors tend to hire more temporary public employees before the election and are more likely to be involved in corruption than their female counterparts. We also analyze whether these gender differences vary according to the level of electoral competition, and find that men seem to be more responsive to electoral competition. In particular we find that gender differences in the number of temporary public employees are driven by mayors in their first term, who are allowed to run for re-election. We also find that male mayors tend to hire more temporary public employees (relative to female mayors) when elections are approaching.

Our results raise a number of questions for further research. First, several experimental papers found that women usually avoid competitive schemes altogether and when forced to attend those, sometimes fail to compete successfully. Our results suggest that those findings might generalize to the field and that policies aiming at increasing female participation through quota might have differential effects compared to policies aimed at increasing the number of women competing against men in open elections.³⁶ It is an exciting direction to uncover the different implications that different policies aimed at achieved equality between gender in political representation.³⁷

Second, we are able to identify our effect in close elections, characterized by an high degree of competition. Our identification strategy does not allow to identify the link between gender and policies in situation characterized by absence of electoral competition. Competition might *per se* enhance gender differences. For example, Gneezy et al. (2003) and Niederle

³⁶Among others, Chattopadhyay and Duflo (2004), Fréchette and Morelli (2008), De Paola, Scoppa and Lombardo (2010) and Besley et al. (2012) analyze the effects of introducing gender quotas in different settings.

³⁷Today women occupy 13 percent of the seats in the lower houses of parliament in Latin America. The region ranks behind Northern Europe (39 percent), and is comparable with the world average, as well as the United States (13%), see Htun and Jones (1999). The quota system for female candidates in the lower house of representatives was implemented in Brazil in 1995 but with no success. In the 2006 federal elections, only 12,6 percent of the candidates running for the lower house were women and in 2010, 19,2 percent of them were female.

and Vesterlund (2007) find that competitive situations might have a gender-differentiated effect. A rapidly growing literature is making political competition an endogenous variable that can be chosen to maximize voters' welfare (Caselli et al., 2012). It is an exciting direction for future research to combine these two areas of research.

Finally, it is unclear whether our results will be externally valid in countries with different attitudes toward women compared to Brazil. Culture has recently become an area of active economic research. Recent findings in the economics of culture suggest pathways through which attitudes toward women may affect policies (Beaman et al., 2009 or Givati and Troiano, 2012). Policymakers may benefit from explicitly accounting for those slow-moving constraints, and understanding the circumstances under which values and beliefs can be affected.

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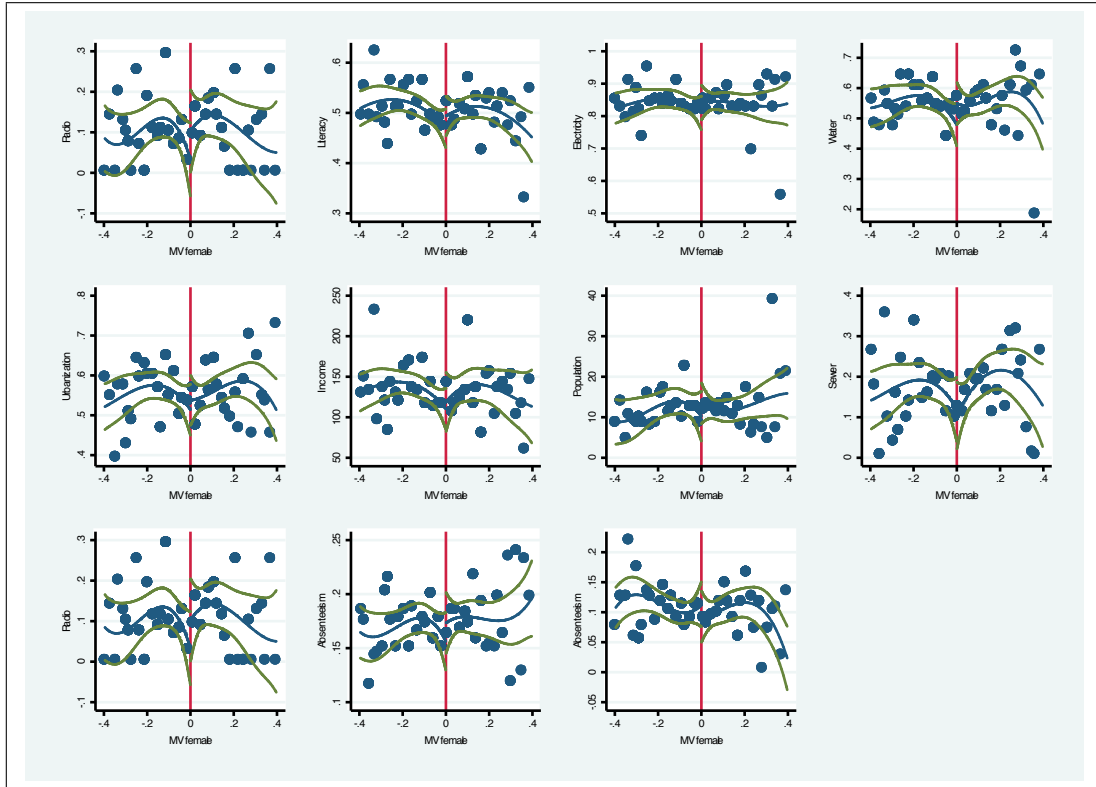
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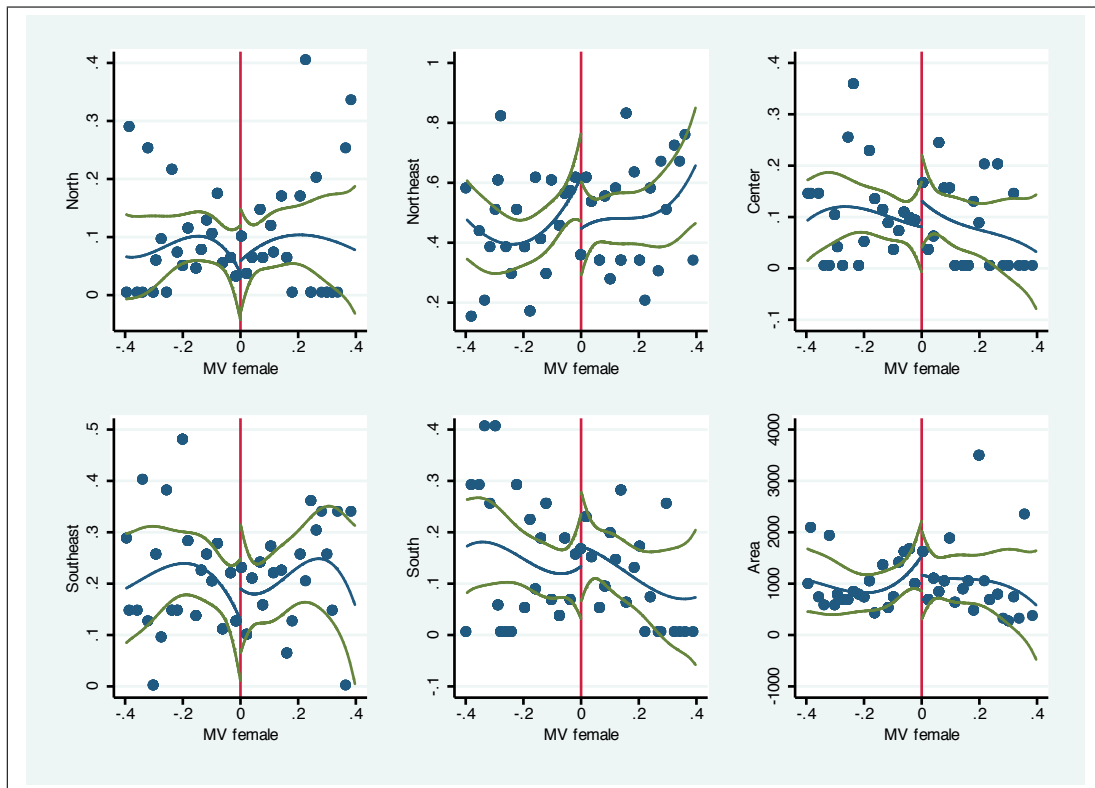
Figures

Figure 1: Balance Tests – Municipal Characteristics (Pre-Treatment Municipal Characteristics)



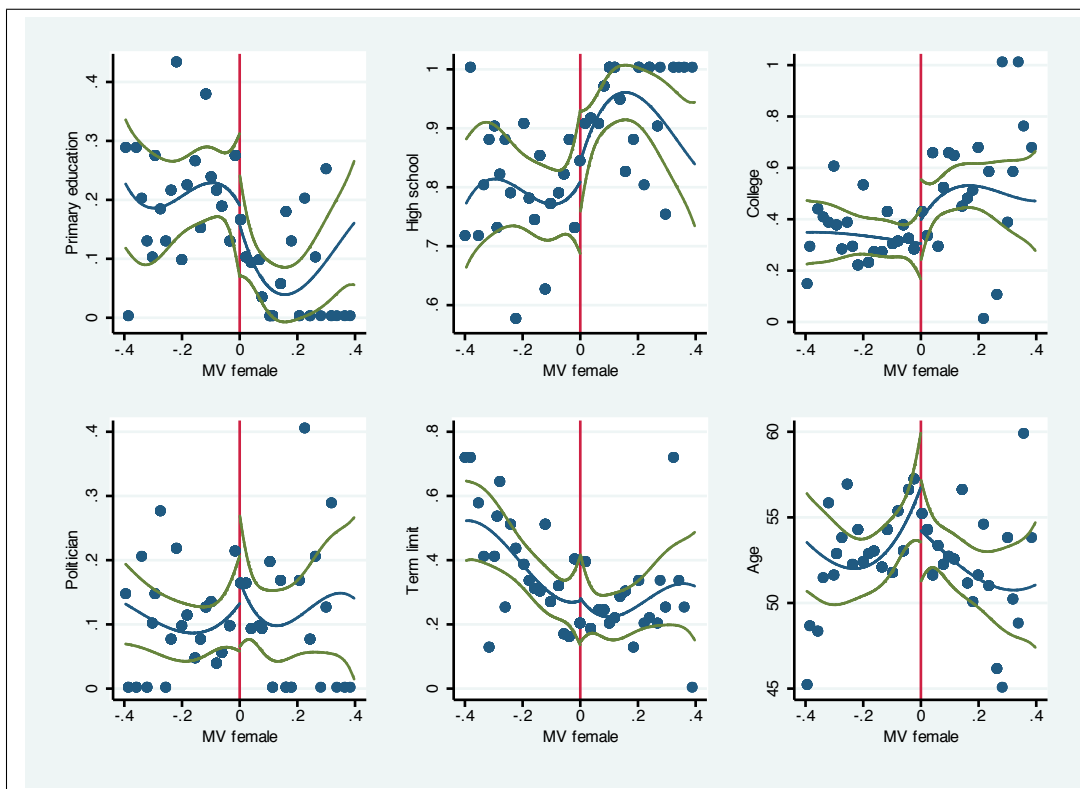
Notes. The blue line is a split third-order polynomial in Margin of Victory of the female candidate in the municipality i and mandate t , fitted separately on each side of the margin of victory (MV female) thresholds at zero. $MV_{it} > 0$ when the winner candidate in the municipality i and mandate t is female, $MV_{it} < 0$ when the winner candidate in the municipality i and mandate t is male. The green lines are the 95 percent confidence interval of the polynomial. Scatter points are averaged over 2 percent intervals. This sample considers races in 2000 and 2004 municipal elections. *Income* refers to monthly per-capita income in 2000 and is measured in Brazilian *reais*. *Urbanization* is the fraction of people living in urban areas. *Literacy rate* is the fraction of people above 20 who are literate. *Gender wage gap* is the estimated gender salary gap, see paper for details about the estimation of this variable.

Figure 2: Balance Tests – Municipal Characteristics (Invariant Town Characteristics)



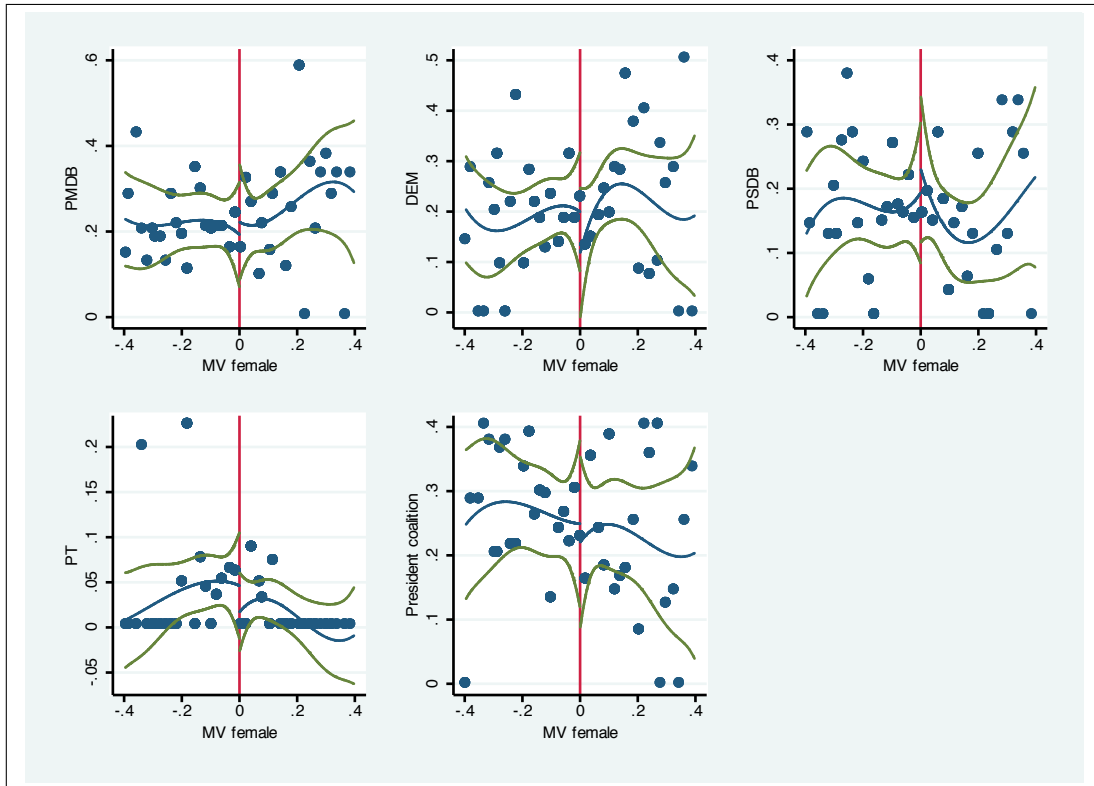
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Figure 3: Balance Tests – Mayoral Characteristics (Education and Political Experience)



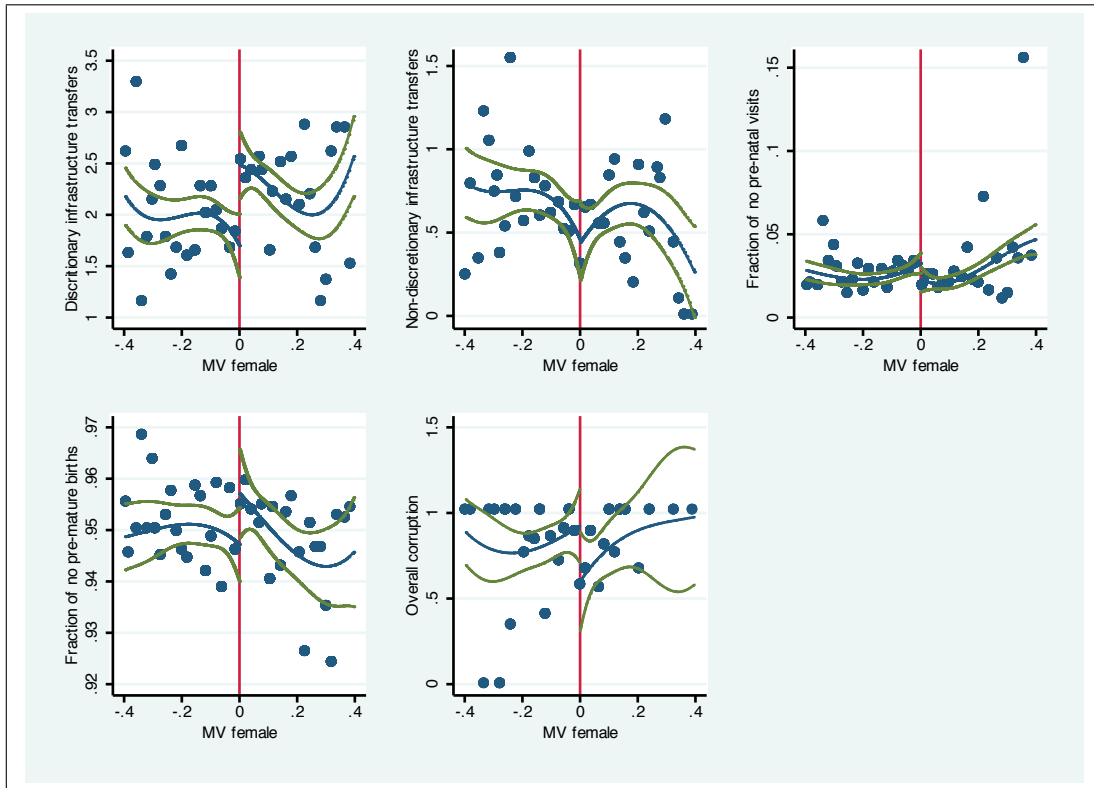
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Figure 4: Balance Test – Mayoral Characteristics (Mayoral Party Affiliation)



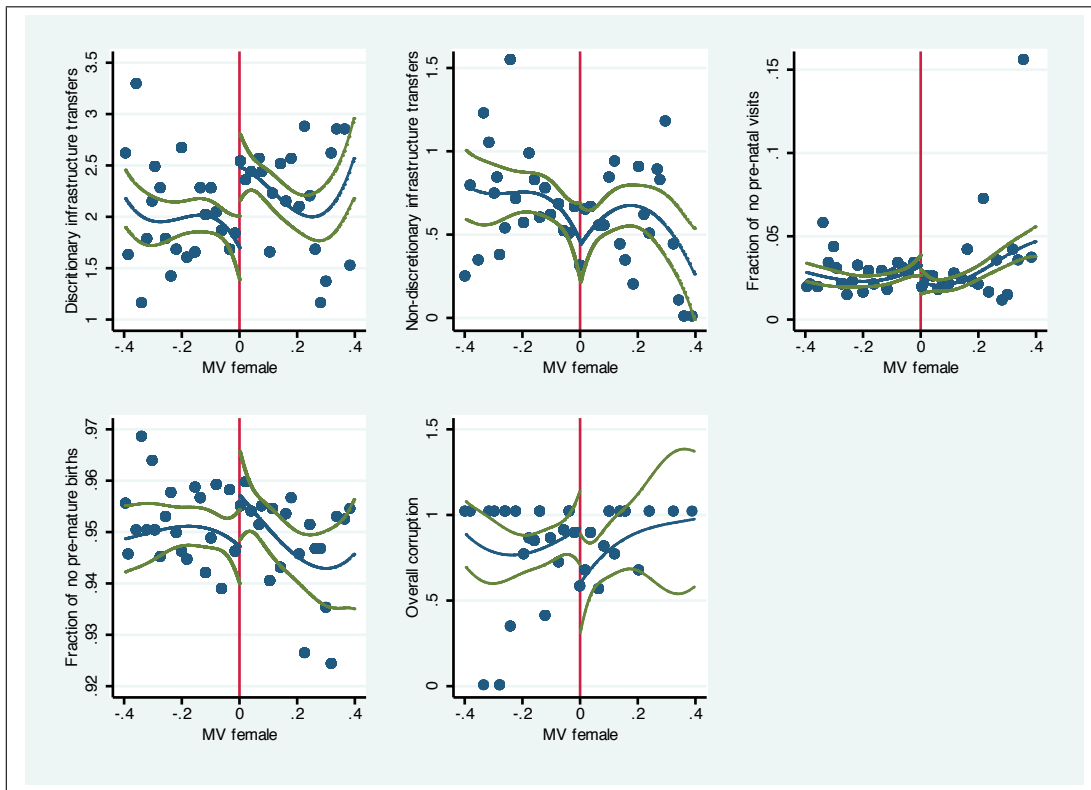
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Figure 5: The Effects of Gender on Infrastructure Transfers, Health Outcomes and on Corruption



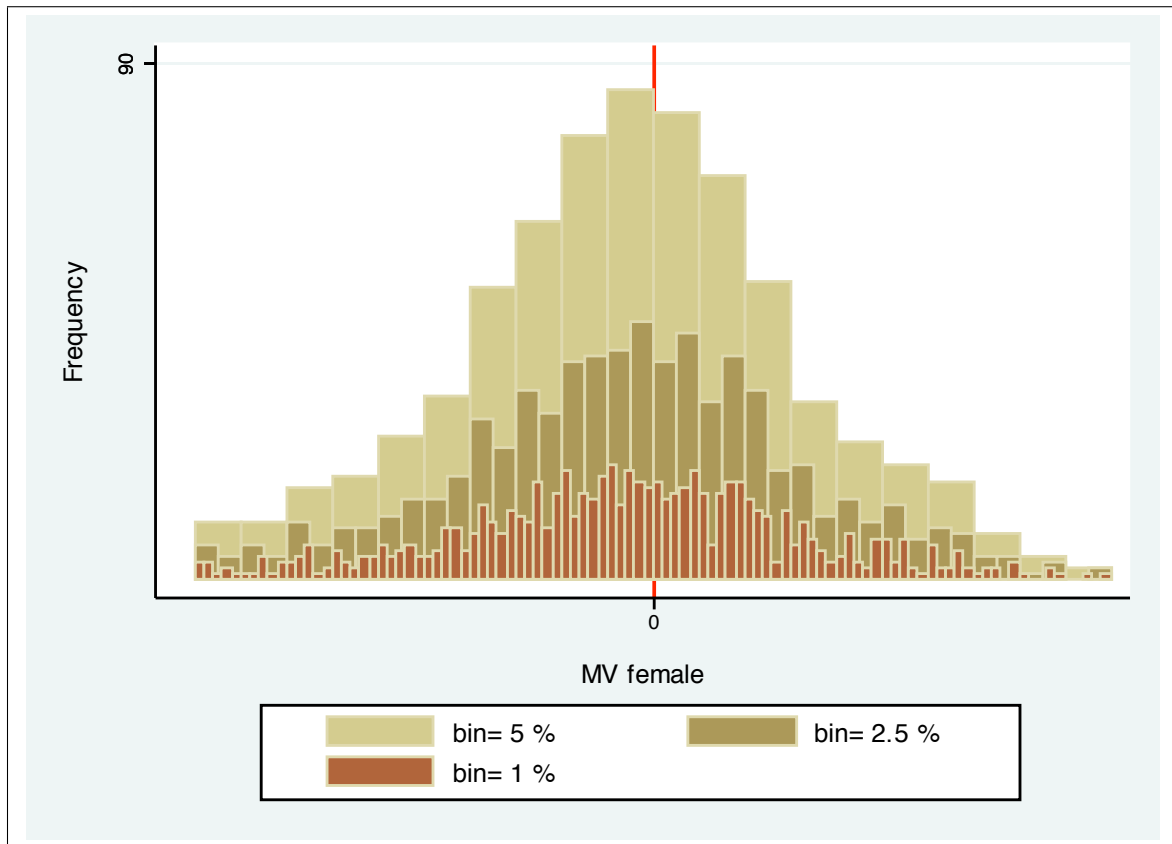
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Figure 6: The Effects of Gender on the Log of Number of Permanent and Log of Temporary Public Employees and on Electoral Outcomes



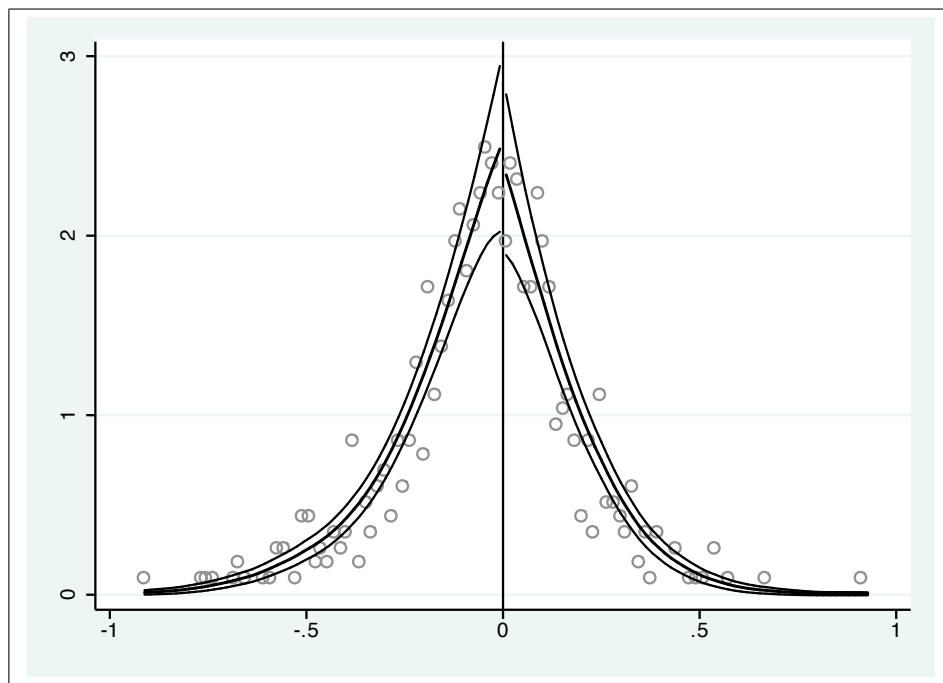
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Figure 7: Frequency of Margin of Victory, Two Candidates Mixed-Gender Races



Notes. Frequency of two-candidate mixed gender races for term 2001 and 2005. $MV_{it} > 0$ when the winner candidate in the municipality i and mandate t is female, $MV_{it} < 0$ when the winner candidate in the municipality i and mandate t is male.

Figure 8: McCrary Test, Two Candidates Mixed-Gender Races



Notes. Weighted kernel estimation of the log density of our running variable (Margin of Victory of the female candidate) performed separately on either side of the zero Margin of Victory threshold. $MV_{it} > 0$ when the winner candidate in the municipality i and mandate t is female, $MV_{it} < 0$ when the winner candidate in the municipality i and mandate t is male. (discontinuity estimate: point estimate -0.049 and standard error (0.071)). Optimal bin-width and bin-size as in McCrary (2008). This sample considers races in 2000 and 2004 municipal elections.

Tables

Table 1: Municipal Characteristics by Gender – Mixed Races vs Other Races

	(1)	(2)	(3)	(4)	(5)
	other	obs	mixed	obs	p-value
	other		mixed		
	races		races		
<i>Municipal characteristics</i>					
Population	24,753	10,054	12,317	723	0.000
Income per-capita (R\$)	163	10,054	131	723	0.000
Literacy rate	0.558	10,054	0.502	723	0.000
Urban	0.589	10,054	0.553	723	0.000
Water supply	0.581	10,054	0.549	723	0.000
Electricity	0.870	10,054	0.839	723	0.000
Sewer	0.229	10,054	0.170	723	0.000
Absenteeism	0.185	10,054	0.176	723	0.016
Presence of local radio station	0.210	10,054	0.109	723	0.000
Gender wage gap	0.134	10,054	0.101	723	0.000
North	0.082	10,054	0.084	723	0.832
Northeast	0.313	10,054	0.487	723	0.000
Center	0.082	10,054	0.093	723	0.316
South	0.216	10,054	0.130	723	0.000
Southeast	0.306	10,054	0.206	723	0.000

Notes. *Other races* is the sample of all other elections that is not considered in the sample *Two-candidate mixed races*. *Two-candidate mixed races* sample where one candidate is female and the other is male. Columns (1) and (3) report the average values in the respective samples; *obs* is the number of observations; *p-value* refers to the statistical significance of the difference between means. *Population* is the number of resident inhabitants in 2000. *Income* refers to monthly per-capita income in 2000 and is measured in Brazilian *reais*. The following variables refer to the 2000 Census and are expressed in percentage terms: *Urban population*, *Water access*, *Sewer*, *Electricity* is the fraction of people living in urban areas, with water access, linked to sewerage system, and with electricity, respectively; *Absenteeism* is the fraction of voters that failure to appear in the election day; *Literacy rate* is the fraction of people above 20 who are literate; *Presence of local radio station* is equal to 1 if there is at least one local radio station in the municipality; *Gender wage gap* is the estimated gender salary gap, see paper for details about the estimation of this variable. *North*, *Northeast*, *Center*, *South*, and *Southeast* are the Brazilian macro-regions.

Table 2: Mayoral Characteristics by Gender – Mixed Races vs Other Races

	(1)	(2)	(3)	(4)	(5)
	other	obs	mixed	obs	p-value
	other		mixed		
	races		races		
<i>Mayoral characteristics</i>					
Term limit	0.288	10,042	0.319	723	0.083
Politician	0.098	10,052	0.112	723	0.233
College	0.398	10,054	0.398	723	0.841
High School	0.402	10,054	0.841	723	0.650
Primary education	0.847	10,054	0.159	723	0.650
President's coalition	0.152	10,054	0.248	723	0.172
Married	0.779	10,054	0.818	723	0.008
Age	53.015	10,050	53.904	723	0.665
PSDB	0.270	10,054	0.160	723	0.567
DEM (PFL)	0.168	10,054	0.212	723	0.000
PMDB	0.208	10,054	0.225	723	0.262
PT	0.054	10,054	0.030	723	0.006

Notes. *Other races* is the sample of all other elections that is not considered in the sample *Two-candidate* mixed races. *Two-candidate* mixed races sample where one candidate is female and the other is male. Columns (1) and (3) report the average values in the respective samples; *obs* is the number of observations; *p-value* refers to the statistical significance of the difference between means. *Politician* is equal to 1 if the mayor has previous experience in politics. *College* is equal to 1 if the mayor has at least college degree. *High School* is equal to 1 if the mayor has at least high school degree. *Primary Education* is equal to 1 if the mayor has at most an elementary school degree. *President's coalition* is the fraction of municipalities the mayor is affiliated to one of the president's coalition party. *PSDB*, *DEM*, *PMDB*, *PT* is the fraction of municipalities where the mayor is affiliated with PSDB, DEM, PMDB, and PT, respectively. *Married* is equal to 1 if the mayor is married. *Age* is the age of the candidate calculated in years during the 2008 elections.

Table 3: Summary Statistics: Outcomes: Mixed Races vs Other Races

	(1)	(2)	(3)	(4)	(5)
	other	obs	mixed	obs	p-value
	rates		rates		
Re-election rate	0.352	7,155	0.347	493	0.806
Re-run rate	0.573	7,155	0.549	493	0.290
Permanent public employees	1.641	5,012	1.374	382	0.028
Temporary public employees	2.979	5,008	2.833	382	0.217
No pre-mature births	0.946	40,237	0.950	2,894	0.000
No pre-natal visits	0.025	40,237	0.026	2,894	0.279
Total infrastructure transfer	2.631	33,557	2.773	2,425	0.652
Non discretionary infrastructure transfer	0.659	33,559	0.646	2,425	0.000
Discretionary infrastructure transfer	1.973	33,557	2.126	2,425	0.000
Charges of overall corruption	0.766	2,057	0.828	163	0.070

Notes. *Other races* is the sample of all other elections that is not considered in the sample *Two-candidate* mixed races. *Two-candidate* mixed races sample where one candidate is female and the other is male. Columns (1) and (3) report the average values in the respective samples; *obs* is the number of observations; *p-value* refers to the statistical significance of the difference between means. *Non discretionary infrastructure transfers* and *Discretionary infrastructure transfers* are yearly transfers from the federal government to municipalities (log of per-capita real values in 2000 Brazilian *reais*). *Re-election rate* is equal to 1 if the incumbent mayor is reelected. *Re-run rate* is equal to 1 if the incumbent mayor re-run the subsequent election. The last two variables are defined for mayors who are eligible to run for reelection. *Non pre-mature births* is the yearly fraction of births that are not pre-mature at the municipality level; *Non pre-natal visits* is the yearly fraction of pregnant women without any pre-natal visit before the delivery at the municipality level; *Temporary public employee* and *Permanent public employee* denote the log of the number of public employees that have temporary and permanent employment contract in the municipal administration. *Charges of overall corruption* is the fraction of audited municipalities with at least one episode of corruption.

Table 4: Discontinuities of Town and Mayoral Characteristics in Mixed Close Races, RDD Estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<i>Brazilian macro-regions</i>												
<i>Panel A</i>												
	South	South	Center	North	North							
Female	-0.002 (0.069)	0.078 (0.063)	0.053 (0.053)	-0.140 (0.091)	0.011 (0.047)							
<i>Panel B</i>												
<i>Pre-determinant town's characteristics</i>												
Literacy rate	Electricity	Water supply	Urban	Income	Population	Sewer	Radio	Absenteeism	Wage gap			
Female	0.022 (0.024)	0.026 (0.032)	0.016 (0.040)	-0.009 (0.035)	8.878 (14.343)	-202 (2,644)	0.043 (0.050)	0.008 (0.015)	-0.011 (0.026)			
<i>Panel C</i>												
<i>Mayoral characteristics</i>												
Term Limit	PT	PMDB	DEM	PSDB	President's coalition	Married	Age	Primary education	High school	College	Politician	
Female	-0.014 (0.079)	-0.018 (0.030)	-0.075 (0.074)	0.042 (0.070)	-0.019 (0.076)	-2.853 (0.075)	-0.028 (1.861)	-0.109 (0.067)	0.109 (0.067)	0.069 (0.086)	0.019 (0.061)	
Obs.	723	723	723	723	723	723	723	723	723	723	723	723

Notes. Estimated discontinuities of town characteristics at the threshold of zero margin of victory. RDD specifications with split polynomial of Margin of Victory of the female candidate. Sample *Two-candidate* mixed races with 2-candidates where one candidate is female and the other is male. In *Panel A* the left-hand side variables are five *Brazilian macro-regions*: North, Northeast, Center, South, and Southeast. *Panel B* the left-hand side variables are pre-determined municipal characteristics: Literacy rate is the fraction of people above 20 who are literate; Electricity, Water supply and Sewer is the fraction of people living in urban areas, linked to electricity, water supply, and sewerage system, respectively. Income refers to monthly per-capita income in 2000 and is measured in Brazilian reais. Population is the number of resident inhabitants in 2000. Radio is equal to 1 if there is at least one local radio station in the municipality. Urban is the fraction of houses in urban areas; Absenteeism is the fraction of voters that failure to appear in the election day. *Panel C* the left-hand side variables are mayoral characteristics: PSDB, DEM, PMDB, PT is the fraction of municipalities where the mayor is affiliated with PSDB, DEM, PMDB, and PT, respectively. President's coalition is the fraction of municipalities the mayor is affiliated to one of the president's coalition party. Primary Education is equal to 1 if the mayor has at most an elementary school degree. High School is equal to 1 if the mayor has at least high school degree. Married is equal to 1 if the mayor is married. Age is the age of the candidate calculated in years during the 2008 elections. College is equal to 1 if the mayor has at least college degree. Politician is equal to 1 if the mayor has previous experience in politics. Robust standard errors clustered at the municipality level are in parentheses. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Table 5: The impact of gender on outcomes, RDD estimates

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A</i>						
	Total transfers	Discretionary transfers	Non discretionary transfers	Non pre-natal visits	No pre-mature births	Overall corruption
OLS	0.155 (0.102)	0.286*** (0.107)	-0.131* (0.076)	-0.000 (0.003)	0.000 (0.003)	-0.057 (0.064)
Observations	2,425	2,425	2,425	2,894	2,894	161
Spline polynomial	0.733*** (0.227)	0.835*** (0.239)	-0.102 (0.147)	-0.016** (0.007)	0.012** (0.006)	-0.338** (0.159)
Observations	2,425	2,425	2,425	2,894	2,894	161
Local linear regression	0.840*** (0.240)	1.080*** (0.267)	0.019 (0.131)	-0.013* (0.008)	0.012** (0.006)	-0.282** (0.141)
Optimal h	14	12	19	11	16	17
Observations	1,349	1,204	1,661	1,366	1,778	110
<i>Panel B</i>						
	Temporary public employment	Permanent public employment	Re-election	Re-run		
OLS	-0.008 (0.173)	-0.071 (0.201)	-0.091** (0.043)	-0.035 (0.045)		
Observations	764	764	493	493		
Spline polynomial	-0.790* (0.444)	-0.269 (0.558)	-0.214** (0.104)	0.045 (0.116)		
Observations	764	764	493	493		
Local linear regression	-0.777* (0.439)	-0.048 (0.548)	-0.185* (0.101)	0.153 (0.127)		
Optimal h	13	13	14	11		
Observations	420	420	297	252		

Notes. Results are displayed for OLS, RDD 3^{rd} order spline polynomial and local linear regressions with optimal bandwidth calculated as in Calonico, Cattaneo and Titiunik (2012) which is constructed using bias-corrected local polynomial estimators. Dependent variables in Panel A: *Non discretionary infrastructure transfers*, *Discretionary infrastructure transfers* and *Total infrastructure transfers* are yearly transfers from the federal government to municipalities (per-capita real values in 2000 Brazilian reais). *No pre-natal visits* is the yearly fraction of pregnant women without any pre-natal visit before the delivery at the municipality level. *No pre-mature births* is the yearly fraction of births that are not pre-mature at the municipality level. *Charges of overall corruption* is the fraction of audited municipalities with at least one corruption episode. Dependent variables in Panel B: *Temporary public employee* and *Permanent public employee* denote the log of number of public employees that have temporary and permanent employment contract in the municipal administration. *Prob. re-election* is equal to 1 if the incumbent mayor is reelected. *Mayor re-runs* is equal to 1 if the incumbent mayor re-run the subsequent election. The last two variables are defined for mayors who are eligible to run for re-election. Mixed races sample with two candidates where one is male and the other a female. RDD specifications with split polynomial and local linear regression as in equation (4) and (5), respectively. h denotes the interval of our running variable. For instance $h=10$ represents mixed gender races where margin of victory is between -10% and 10%. Robust standard errors clustered at the municipality level are in parentheses. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Table 6: The impact of gender on health outcomes by education category, RDD estimates

	(1)	(2)	(3)	(4)
	Illiterate	Semi-illiterate	Primary education	Secondary education
Panel A: No pre-natal visits				
OLS	-0.012*	-0.002	-0.025**	-0.002
	(0.007)	(0.004)	(0.002)	(0.001)
Observations	2,894	2,894	2,894	2,894
Spline Polinomial	-0.032*	-0.025**	0.002	0.001
	(0.016)	(0.010)	(0.004)	(0.003)
Observations	2,894	2,894	2,894	2,894
Local linear regression	-0.026	0.015	-0.004	0.002
	(0.019)	(0.011)	(0.004)	(0.004)
Optimal h	12	12	14	14
Observations	1,450	1,450	1,614	1,614
Panel B: No pre-mature births				
OLS	0.004	-0.003	0.002	0.002
	(0.005)	(0.004)	(0.003)	(0.004)
Observations	2,894	2,894	2,894	2,894
Spline Polinomial	-0.001	-0.001	0.009	0.008
	(0.011)	(0.010)	(0.009)	(0.011)
Observations	2,894	2,894	2,894	2,894
Local linear regression	0.018*	-0.004	0.004	0.011
	(0.010)	(0.011)	(0.008)	(0.012)
Optimal h	22	15	21	14
Observations	2,138	1,706	2,070	1,614

Notes. Results are displayed for OLS, RDD 3^{rd} order spline polynomial and local linear regressions with optimal bandwidth calculated as in Calonico, Cattaneo and Titiunik (2012) which is constructed using bias-corrected local polynomial estimators. Panel A reports the results for our baseline estimates (as in equation (4)). Panel A report the results when *no pre-natal visits* is the dependent variable. Panel B report the results when *no pre-mature birth* is the dependent variable. *No pre-natal visits* is the yearly fraction of pregnant women without any pre-natal visit before the delivery at the municipality level. *No pre-mature births* is the yearly fraction of births that are not pre-mature at the municipality level. In column 1, *Illiterate* is the fraction of illiterate women with *No pre-mature births* or *Non pre-natal visits*; in column 2, *semi-Illiterate* is the fraction of semi-illiterate women with *No pre-mature births* or *No pre-natal visits*; In column 3, *Primary education* is the fraction of women with at most primary education and with *No pre-mature births* or with *No pre-natal visits*; in column 4, *Secondary education* is the fraction of women with at most secondary education and with *No pre-mature births* or *No pre-natal visits*, respectively. Robust standard errors clustered at the municipality level are in parentheses. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Table 7: The impact of gender on discretionary infrastructure transfers, pre-natal visits and temporary public employment, heterogeneity results

	Discretionary infrastructure transfers	No pre-natal visits	Temporary public employment
<i>Panel A</i>			
First-term	0.704*** (0.236)	-0.006 (0.005)	-1.158*** (0.423)
Second-term	0.767*** (0.062)	0.006*** (0.000)	0.519 (0.360)
Difference	0.063 (0.424)	0.013* (0.008)	1.677** (0.949)
Observations	2,425	2,894	764
<i>Panel B</i>			
First 2-years	0.775*** (0.278)	-0.017*** (0.006)	-0.287 (0.532)
Last 2-years	0.810*** (0.030)	-0.012*** (0.001)	-1.292*** (0.136)
Difference	0.036 (0.371)	0.004 (0.007)	-1.005 (0.746)
Observations	2,425	2,894	764

Notes. Dependent variables: *Discretionary infrastructure transfers* are yearly transfers from the federal government to municipalities (log of per-capita real values in 2000 Brazilian *reais*). *Pre-natal visits* is the fraction of women with at least one pre-natal visit in the municipality. *Temporary Public* denotes the log number of temporary public employees in the last year of mayoral mandate. Treatment is a dummy that is equal to one when the mayor is female and zero otherwise. In Panel A treatment is interacted with a dummy variable that denotes whether the mayor is on her second-term, where the mayor face a binding term limit. In panel B treatment is interacted with a dummy variable that denotes the last two years of the municipal mandate and zero in the first two years. RD specifications with 3rd-order spline polynomial in different subsamples. Mixed races sample with two candidates where one is male and the other a female. Robust standard errors clustered at the municipality level are in parentheses. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Appendix (not for publication)

This Appendix provides additional robustness checks, which are also discussed in the paper. In particular, we present the following robustness checks:

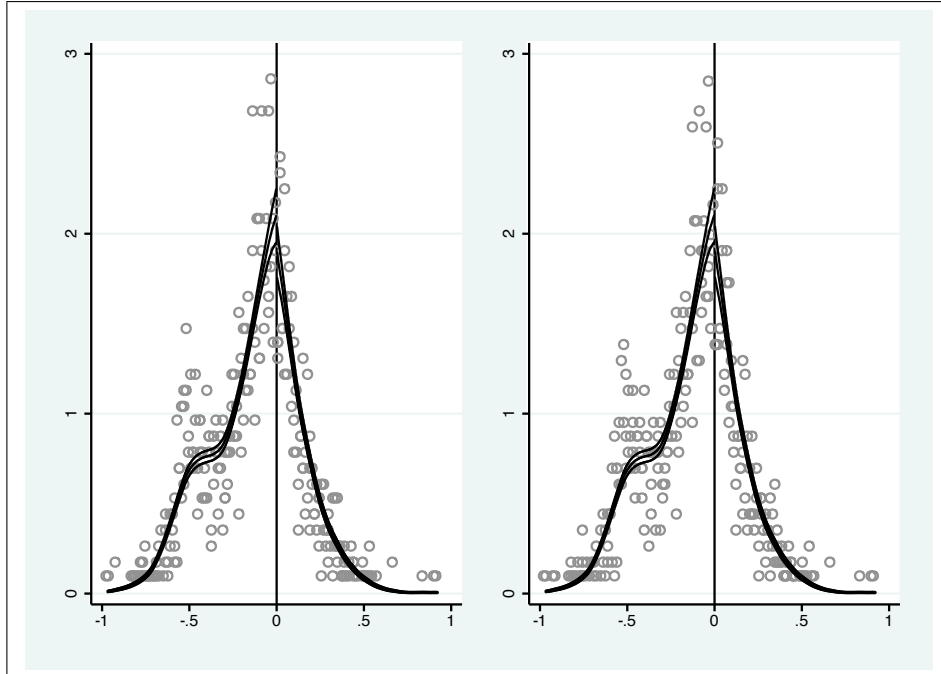
- T-test of the outcomes in close elections (Table A1);
- Test of the continuity of the density for different sub-samples (Figure A1);
- Placebo tests based on permutation methods (Figure A2).

Table A1: Outcomes: Female vs Male

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
MV Interval	Female	obs	Male	obs	p-value	Female	obs	Male	obs	p-value	Female	obs	Male	obs	p-value
	<i>Total transfers</i>														
[-5; +5]	2.956	271	2.355	284	0.000	2.508	271	1.840	284	0.000	0.449	271	0.515	284	0.512
[-7.5; +7.5]	2.978	372	2.395	408	0.000	2.454	372	1.840	408	0.000	0.523	372	0.556	408	0.721
[-10; +10]	2.481	508	2.985	528	0.000	2.445	508	1.900	528	0.000	0.540	508	0.581	528	0.611
	<i>No pre-natal visits</i>														
[-5; +5]	0.023	324	0.031	340	0.028	0.953	324	0.947	340	0.128					
[-7.5; +7.5]	0.021	448	0.031	496	0.001	0.954	448	0.949	496	0.091					
[-10; +10]	0.021	602	0.029	648	0.000	0.954	602	0.949	648	0.051					
	<i>Overall corruption</i>														
[-5; +5]	0.688	16	0.904	21	0.099										
[-7.5; +7.5]	0.667	27	0.897	29	0.037										
[-10; +10]	0.697	33	0.872	39	0.070										
	<i>Temporary public employees</i>														
[-5; +5]	2.772	84	3.396	94	0.037	1.221	84	1.281	94	0.844					
[-7.5; +7.5]	2.791	114	3.238	130	0.080	1.156	114	1.176	130	0.932					
[-10; +10]	2.846	156	3.081	170	0.302	1.182	156	1.953	170	0.778					
	<i>Re-election probabilities</i>														
[-5; +5]	0.200	60	0.348	66	0.064	0.566	60	0.500	66	0.458					
[-7.5; +7.5]	0.224	85	0.351	91	0.062	0.576	85	0.554	91	0.768					
[-10; +10]	0.254	114	0.367	120	0.064	0.544	114	0.578	120	0.595					

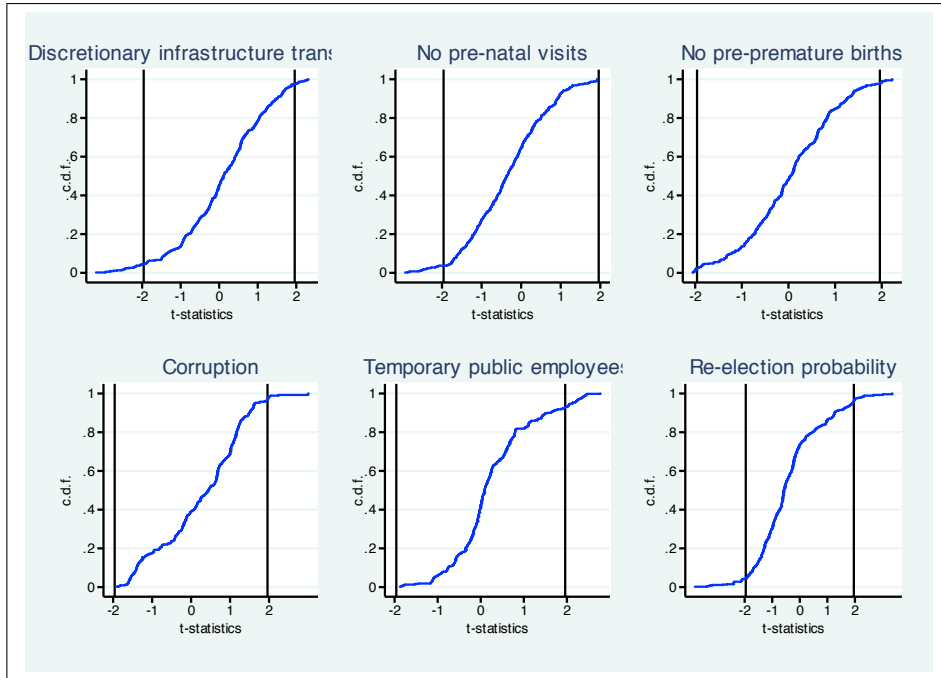
Notes. Mean-comparison tests for samples of municipalities with the female mayors vs male mayors. Different intervals of Margin of Victory of the female candidate are considered in the two-candidates gender mixed races sample. Variables: *Total infrastructure transfers*, *Discretionary infrastructure transfers* and *Non discretionary infrastructure transfers* are yearly transfers from the federal government to municipalities (per-capita real values in 2000 Brazilian reais). *No pre-natal visits* is the yearly fraction of pregnant women without any pre-natal visit before the delivery at the municipality level. *No pre-mature births* is the yearly fraction of births that are not pre-mature at the municipality level. *Charges of overall corruption* and *Charges of illegal procurement practices* is the fraction of audited municipalities with at least one corruption episode and with at least one episode of each one of illegal procurement practices, respectively. *Temporary public employees* is the log of the number of temporary public employees hired to work in the public administration and *Permanent public employees* is the log of the number of non-temporary public employees hired to work in the public administration. *Re-election probabilities* and *Re-run probabilities* are equal to one whether the mayors in their first mandate won/run the subsequent election and zero otherwise

Figure A1: McCrary Test for Other Mixed Gender Races Samples



Notes. Weighted kernel estimation of the log density of the running variable (Margin of Victory of the female candidate) performed separately on either side of the zero Margin of Victory threshold. $MV_{it} > 0$ when the winner candidate in the municipality i and mandate t is female, $MV_{it} < 0$ when the winner candidate in the municipality i and mandate t is male. Optimal bin-width and bin-size as in McCrary (2008). We are presenting the tests for the following mixed races samples: left panel considers all races where the two first candidates are a man and a woman (discontinuity estimate: point estimate -0.095 and standard error (0.054)), right panel considers all races where in the first three candidates there are at least one man and one woman (discontinuity estimate: point estimate -0.094 and standard error (0.054)). All samples consider 2000 and 2004 municipal elections.

Figure A2: Placebo Tests for Outcomes



Notes. The figure reports the empirical c.d.f. of the t-statistics from a set of red estimations at 580 false thresholds below and above the true threshold at Margin of Victory of the female candidate equal zero (namely, t-statistics from regressions that consider margin of victory from -30% to -1% as fake cutoffs and t-statistics from regressions that consider margin of victory from 1% to 30% as fake cutoffs).