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# Women in politics: effects of electing mayors on the public finances of Brazilian municipalities

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## Abstract

This paper investigates what is the effect on Brazilian municipal public finances of electing women to the position of head of the local executive branch. By performing a Discontinuous Regression Design (RDD), the results indicated that there is no effect of elected women on municipal fiscal balance. However, the findings point towards personnel and social expenditures. As a mechanism, the paper identifies that there is a greater hiring of education and health professionals as a result of the election of Women Mayors. These results were robust to other specifications and placebo tests. The article brings contributions to the fiscal literature, especially the Brazilian one, as well as enhances research that studies gender differences and its various effects on the social environment.

**Palavras chaves:** Elections. Women. RDD. Public Finance. Social Expenditure.

**JEL:** D72. J16. H50.

# SUMÁRIO

## 1.1 Introduction

Recent years have shown an increase in women's participation in the political sector (Baskaran and Hessami, 2018). Largely, the literature points out that this presence is a positive force for the system with improvement in health indicators (Chattopadhyay and Duflo, 2004; Beaman et al., 2012; Clots-Figueras, 2011, 2012; Brollo and Troiano, 2016), education (Beaman et al., 2012), and economic performance (Baskaran and Hessami, 2018). However, there is no consensus when assessing the effect of electing women on public finances (Baskaran and Hessami, 2019). Research in India has indicated an increase in education and health spending as a result of women's election (Chattopadhyay and Duflo, 2004; Clots-Figueras, 2011) while recent studies report that the election of women in the United States (Ferreira and Gyourko, 2014), Spain (Bagues and Campa, 2021), Italy (Baltrunaite et al, 2019; Casarico, Lattanzio and Profeta, 2021) and in Norway (Geys and Sørensen, 2019) do not significantly affect the composition of public spending. In the Brazilian case, Rocha, Fernandez Orellano, and Bugarin (2018) failed to analyze gender differences in fiscal indicators.

Given this gap in the literature, I bring new evidence to this debate by investigating whether women make different decisions about the level and composition of local public spending and revenues, as well as studying through which mechanisms this phenomenon occurs. To this end, I use a Regression Discontinuity Design (RDD) with data from 4 Brazilian electoral terms between 2004 and 2019 to estimate the effect of electing a female mayor, similar to other research that has explored women's outcomes in public policy (Brollo and Troiano, 2016; Ferreira and Gyourko, 2014; Bhalotra and Clots-Figueras, 2014; Bhalotra, Clots-Figueras, and Iyer, 2018).

I found no statistically significant effects on the total size of revenues and expenditures in Brazilian municipalities when analyzing the discontinuity in fiscal outcome variables. This result holds across several specifications. Brollo and Troiano (2016) had already pointed out the high dependence of Brazilian municipalities on mandatory federal transfers and the impossibility for a mayor to considerably raise taxes and local government size.

On the other hand, when analyzing the composition of expenditures, the results are different. There is an increase in the share of social expenditures of approximately 3 p.p., due to the election of women to the position of head of the local executive branch. I define social expenditures as the aggregate of spending on education, health, culture and social assistance (Gouvêa and Girardi, 2021). This result differs from recent studies in developed countries that found no gender differences in fiscal policies (Geys and Sørensen, 2019; Casarico, Lattanzio, and Profeta, 2021; Bagues and Campa, 2021). Baskaran and Hessami (2019) show that the effect of women on public finances may be underestimated in developed countries because these countries already allocate large portions of their budget to the social area.

When analyzing the economic category of expenditures, the indicators show that mayors spend more on personnel - with an average allocation of 2% more in the budget share. There is a decrease in Other Current Expenditures in the same proportion, and there are no effects on public investments. In this sense, it is inferred that there is only a reallocation within the Costing Expenditures with no impact on government investments. Still, there was no effect on the indicator of personnel expenditures in relation to net current revenue, which allows us to infer that there is no immediate greater indebtedness because of this increase in spending.

The results pointed out that the election of women increases social spending and the share of personnel expenditures in the municipality. To identify the mechanisms that explain this phenomenon, I analyze data from the Annual Social Information Report - RAIS and observe that there is a higher hiring of education and health professionals in the municipal public sector and a higher average salary of these professionals. This result is similar to research that has explored the effect of women in politics in developing countries (Chattopadhyay and Duflo, 2004; Clots-Figueras, 2011, 2012; Beaman et al., 2012; Baskaran and Hessami, 2019).

Detraz and Peksen (2018) point out that government fiscal commitment to social policies is positively related to female participation in the total labor force and in national politics. Therefore, discontinuity among Women Mayors may be occasioned in municipalities that already carried out more social spending before their term in office. In this sense, I follow the specification of Gouvêa and Girardi (2021), analyzing the expenditures in each year of the mandate, and I also observe if the social expenditures of the previous mandate explain the present discontinuity. In both, the hypothesis that past social spending influenced the observed discontinuity is rejected.

In terms of the contributions of this paper, the main result of the article goes in the opposite direction to recent research that has addressed this issue in developed countries (Geys and Sørensen, 2019; Casarico, Lattanzio and Profeta, 2021; Bagues and Campa, 2021) in addition to bringing a broader set of results and with a more recent time period (2004-2019) when female presence in local governments became more widespread. It also extends the results found for developing countries (Chattopadhyay and Duflo, 2004; Clots-Figueras, 2011; Bhalotra and Clots-Figueras, 2014; Baskaran and Hessami, 2018). In addition, it captures mechanisms identifying that the increase in social spending occurs as a result of hiring health and education professionals in addition to increasing their salaries. From a methodological point of view, the analysis through RDD allows to rigorously control for the different dimensions of heterogeneity.

The article begins with this introduction, followed by Section 1.2, which presents the institutional and theoretical framework used. Next, Section 1.3 presents the data and the empirical methodology employed. The presentation of the results occurs in Section 1.4 by segmenting the main findings and robustness tools. Finally, Section 1.5 presents the final considerations, limitations, and suggestions for further studies.

## 1.2 Theoretical Review

### 1.2.1 Women's participation in politics

Women's participation in politics is still low (Baskaran and Hessami, 2019). The Global Gender Gap Index analyzes the evolution of gender-based gaps along four dimensions (economic participation and opportunity; educational attainment; health and survival; and political empowerment) and tracks progress toward closing this gap over time. The 2021 report points out that at the current pace, equality in political empowerment between men and women would only be achieved in 145 years. In the national context, Brazil occupies - in 2021 - position 108 in the ranking of women's political empowerment.

Despite the low female participation in politics, it has been growing in recent decades. With the advancement of women's participation in political positions, the number of studies evaluating this impact has increased. The promotion of female participation in politics is justified on equity grounds (Stevens, 2007), since women represent 50% of the general voting population. Their participation in politics can also generate incentives for other women to want to pursue political careers (Gilardi, 2015).

Initially, women began to have more interest in running for political office (Fox and Lawless, 2004). In addition, countries and political parties developed gender quota systems as an incentive for female participation in politics (Kunovich and Paxton, 2005; Julio and Tavares, 2017). Collaborating with this are the decrease in prejudice (SchwindtBayer, 2010) and female empowerment policies (Baltrunaite et al., 2019). Exposure to female representation can have a powerful effect on how voters perceive women (Hessami and da Fonseca, 2020), as they have the opportunity to debunk entrenched biases and prove their worth (Beaman et al., 2012). In turn, the effect is not always clear in the literature. Bagues and Campa (2021) point out that after three rounds of local elections under a quota on candidate lists in Spain, women still do not reach influential positions, such as party leader or mayor.

The welfare outcomes of female leadership are also explored in the literature. Quasi-experimental studies began to explore the Indian setting because of the policy, instituted in 1993, of quotas for women in political office. Due to the randomness of the assignment mechanism, researchers were able to attribute differences in policy outcomes to the presence of a female village leader. As a result, villages assigned to a female leader provided more public goods (Beaman et al., 2012), which better reflect women's preferences and whose quality is at least as high as in unreserved villages (Chattopadhyay and Duflo, 2004). As a consequence, it has been observed that children do better on health dimensions, girls spend less time on household chores, and the difference in educational attainment decreases significantly in villages with a female leader than in those with a male leader (Beaman et al., 2012).

In the same vein, Baskaran and Hessami (2019), indicate that a higher proportion of female city councilors affects the expansion of the number of public childcare slots. When looking at institutions, Dollar, Fisman, and Gatti (2001); Swamy et al. (2001) found a negative relationship between female representation and different measures of corruption, relying on survey data from large samples from developed and developing countries. Beaman et al. (2012) show that residents in villages with councils reserved for women in India are less likely to pay bribes. Kumar and Sarangi (2018) point out that the presence of women in parliament has a causal and negative effect on corruption.

Some recent research highlights the divergence in the literature of the effect of women holding political office. Aldrich and Lotito (2020) point out that countries led by women had similar COVID-19 mortality to those led by men. In contrast, Garikipati and Kambhampati (2021) show that countries led by women had better outcomes than those led by men and attributes these differences to early adoption of personal protective equipment by female leaders. Sergent and Stajkovic (2020), meanwhile, show that female-led states had fewer COVID-19 deaths.

In Brazil, Brollo and Troiano (2016) run RDD estimates using data from elections for mayor and find a negative impact of female representation on corruption, measured objectively by random audits of local administrations. In addition, the same study points out that women have greater ability to raise funds by covenant and deliver better results in decreasing infant mortality. Bruce et al. (2022) analyzes the effect of Women Mayors in managing the pandemic COVID-19 and provide evidence that municipalities under female leadership had fewer deaths and hospitalizations per 100,000 population and applied more non-pharmaceutical interventions (e.g., use of masking and banning of meetings).

### 1.2.2 Women in politics and effects on public finances

Public finances are one of the main mechanisms for policy implementation. In this sense, the characteristics of the policy implemented are expected to be reflected in the composition and structure of the government budget. In this sense, research explores the composition of public finances, either in theoretical models (Alesina and Tabellini, 1987; Persson, Roland, and Tabellini, 2000) or in empirical research that relates them to factors such as immigration (Preston, 2014) and political parties (Ferreira and Gyourko, 2014; Gouvêa and Girardi, 2021).

On women's participation in public finance, there is divergence of effects in the literature. Bagues and Campa (2021) use RDD estimates to assess the impact of introducing a gender quota on candidate lists in Spain and find no impact of increased female representation on the composition or size of public spending. Geys and Sørensen (2019) explore gender quotas on candidate lists for local executive council in Norway and report that it does not affect local spending patterns. In the same vein, Ferreira and Gyourko (2014) also point out that gender does not matter for political decisions on the size and composition of municipal spending. Baltrunaite et al. (2019) report that an 18-percentage point increase in the proportion of female local councilors - due to a reform of the electoral system in Italy - did not affect the structure of public spending.

Casarico, Lattanzio and Profeta (2021) use RDD to analyze the election of mayors in Italian municipalities over the period 2000-2015 and find no significant differences in the policies implemented by mayors and Women Mayors. However, when exploring spending heterogeneity, they find evidence that Women Mayors devote a larger share of spending to the environment when there are more women on the municipal council, while they reduce the amount of resources allocated to social spending in the second round compared to the single round system.

However, some recent studies suggest that the effect of women politicians may be underestimated (Hessami and da Fonseca, 2020). Baskaran and Hessami (2019), provide evidence for a significant effect of female political representation on political choices. The authors explore an open-list electoral system in Bavaria. A female victory in the election accelerated the expansion of public daycare provision by 40-50%. Using detailed information from council meetings, the authors also show that an additional woman on the council leads to more frequent discussions about childcare and induces all women councilors to discuss the public budget more. Chattopadhyay and Duflo (2004) found that female leaders in India allocate more resources to investments that are more relevant to their own gender.

Lippmann (2020), in turn, takes advantage of the near-random variation in women entering the legislature through affirmative action and mixed-gender close elections to analyze the amendments submitted by legislators and finds that female legislators are much more likely to author amendments on women's or children's and health issues than male legislators. The finding reiterates the importance of examining more closely the actions of individual officeholders in investigating their (potential) impact on policy. Funk and Gathmann (2014) show that in Switzerland referendum women support allocating resources to health, environmental protection, defense, and welfare.

In analyzing Brazilian elections, Brollo and Troiano (2016) point out that Women Mayors are more able to get budget resources from covenants-non-mandatory transfers-and indicate a better ability of women to get extra resources to allocate to other budget expenditures.

### 1.2.3 Brazilian Elections

Brazil is a continental federative country. Its federative structure is composed of three federative levels: (i) the Union (Federal Government), (ii) 26 states, 1 Federal District, and (iii) 5570 municipalities. The Brazilian Constitution was passed in 1988 and grants Brazilian municipalities the status of autonomous federative entities. Thus, they are not subordinated to the states and the Union, have local elections for the Legislative and Chief Executive branches, have tax jurisdiction and financial transfers assured by legislation.

Each municipality has a single mayor and a municipal legislature, which is elected every four years. Municipal elections are regulated by federal legislation, and all municipalities have the same election and inauguration dates. The municipalities are not divided into districts, so elections are free.

The election legislation for Brazilian municipalities establishes that, in municipalities with more than 200,000 voters, a second round must be held if no candidate reaches an absolute majority in the vote count. In this case, the dispute is between the two candidates with the most votes in the first round. In addition, the Constitution establishes that mayoral elections must be held under the plurality system with a single vote in municipalities with less than 200,000 voters, while municipalities with 200,000 voters must hold a second round of voting if an absolute majority of votes is not reached. The effects of this electoral particularity can be seen in Fujiwara (2011).

According to the official website of the Superior Electoral Court[1], the mayors' duties, which are not exhaustive, are (i) to develop the city's social functions and ensure the well-being of its inhabitants; (ii) to organize public services of local interest; (iii) to promote urban development and land use planning; (iv) to implement and maintain, in good working order, municipal health clinics, schools and day-care centers, in addition to providing school transportation for children.

### 1.2.4 Municipal Public Finance

Among the duties of the mayors are those of managing municipal revenues and expenditures. In this sense, in Brazilian municipalities - as well as at the federal and state levels - the Executive Branch has a dominant role in the preparation, approval and execution of the budget. For the Legislative Branch, there is a limitation that consists mainly in amending limited parts of the budget bill prepared by the Executive and, after spending has occurred, auditing and reviewing municipal expenditures (Gouvêa and Girardi, 2021). Although many categories of expenditures have been decentralized to the cities, tax collection remains quite centralized at the federal and state levels. As a consequence, municipalities have relatively low self-financing capacity and are highly dependent on mandatory intergovernmental transfers (Brollo and Troiano, 2016; Gouvêa and Girardi, 2021).

Since the enactment of the Fiscal Responsibility Law (LRF) in 2000, municipalities (as well as other levels of government) face strong restrictions on their deficit levels. Furthermore, in order to unify the national accounts and promote better monitoring of public accounts, the Federal Government is responsible for promoting, by June 30th, the consolidation of the federal units' accounts for the previous year. This aggregation is consolidated in FINBRA and allows us to explore information on the dimension of expenditure allocation by budget function or economic category of expenditure.

1 Available at: https://www.tse.jus.br/imprensa/noticias-tse/2016/Setembro/conheca-as-principais-atribuicoes-do-prefeito, accessed 20/09/2021.

The function and subfunction codes are established by Ordinance No. 42/1999 - Ministry of Planning, Budget and Management (MPOG). The function is understood as the highest level of aggregation of the various areas of expenditure that compete with the public sector, i.e., it seeks to classify in which area of governmental action the expenditure is being made. Examples of budgetary functions are education, health, social security, security, among others. The sub-function represents a partition of the function, aiming to aggregate a certain subset of public sector expenditures. Examples of sub-functions are basic education, higher education, basic health, planning and administration, etc. The legislation above also states that interaction between functions and sub-functions is possible. For example, sub-functions primarily assigned to the health function can be allocated to the education function depending on the policy to be implemented.

In turn, the classification by economic category of expenditure aims to inform “what” the municipality is spending on. It initially segments the expenditures into current and capital expenditures. Within the current expenditures we have the expenditures with personnel payment and benefits (salaries, aids to public servants, among others) and other current expenditures (per diems, consumption materials, rents, services, among others). In turn, in the capital expenditures we have the expenditures with investments that involve the execution of works, equipment acquisitions, among others. A detailed analysis of all the classifications of expenditure can be found in the Budget Technical Manual (SOF, 2020).

## 1.3 Methodology

### 1.3.1 Overview of the model and definition of the running variable

Local policy outcomes depend on many city-specific factors. This implies that simply comparing cities with male and Women Mayors can create selection bias in the estimation. Increasingly, we seek to make reliable causal inferences, and a non-experimental empirical tool meets a very important quality standard if it can reproduce the results of a randomized experiment (Angrist and Pischke, 2008, 2010; Cattaneo, Idrobo, and Titiunik, 2020; Cunningham, 2021). To this end, I define $\Upsilon_{it}(1)$ as a potential municipality outcome $i$ if the mayor is a woman and $\Upsilon_{it}(0)$ the potential outcome if the mayor is male, in time period $t$.

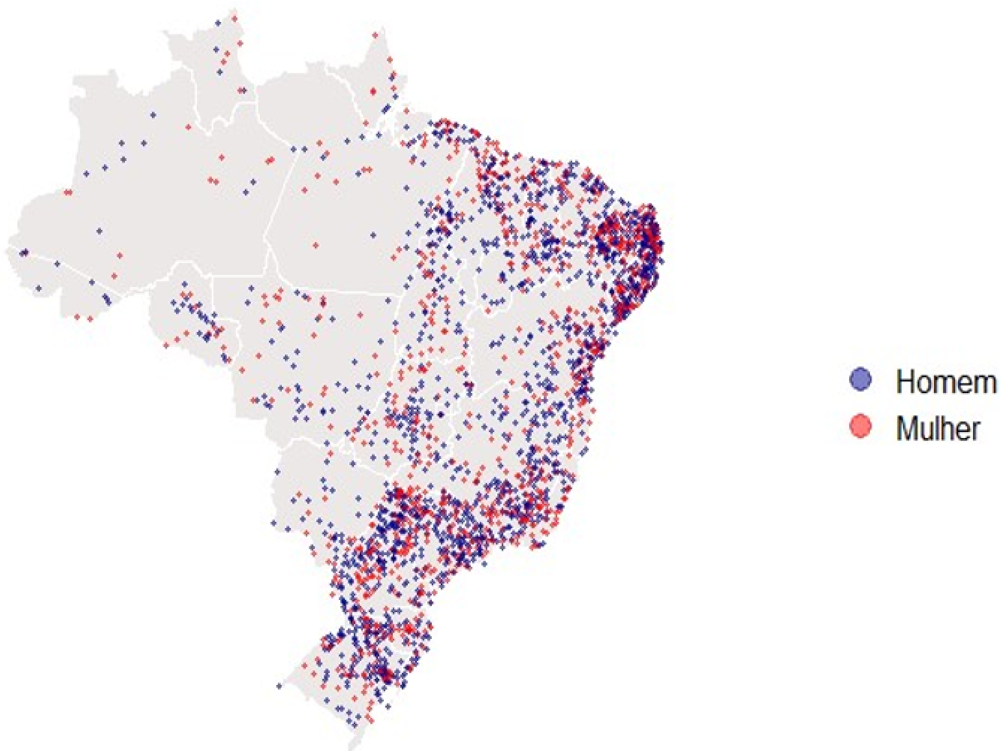
What I seek in the article is to estimate the potential outcome of electing a female mayor, therefore, $E(\Upsilon_i(1) - \Upsilon_i(0) \mid \forall \in \Omega)$ The problem with causal inference is precisely not observing the same outcome in both situations. In this regard, the use of Regressions Discontinuity Designs (RDDs) has exploded in the last decade (Eggers et al., 2018). In an RDD design, individuals are dichotomously assigned to a treatment if they cross a certain cutoff of a continuous, observable variable, while those who fail to cross the cutoff form the control group.

The empirical strategy used in this paper is similar to that used in other research studying effects of elected candidates in so-called "close elections" (Meyersson, 2014; Brollo and Troiano, 2016; Cattaneo, Idrobo, and Titiunik, 2020). Recent research has found this methodology to be valid for studying this issue (Hyytinen et al., 2018). This study uses the Margin of Victory (MV) of gender elections as a running variable. To do so, it compares municipal elections from 2004, 2008, 2012, and 2016 that had a woman first place and a man second place and a man first place and a woman second place.

The Victory Margin - $MV_{it}$ can be viewed as a random variable depending on observable and unobservable variables as well as random events on election day. This paper analyzes 4 electoral terms - 2005-2008; 2009-2012; 2013-2016; 2017-2019 - using electoral data from the Superior Electoral Court (TSE). In this period, there were 3,992 gendered elections - elections that had a woman contesting with a male candidate. Elections that were contested in court and candidates sub judice were excluded from the database. It should be noted that, depending on the variable explained, the number of observations may decrease considering data availability. Picture 1.1 plots the geographical distribution of the elections and the number of male and female candidates. Table 1.1 presents the descriptive data.

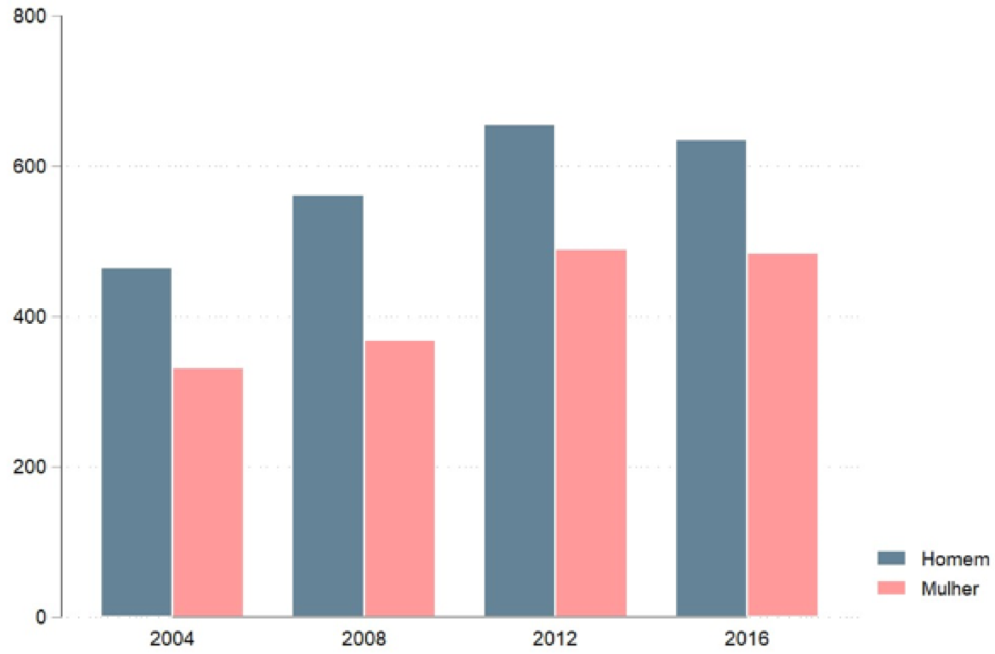
**Picture 1.1** - Spatial distribution and elections held

Panel (A) - Analyzed elections and spatial distribution




Man (blue) | Woman (red)

Panel (B) - Elected Candidates




Note: Panel A plots the spatial locality of the gendered elections analyzed in this paper. Panel B plots the number of elected male and female candidates who participated in a gender election.

**Table 1.1** - Descriptive Statistics

| Electoral Characteristics | | | | | |
|---|---|---|---|---|---|
| **Panel (A)** | **Total Share** | **Men** | | **Women** | |
| | | **Share** | **Obs.** | **Share** | **Obs.** |
| Election 2004 | 0.200 | 0.201 | 2,317 | 0.198 | 1,674 |
| Election 2008 | 0.233 | 0.242 | 2,317 | 0.220 | 1,674 |
| Election 2012 | 0.287 | 0.283 | 2,317 | 0.293 | 1,674 |
| Election 2016 | 0.280 | 0.274 | 2,317 | 0.289 | 1,674 |
| left | 0.250 | 0.267 | 2,317 | 0.226 | 1,674 |
| PT | 0.0814 | 0.0824 | 2,317 | 0.0800 | 1,674 |
| PSDB | 0.139 | 0.138 | 2,317 | 0.139 | 1,674 |
| PP | 0.0772 | 0.0721 | 2,317 | 0.0842 | 1,674 |
| PMDB | 0.192 | 0.185 | 2,317 | 0.201 | 1,674 |
| North | 0.0995 | 0.100 | 2,317 | 0.0986 | 1,674 |
| Northeast | 0.409 | 0.404 | 2,317 | 0.418 | 1,674 |
| South | 0.151 | 0.154 | 2,317 | 0.148 | 1,674 |

| | | | | | |
|---|---|---|---|---|---|
| Southeast | 0.252 | 0.254 | 2,317 | 0.249 | 1,674 |
| Midwest | 0.0879 | 0.0885 | 2,317 | 0.0872 | 1,674 |

| Regional Features | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Panel (B)** | **Total** | | **Men** | | | **Women** | | |
| | **Average** | **sd** | **Average** | **sd** | **Obs.** | **Average** | **sd** | **Obs.** |
| phone | 0.751 | (0.174) | 0.751 | (0.177) | 2,317 | 0.751 | (0.169) | 1,674 |
| no income | 0.394 | (0.0840) | 0.394 | (0.0846) | 2,317 | 0.395 | (0.0831) | 1,674 |
| uneducated | 0.646 | (0.0971) | 0.644 | (0.0994) | 2,317 | 0.648 | (0.0938) | 1,674 |
| fundamental | 0.153 | (0.0310) | 0.153 | (0.0315) | 2,317 | 0.152 | (0.0304) | 1,674 |
| top | 0.0383 | (0.0251) | 0.0392 | (0.0263) | 2,317 | 0.0372 | (0.0232) | 1,674 |
| ln_density | 3.144 | (1.428) | 3.150 | (1.440) | 2,317 | 3.136 | (1.411) | 1,674 |
| alphabetizes | 0.833 | (0.0924) | 0.835 | (0.0927) | 2,317 | 0.831 | (0.0920) | 1,674 |
| urban | 0.629 | (0.216) | 0.630 | (0.219) | 2,317 | 0.628 | (0.213) | 1,674 |
| rural | 0.371 | (0.216) | 0.370 | (0.219) | 2,317 | 0.372 | (0.213) | 1,674 |
| population | 9.383 | (1.068) | 9.408 | (1.080) | 2,317 | 9.348 | (1.050) | 1,674 |

The table presents the descriptive data used. Panel (A) reports electoral characteristics. share represents the percentage as a proportion of the total. Panel (B) reports institutional and regional characteristics from the period before the elections using data from IBGE. sd represents the standard deviation of the sample.

### 1.3.2 Description of the financial variables

In order to analyze the fiscal effects of a mayor being elected, this article uses outcomes that indicate the composition of the budget and fiscal result. With the publication of the Fiscal Responsibility Law, the Federal Government is responsible for promoting the consolidation of the accounts of the federative units. With this, FINBRA (Public Finance Brazil) consolidates the financial execution data of the municipalities.

To construct the fiscal result financial variables two FINBRA data reports were used: (i) budget revenues, (ii) budget expenditures segmented by economic category. The criteria for creating the Primary Result are those available in the Manual of Fiscal Statements (MDF) and Table 1.2 shows the construction of these variables. To perform the logarithmic transformation of these variables, given that the result may present a negative sign, we used a function used in studies (Busse and Hefeker, 2007) that explore the result in private finance where $y = \ln(x + \sqrt{(x^2+1)})$

**Table 1.2** - Fiscal Result Variables

| Variable | Includes | Excludes |
|---|---|---|
| Current Revenues (1) | Taxes, Fees and Improvement Contributions;<br>Contributions;<br>Asset;<br>Other Asset Revenues;<br>Current Transfers | Financial Investments;<br>Other Financial Revenues |
| Capital Revenues (2) | Disposal of Assets;<br>Other Disposal of Assets;<br>Capital Transfers;<br>Covenants; Other<br>Capital Transfers; Other Capital Revenue | Credit Operations;<br>Loan Amortization;<br>Revenues from Disposal of Temporary Investments;<br>Revenues from Disposal of Permanent Investments |
| Current Expenditures (3) | Personnel and Social Charges;<br>Other Current Expenditures;<br>Constitutional and Legal Transfers; Other<br>Current Expenditures | Interest and Debt Charges |
| Capital Expenditures (4) | Investments;<br>Financial Investments | Granting of Loans and Financing;<br>Acquisition of Paid-in Capital Securities;<br>Acquisition of Credit Securities;<br>Debt Amortization |
| Fiscal Result (E) | | (1) + (2) - (3) - (4) |
| Current Results | | (1) - (3) |

The table reports the criteria for constructing the primary result variables using data from FINBRA/STN. These can be analyzed in detail in the Fiscal Reporting Manual accessed 11/11/2021: https://www.tesourotransparente.gov.br/publicacoes/manual-de-demonstrativos-fiscais-mdf/40050.

To analyze the composition of budget revenues and expenditures, in addition to the aforementioned, the budget function report was used to find out in which area the municipal financial resources were allocated. The variables were calculated in per capita volume and as a ratio of the budget (budget share). All financial values were deflated to 2020 values by means of the IPCA made available by the Central Bank of Brazil.

### 1.3.3 Specification of the econometric model

The standard assumption of RDD is that the potential outcomes should be a continuous function of the variable running on the boundary (Hahn, Todd, and der Klaauw, 2001; Cattaneo, Idrobo, and Titiunik, 2020). The estimate of interest is given by $\beta = \lim_{MV\downarrow 0} E[\Upsilon \mid MV] - \lim_{MV\uparrow 0} E[\Upsilon \mid MV]$ and $\Upsilon$ is the level of the analyzed outcome. The one-set estimation of the effect of electing a female mayor on a given variable is given by:

$$\Upsilon_{it} = \beta 1[MV_{it} \geq 0] + f(MV_{it}) + \psi X_{it} + \epsilon_{it}$$

Where $\Upsilon_{it}$ is the variable of interest in municipality $i$ in term $t$, $1[MVit \geq 0]$ is a variable equal to 1 if the elected candidate is a woman and $f(MV_{it})$ is a continuous function of the margin of victory[2]. $X_{it}$ is a covariate vector containing fixed effects of the units of the federation (states) used to improve the efficiency of the estimator (Calonico et al., 2019). In addition, this variable is important to isolate state characteristics of public finance such as, for example, oversight by state audit courts and state-specific management systems. $\epsilon it$ is the idiosyncratic error of the model.

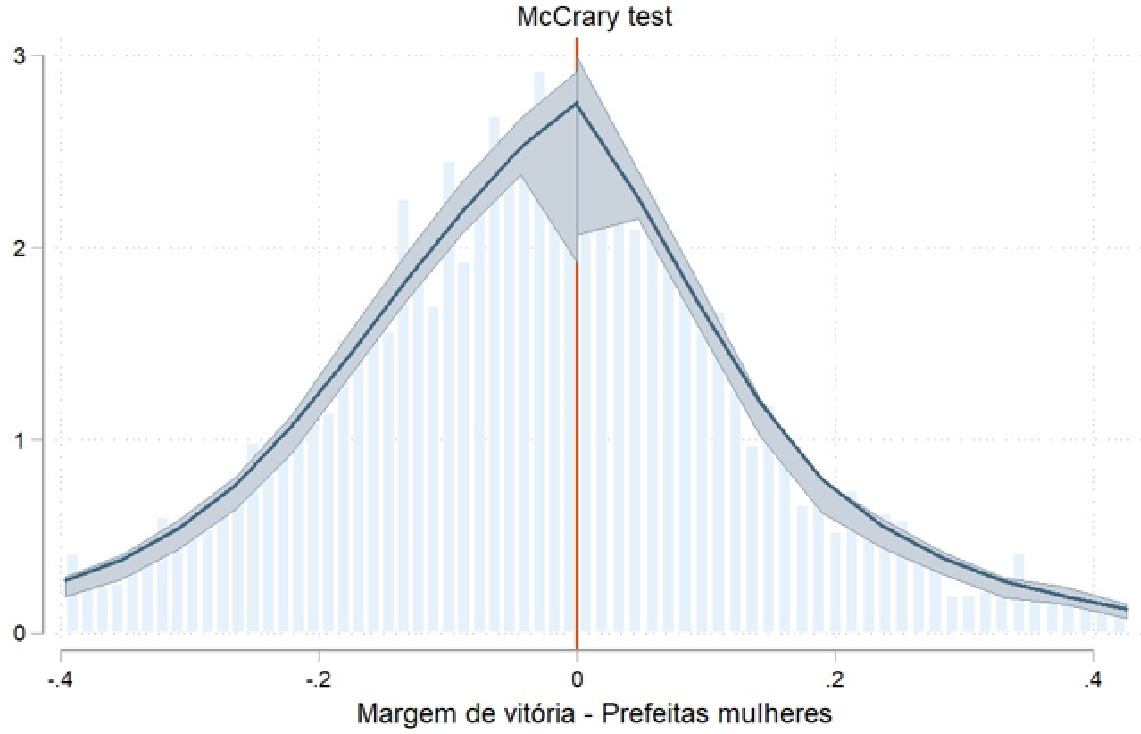
A pressing question is: what is the optimal cutoff distance to perform the estimation? The estimations in this paper use the bandwidth selection described by Calonico, Cattaneo and Farrell (2019) and used in recent research applying RDD (Gouvêa and Girardi, 2021; Casarico, Lattanzio and Profeta, 2021).

To rule out endogenous electoral selection for treatment, which could be caused, for example, by strong preferences for Women Mayors, a standard practice is to show the absence of a density discontinuity around the cutoff. To examine this issue, the McCrary Density Test (McCrary, 2008) is performed with the robust estimation implemented by (Cattaneo, Jansson and Ma, 2020) - used in recent research (Gonzalez-Eiras and Sanz, 2021; Gonzalez, 2021). This test checks null hypothesis of no discontinuity of the running variable around the cutoff point. The results shown in Picture 1.2 indicate that there is no such natural selection.

2 As a default, a Triangular Kernel Function is used that fits the regression around the cutoff. With this approach, one locates the polynomial fit to the cutoff (discarding observations far enough away) and employs a low-order polynomial approximation (usually linear or quadratic).

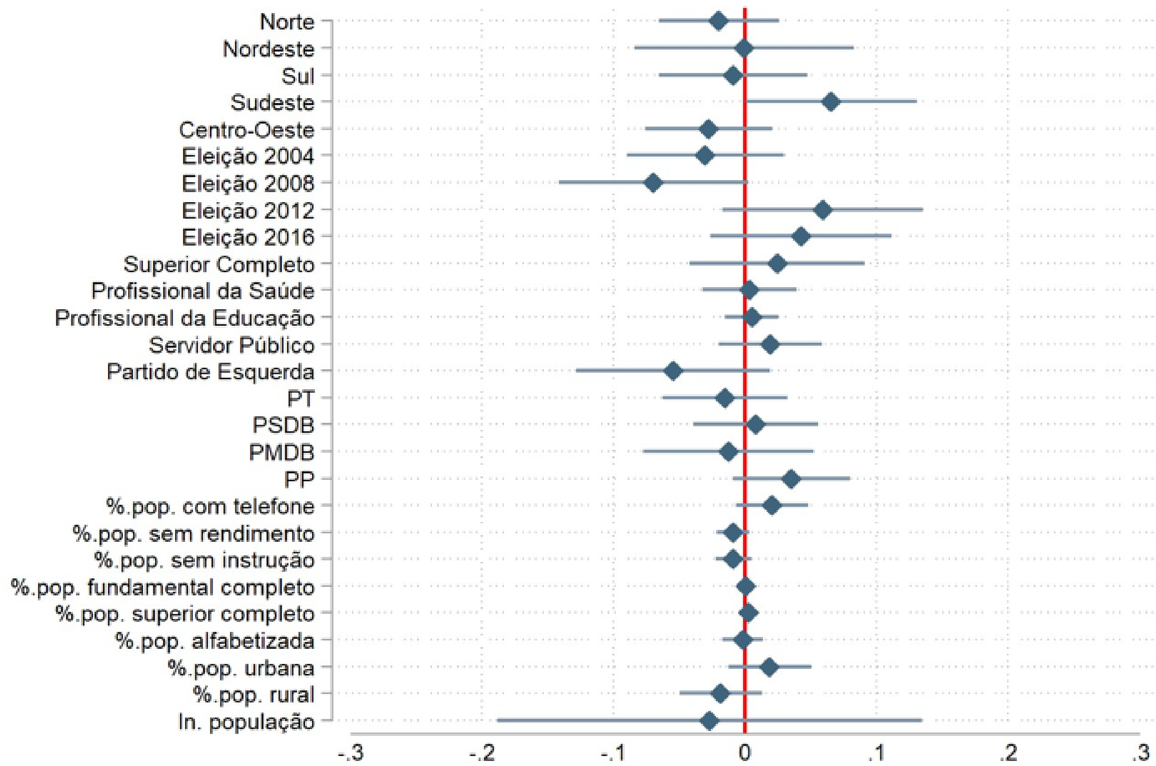
**Picture 1.2** - McCrary's density test and estimated discontinuity in institutional characteristics

Panel (A) - McCrary's density test




Victory Margin – Women Mayors

Panel (B) - Estimated discontinuity in institutional characteristics




Note: Panel (A) plots the result of the McCrary(2008) test. Statistical significance level 95%. Results indicate that there is no endogenous discontinuity in the running variable. Estimates show t.0.3025 and p>0.7622 in the unrestricted - vce jackknife specification and t.0.1135 and p>0.9096 in the restricted - vce plugin specification. Panel (B) plots the result of the discontinuity in institutional characteristics around the cutoff. 95% confidence interval

To strengthen the evidence suggested by the mentioned tests, as well as to rule out that endogenous institutional characteristics are the true drivers of the estimated effect, as approached by (de la Cuesta and Imai, 2016). The discontinuity of these covariates before the treatment suggests that the institutional framework is driving the outcome. The results in Picture 1.2 reject this hypothesis.

## 1.4 Results and discussion

### 1.4.1 Tax Result

The Fiscal Responsibility Law - LRF defined the control of public debt as one of the main focuses of a fiscally responsible management. The primary result is given by the comparison between primary revenues and expenditures and a positive result can be understood as an effort directed to reduce the public debt stock.

Analyzing the impact of electing a woman mayor on fiscal results is therefore important to know whether the gender difference can influence the trajectory of public debt. In this sense, the main results are presented in Table 1.3. Columns 1 and 4 bring the log of the average fiscal outcome in the electoral mandate. Columns 2 and 5, in turn, present the average of the per capita result in the mandate years and, in turn, in columns 3 and 6 the transformation into $log$ of the per capita data, as specified in the previous section. In columns 1, 2 and 3 the entire Primary Result is analyzed and in columns 4, 5 and 6 the Current Fiscal Result.

**Table 1.3** - Result of women's election in fiscal variables - RDD

| Panel (A) - Linear | Fiscal Result | | | Current Results | | |
|---|---|---|---|---|---|---|
| | (1) log | (2) per capita | (3) log. per capita | (4) log | (5) per capita | (6) log. per capita |
| Coef. | 0.1351 | 7.8750 | 0.3119 | 0.1575 | 13.7770 | 0.2691 |
| Robust p-value | 0.846 | 0.872 | 0.192 | 0.781 | 0.795 | 0.183 |
| Std. Error. | (0.697) | (48.841) | (0.239) | (0.567) | (53.030) | (0.202) |
| Remarks | 3,966 | 3,969 | 3,969 | 3,969 | 3,969 | 3,969 |
| Bandwidth | 0.108 | 0.108 | 0.0947 | 0.109 | 0.0907 | 0.0893 |
| Eff. Obs. Left | 1034 | 1027 | 912 | 1036 | 875 | 861 |
| Eff. Obs. Right | 931 | 927 | 843 | 933 | 818 | 809 |

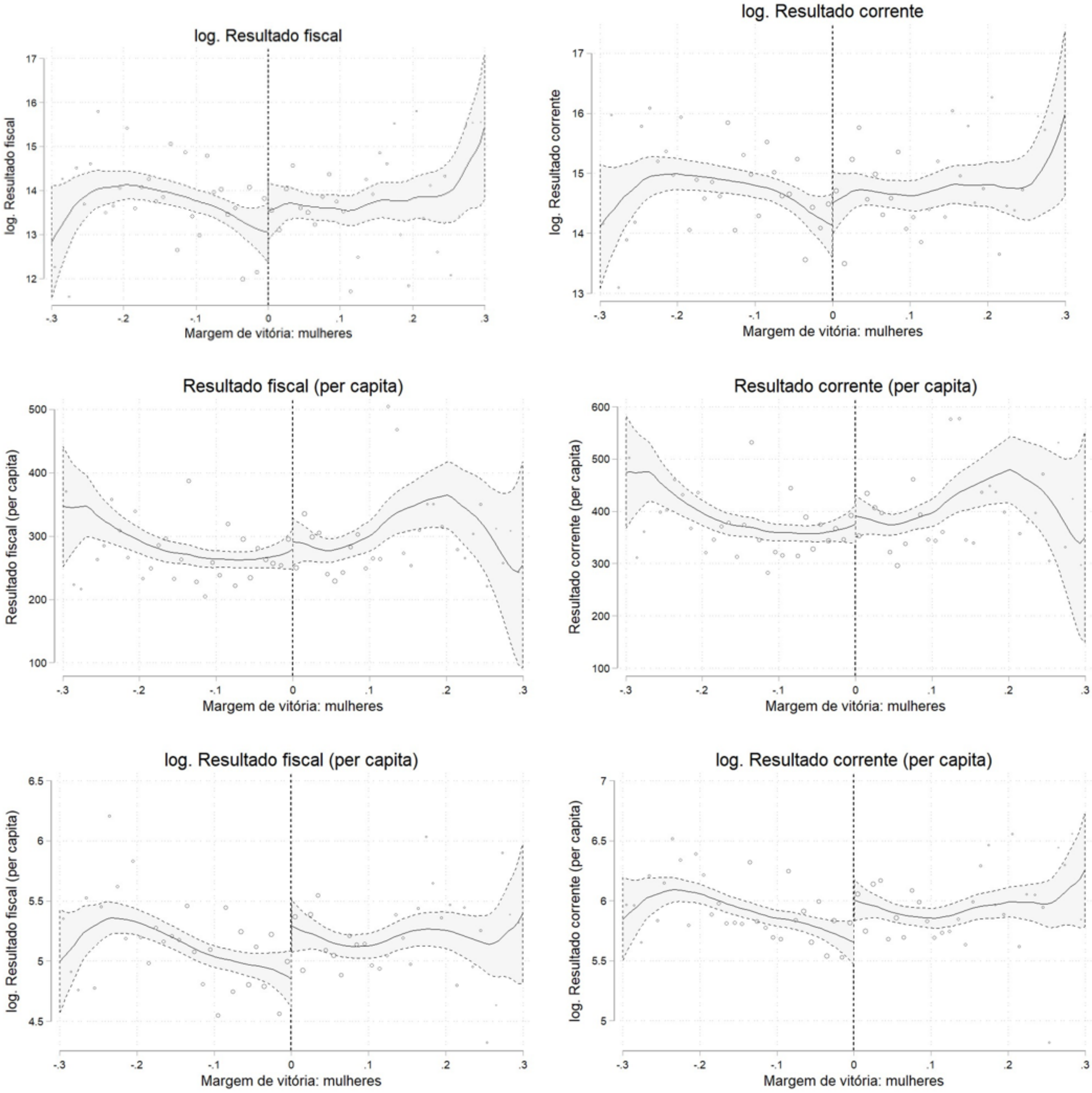
| Panel (B) - Quadratic | Fiscal Result | | | Current Results | | |
|---|---|---|---|---|---|---|
| | (1) log | (2) per capita | (3) log. per capita | (4) log | (5) per capita | (6) log. per capita |
| Coef. | -0.3731 | 1.9046 | 0.3276 | -0.1504 | 5.8497 | 0.2522 |
| Robust p-value | 0.657 | 0.979 | 0.208 | 0.822 | 0.936 | 0.263 |
| Std. Error. | (0.840) | (73.771) | (0.260) | (0.669) | (72.366) | (0.225) |
| Remarks | 3,966 | 3,969 | 3,969 | 3,969 | 3,969 | 3,969 |
| Bandwidth | 0.145 | 0.128 | 0.165 | 0.149 | 0.121 | 0.144 |
| Eff. Obs. Left | 1309 | 1172 | 1440 | 1335 | 1113 | 1304 |
| Eff. Obs. Right | 1112 | 1042 | 1192 | 1136 | 1004 | 1111 |

Note: This table presents the results for the discontinuity estimated around the cutoff by polynomial approximation. (1) Represents the log of the average fiscal result during every electoral term. (2) Average fiscal result per capita. (3) log of fiscal result per capita. (4) Represents the log of the average current result during every electoral term. (5) Average current result per capita. (6) log of current result per capita. Robust errors reported. Triangular Kernel and Bandwidth selected by CER-Optimal (Calonico, Cattaneo and Farrell, 2019). *** p<0.01, ** p<0.05, * p<0.1.

This paper finds no significant results from the election of women on county fiscal outcomes. In other words, no discontinuity was found around the cutoff in any of the variables used.

One of the advantages of RDD is the possibility of graphical analysis of the results (Hyytinen et al., 2018). Thus, this result can be visualized graphically in Picture 1.3.

**Picture 1.3** - Result of women's election on fiscal variables - Graphical analysis




Resultado Fiscal – Fiscal Result

Resultado Corrente – Current Result

Margem de Vitória: mulheres – Margin of Victory: women

Note: the Picture plots the result of the discontinuity in fiscal variables around the cutoff. Male mayors ($MV < 0$) and Women Mayors ($MV > 0$). Circles represent the mean of the dependent variable with 1pp. Bins with size proportional to their relative frequency. Robust standard error and $p < 0.05$.

This finding is similar to research that has studied effects of political parties on Brazilian finances (Gouvêa and Girardi, 2021). Among the facts that explain this, one can report the high municipal dependence on external transfer revenues (the so-called mandatory constitutional transfers) from the Municipal Participation Fund (FPM) (Brollo and Troiano, 2016). Since this transfer is exogenous, and depends on the size of the municipal population, the manager's discretion to generate revenues that can increase the local primary result is reduced.

### 1.4.2 Composition of Budget Revenues

Given an inflexible budget, where the main revenues and expenditures are stiffened, it is necessary to study its composition and whether an elected mayor can change it. Even though a large part of municipal budget revenues is received through constitutional transfers, there are still other sources of funds that can be changed during a mandate. Among them, this study analyzes two: (i) taxes (taxes, fees and contributions) and (ii) agreements.

The main results on revenue composition are presented in Table 1.4 and illustrated in Picture 1.4. When looking at the composition of taxes, either per capita or as a ratio of total revenue, no statistically significant effects were found in any of the specifications.

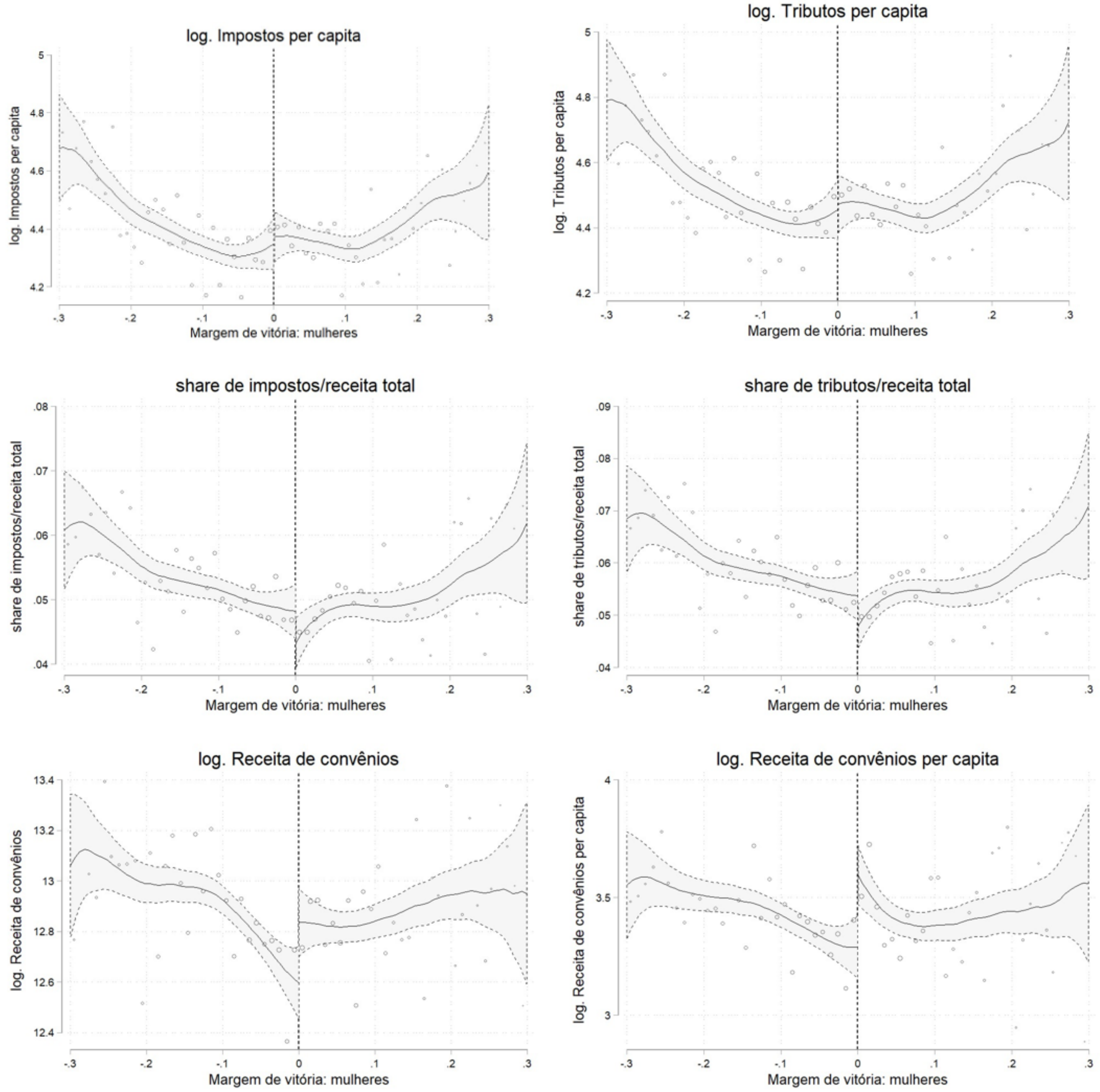
**Table 1.4** - Result of women's election in budget revenues - RDD

| **Panel (A)- Linear** | **(1) log. tax. pc** | **(2) log. tribute. pc** | **(3) share tribute** | **(4) share tax** | **(5) log. conv.** | **(6) log. pc conv.** |
|---|---|---|---|---|---|---|
| Coef. | 0.0244 | 0.0214 | -0.0068 | -0.0059 | 0.2914* | 0.3799*** |
| Robust p-value | 0.732 | 0.755 | 0.144 | 0.163 | 0.0732 | 0.009 |
| Std. Error. | (0.071) | (0.068) | (0.005) | (0.004) | (0.163) | (0.146) |
| Remarks | 3,974 | 3,975 | 3,976 | 3,976 | 3,838 | 3,840 |
| Bandwidth | 0.125 | 0.135 | 0.0884 | 0.0883 | 0.0797 | 0.0806 |
| Eff. Obs. Left | 1147 | 1240 | 858 | 858 | 761 | 768 |
| Eff. Obs. Right | 1026 | 1061 | 799 | 799 | 711 | 718 |

| **Panel (B) - Quadratic** | **(1) log. tax. pc** | **(2) log. tribute. pc** | **(3) share tribute** | **(4) share tax** | **(5) log. conv.** | **(6) log. pc conv.** |
|---|---|---|---|---|---|---|
| Coef. | -0.0234 | -0.0312 | -0.0087 | -0.0073 | 0.2671 | 0.4080** |
| Robust p-value | 0.811 | 0.749 | 0.120 | 0.154 | 0.159 | 0.0235 |
| Std. Error. | (0.098) | (0.098) | (0.006) | (0.005) | (0.190) | (0.180) |
| Remarks | 3,974 | 3,975 | 3,976 | 3,976 | 3,838 | 3,840 |
| Bandwidth | 0.130 | 0.129 | 0.128 | 0.125 | 0.120 | 0.109 |
| Eff. Obs. Left | 1199 | 1188 | 1180 | 1146 | 1064 | 999 |
| Eff. Obs. Right | 1049 | 1047 | 1042 | 1023 | 955 | 894 |

Note: This table presents the results for the discontinuity estimated around the cutoff by polynomial approximation. (1) Represents the log of the average tax collected - per capita. (2) Represents the log of the average tax collected - per capita. (3) Ratio of taxes to all revenue collected. (4) Ratio of taxes to all revenue collected. (5) Log of the average revenue collected from covenants. (6) Log of the average revenue collected - per capita. The robust errors. Triangular Kernel and Bandwidth selected by CER-Optimal (Calonico, Cattaneo and Farrell, 2019). *** p<0.01, ** p<0.05, * p<0.1

**Picture 1.4** - RDD results on budget revenue variables - graphical analysis




Impostos per capita – Per Capita Taxes
Margem de Vitória: mulheres – Margin of Victory: women
Share de impostos/receita total – Tax share/Total Revenue

Receita de Convênios – Covenant Revenue
Note: the Picture plots the result of discontinuity in budget revenue variables around the cutoff. Male mayors ($MV < 0$) and Women Mayors ($MV > 0$). Circles represent the mean of the dependent variable with 1pp. Bins with size proportional to their relative frequency. Robust standard error and $p < 0.05$.

In turn, complementing the studies of Brollo and Troiano (2016), there are significant effects on voluntary federal transfers. Covenants are agreements made between the Union and government entities of other entities of the Federation, or non-governmental organizations, for the transfer of financial resources to be used in the execution of a common object. Some characteristics of the covenants must be observed. To receive resources through an agreement, a Work Proposal is prepared containing the complete description of the object and its justification. It is, therefore, a financial resource that is destined for a specific purpose. For example: building/refurbishing a school, holding an event, etc. Besides, it is a discretionary resource received by the municipality from the Federal Government. That is, it is necessary political articulation to receive this resource (Brollo and Troiano, 2016).

However, it is also necessary to demonstrate technical capacity to receive it, which involves applying the minimum constitutional limits in health and education up to guarantees of counterpart resources. However, it is forbidden, by force of law, to pay the personnel linked to the covenanting entity with financial resources coming from the covenant. In other words, it is not possible to make an agreement for the payment of municipal employees. It can be seen, therefore, that in order to receive resources through agreements, political interlocution and technical management skills are required.

The positive results, where women mayors capture more covenant resources per capita converge with the literature on gender and negotiation where women work harder than men when negotiating on behalf of others (Bowles, Babcock, and McGinn, 2005). The results presented in the literature by Brollo and Troiano (2016), analyzing the 2000 and 2004 Brazilian elections, indicated that women mayors raised around 55% to 65% more covenant resources than male mayors. By extending the electoral mandates until 2016, and changing the estimation techniques in some points, this research converges to the positive result previously presented, even with a lower intensity. The results presented in Table 1.4, and illustrated in Picture 1.4, indicate that women capture around 25% to 40% more grant resources, either per capita or in total, than male mayors.

### 1.4.3 Composition of Budget Expenditures

#### 1.4.3.1 Analysis in the economic categories of expenditure

The analysis of the composition of budget expenditures begins by looking at the main economic categories of the budget. Table 1.5 and Picture 1.5 show that there is a discontinuity in per capita spending on personnel expenditures and in the ratio of these expenditures to the total budget. The results are significant and indicate that Women Mayors make more expenditures on personnel per capita - on the order of 20% - and with a budget allocation, on average, 2% higher. This result should be analyzed with caution, and in conjunction with the other results estimated in this article.

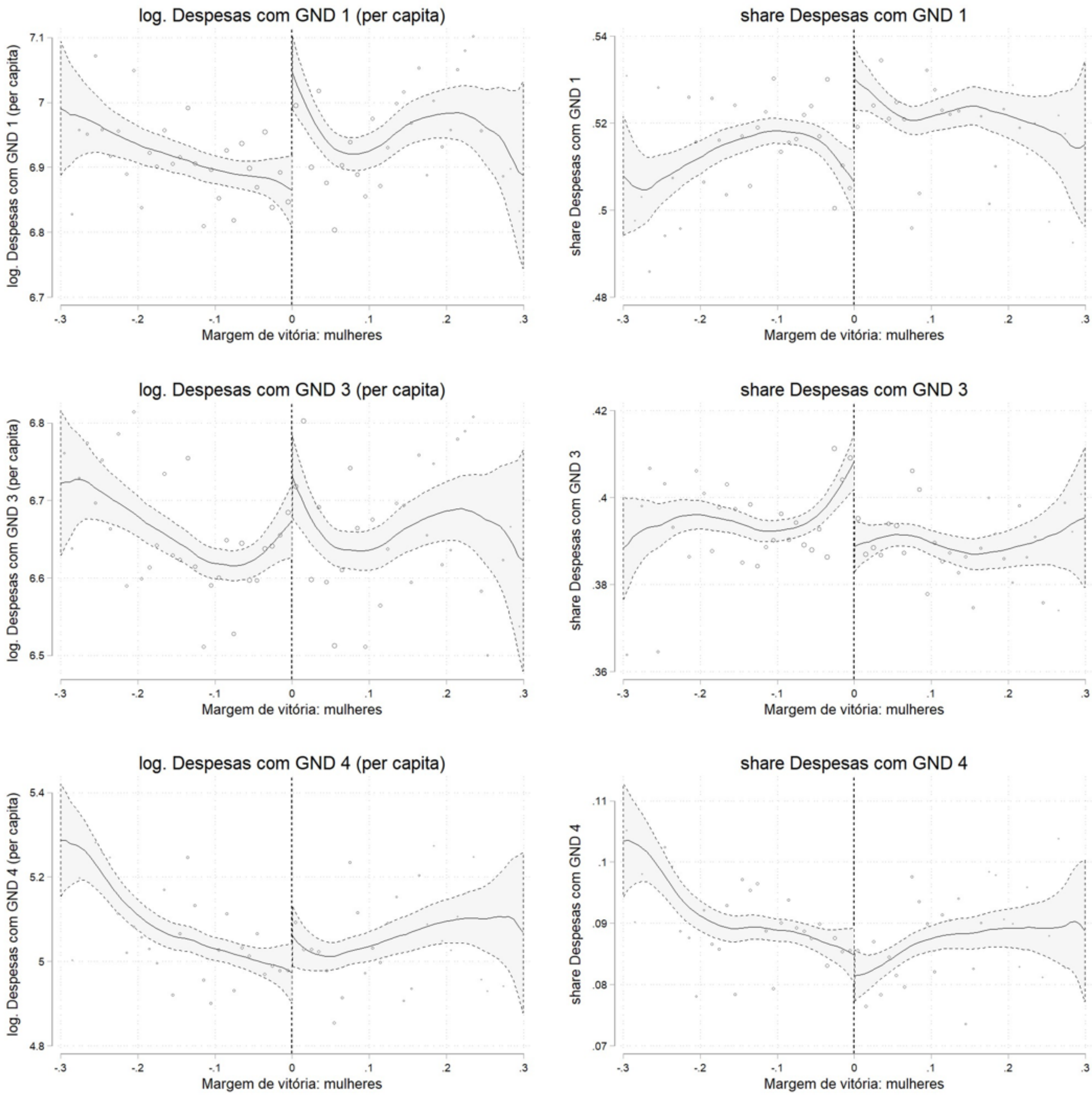
**Table 1.5** - Result of the election of women in the economic category of expenditure - RDD

| Panel (A) - Linear | (1) log. gnd1 | (2) share gnd1 | (3) log. gnd3 | (4) share gnd3 | (5) log. gnd4 | (6) share gnd4 |
|---|---|---|---|---|---|---|
| Coef. | 0.1875** | 0.0255*** | 0.0444 | -0.0224*** | 0.0869 | -0.0028 |
| Robust p-value | 0.011 | 0.002 | 0.389 | 0.001 | 0.267 | 0.542 |
| Std. Error. | (0.073) | (0.008) | (0.052) | (0.007) | (0.078) | (0.005) |
| Remarks | 3,977 | 3,977 | 3,977 | 3,977 | 3,977 | 3,977 |
| Bandwidth | 0.0868 | 0.0946 | 0.0881 | 0.101 | 0.0994 | 0.109 |
| Eff. Obs. Left | 852 | 916 | 857 | 970 | 959 | 1042 |
| Eff. Obs. Right | 792 | 842 | 797 | 879 | 872 | 933 |
| Pol. order | 1 | 1 | 1 | 1 | 1 | 1 |

| Panel (B) - Square | (1) log. gnd1 | (2) share gnd1 | (3) log. gnd3 | (4) share gnd3 | (5) log. gnd4 | (6) share gnd4 |
|---|---|---|---|---|---|---|
| Coef. | 0.2136** | 0.0237** | 0.0697 | -0.0236** | 0.1636 | 0.0016 |
| Robust p-value | 0.030 | 0.022 | 0.273 | 0.012 | 0.111 | 0.786 |
| Std. Error. | (0.098) | (0.010) | (0.064) | (0.009) | (0.103) | (0.006) |
| Remarks | 3,977 | 3,977 | 3,977 | 3,977 | 3,977 | 3,977 |
| Bandwidth | 0.105 | 0.126 | 0.114 | 0.116 | 0.117 | 0.127 |
| Eff. Obs. Left | 1014 | 1159 | 1079 | 1090 | 1093 | 1166 |
| Eff. Obs. Right | 913 | 1031 | 964 | 981 | 987 | 1040 |
| Pol. order | 2 | 2 | 2 | 2 | 2 | 2 |

Note: This table presents the results for the discontinuity estimated around the cutoff by polynomial approximation. GND1 - Personnel expenditures. GND3 - Other current expenditures. GND4 - Investment expenditures. Variables in log represent the log of average per capita spending. Errors are robust. Triangular Kernel and Bandwidth selected by CER-Optimal (Calonico, Cattaneo and Farrell, 2019). *** $p<0.01$, ** $p<0.05$, * $p<0.1$

**Picture 1.5** - Result of women's election in the economic category of expenditure - Graphical analysis




Despesas com GND – GND Expenditures

Margem de Vitória: mulheres – Margin of Victory: women

Note: the Picture plots the result of the discontinuity in fiscal variables around the cutoff. Male mayors ($MV < 0$) and Women Mayors ($MV > 0$). Circles represent the mean of the dependent variable with 1pp. Bins with size proportional to their relative frequency. Robust standard error and $p < 0.05$.

Analyzing the result in conjunction with the previous section, one notices that there is no immediate fiscal effect of such a measure, which appears to be a reallocation of resources within the current expenditure category (between GND 3 and GND 1).

Nevertheless, this finding brings new insights to the literature on the effects of rulers' characteristics on personnel expenditures and not only the institutional framework. In this case, it is noteworthy that the effect of Women Mayors is positive while, in principle, it is sustainable considering there is no increase between the net current revenue ratio and the fiscal result.

### 1.4.3.2 Analysis in the budget functions

In a second step, the composition of expenditures in the main functions of government was analyzed. Studying budget functions is particularly important to understand in which area government spending was made. The main result found is that social spending per capita was 9% to 13% higher for a female mayor than for male mayors (Table - 1.6, column 1) and 2% in the proportion of the budget spent on the social area (Table 1.7). Picture - 1.6 and Picture - 1.7 note the discontinuity around the cutoff in social spending per capita. It is emphasized, that considering that the estimation does not consider 2020 financial data there is no bias in the data caused by the Covid-19 pandemic.

There are a few explanations in the literature on this topic. Initially, it is hypothesized that preferences between men and women are different. In this sense, analyzing the behavior of the family budget, studies have indicated that women spend more on health and education and reduce spending on alcohol, smoking and leisure (Gummerson and Schneider, 2012).

Economically, there is theoretical disagreement as to whether men and women produce different effects by being elected. Downs' (1957) median voter theory predicts that politicians converge on policies to cater to the median voter in order to secure reelection. Therefore, in this theory, gender would not affect policy decisions. However, Besley and Coate (1997) propose an alternative view of the political process that produces contradictions to the median voter theory. This alternative view, known as the citizen-candidate model, combines politicians' preferences for different outcomes and their inability to commit to moderate policies. According to this model, policy differs depending on who wins the election. The citizen-candidate model extends beyond partisanship (Lee, Moretti, and Butler, 2004) into the realm of identity politics and points to the relevance of gender to policymaking by considering the differences in policy preferences that exist between men and women (Besley, 2005).

When analyzing empirical studies, however, recent research has found no significant effects on social spending due to the election of women to the executive or legislative branch in developed countries (Bagues and Campa, 2021; Casarico, Lattanzio and Profeta, 2021). Hessami and da Fonseca (2020) point out that the effects on social spending in these countries may be underestimated, because the optimal level may have already been reached and the new focus is on optimizing spending rather than increasing the amounts.

In this sense, the results found in this research are similar to those of Chattopadhyay and Duflo (2004), who studied India, where the greater participation of women generates an increase in social spending. The results for the Brazilian case are in line with research that points out that developing countries are not at the optimum of social expenditures and the election of women can affect the levels of these expenditures (Hessami and da Fonseca, 2020).

In the Brazilian case, the research by Rocha, Fernandez Orellano, and Bugarin (2018) analyzed the effect of mayors' personal characteristics on Brazilian municipal public finances. When looking at the effect of gender on fiscal indicators and spending composition, the authors found no significant results. This occurred because of the difference in qualifications between male and female candidates. However, in this research, there was a broadening of the analyzed period and the analysis of gender elections only. Thus, with the data on screen, there was no discontinuity in the qualification variable (Picture - 1.2) which allows us to infer that Women Mayors spend more on the social area than men.

In addition, research by Brollo and Troiano (2016) indicated that elected women have better results in health outcomes, such as infant mortality and prenatal visits. In this sense, this article complements the above research by highlighting a possible mechanism of these findings, which is precisely a greater allocation of per capita spending in the social area.

**Table 1.6 -** Result of the election of women in budget functions - log. per capita - RDD

| Variables | Social | General Administration | Social Welf. | Health | Work | Education | Culture | Urbanism | Envir. |
|---|---|---|---|---|---|---|---|---|---|
| Panel (A) - Log of per capita expenditures - Linear | | | | | | | | | |
| Coef. | 0.0941** | 0.0048 | 0.0477 | 0.0788* | -0.1367 | 0.0959** | 0.2194* | -0.1814* | -0.0828 |
| Robust p-value | (0.047) | (0.057) | (0.063) | (0.038) | (0.109) | (0.046) | (0.130) | (0.107) | (0.118) |
| Std. Error. | 0.044 | 0.933 | 0.452 | 0.06 | 0.211 | 0.039 | 0.091 | 0.090 | 0.484 |
| Remarks | 3,977 | 3,977 | 3,977 | 3,977 | 3,977 | 3,977 | 3,977 | 3,977 | 3,977 |
| Bandwidth | 0.110 | 0.0957 | 0.0940 | 0.114 | 0.0911 | 0.109 | 0.0952 | 0.0966 | 0.110 |
| Eff. Obs. Left | 1051 | 927 | 908 | 1080 | 883 | 1043 | 924 | 935 | 1046 |
| Eff. Obs. Right | 939 | 851 | 838 | 964 | 818 | 934 | 848 | 855 | 936 |
| Panel (B) - Log of per capita expenditures - Quadratic | | | | | | | | | |
| Coef. | 0.1397** | 0.0430 | 0.0456 | 0.1177* | -0.1064 | 0.1294** | 0.2977* | -0.1828 | -0.0426 |
| Robust p-value | (0.069) | (0.069) | (0.070) | (0.065) | (0.131) | (0.065) | (0.166) | (0.125) | (0.144) |
| Std. Error. | 0.042 | 0.532 | 0.512 | 0.070 | 0.418 | 0.045 | 0.073 | 0.143 | 0.768 |
| Remarks | 3,977 | 3,977 | 3,977 | 3,977 | 3,977 | 3,977 | 3,977 | 3,977 | 3,977 |
| Bandwidth | 0.131 | 0.131 | 0.155 | 0.135 | 0.125 | 0.142 | 0.113 | 0.143 | 0.146 |
| Eff. Obs. Left | 1206 | 1207 | 1387 | 1245 | 1149 | 1293 | 1070 | 1300 | 1322 |
| Eff. Obs. Right | 1050 | 1050 | 1159 | 1065 | 1027 | 1098 | 957 | 1106 | 1119 |

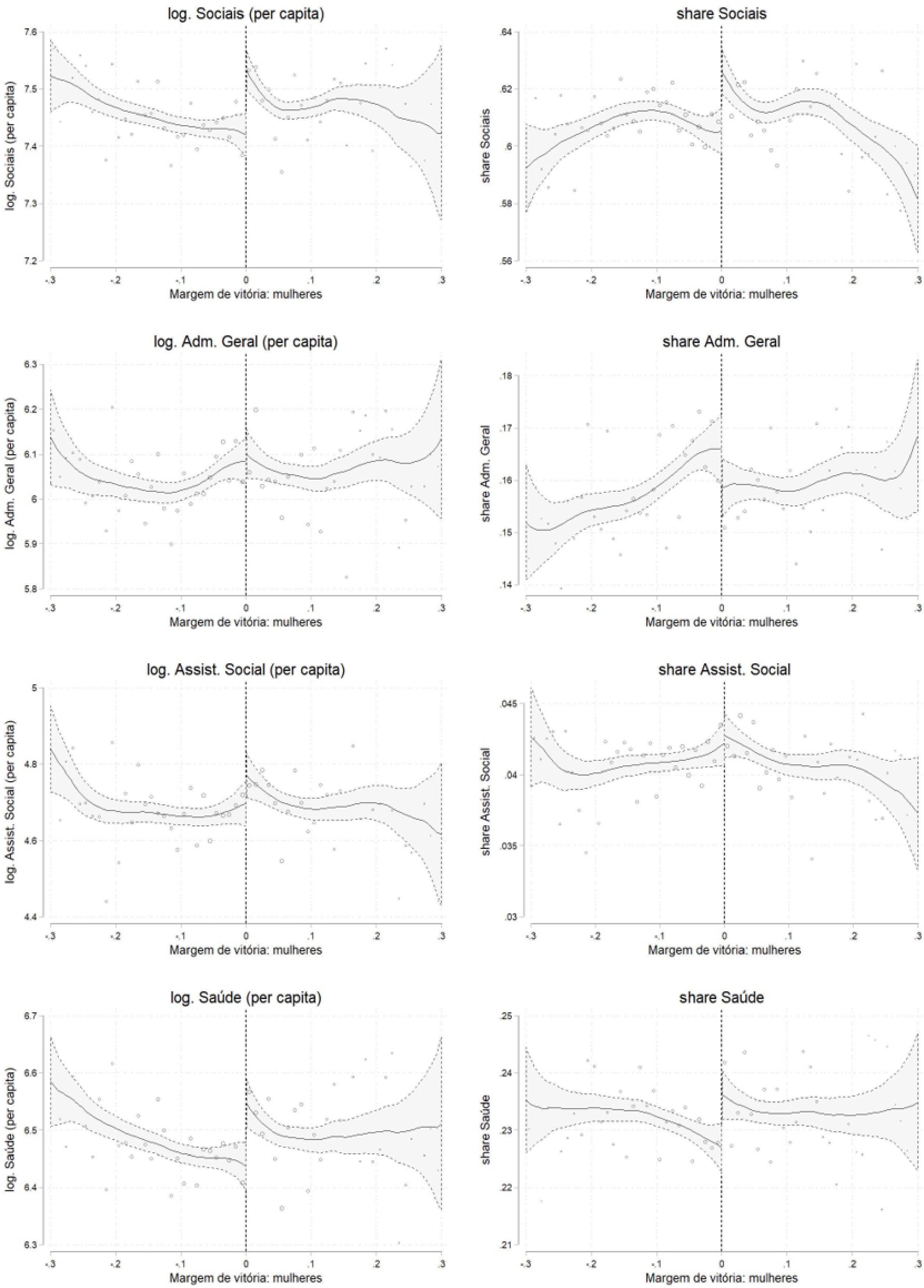
Note: This table presents the results for the discontinuity estimated around the cutoff by polynomial approximation. Variables in log represent the log of average per capita spending. Errors are robust. Triangular Kernel and Bandwidth selected by CER-Optimal (Calonico, Cattaneo and Farrell, 2019). *** p<0.01, ** p<0.05, * p<0.1

**Table 1.7** - Result of the election of women in budget functions - share - RDD

| Variables | Social | General Administration | Social Welf. | Health | Work | Education | Culture | Urbanism | Envir. |
|---|---|---|---|---|---|---|---|---|---|
| Panel (A) - share of expenditures - Linear | | | | | | | | | |
| Coef. | 0.0216*** | -0.0067 | -0.0001 | 0.0076 | 0.0005 | 0.0137** | 0.0008 | -0.0078* | -0.0006 |
| Robust p-value | (0.007) | (0.007) | (0.002) | (0.005) | (0.001) | (0.006) | (0.001) | (0.004) | (0.000) |
| Std. Error. | 0.003 | 0.350 | 0.971 | 0.107 | 0.549 | 0.031 | 0.438 | 0.062 | 0.228 |
| Remarks | 3,976 | 3,976 | 3,976 | 3,976 | 3,976 | 3,976 | 3,976 | 3,976 | 3,976 |
| Bandwidth | 0.109 | 0.119 | 0.0963 | 0.0902 | 0.110 | 0.114 | 0.103 | 0.0966 | 0.0906 |
| Eff. Obs. Left | 1041 | 1105 | 930 | 872 | 1051 | 1084 | 995 | 935 | 879 |
| Eff. Obs. Right | 932 | 991 | 853 | 816 | 939 | 967 | 897 | 855 | 816 |
| Panel (B) - Expenditure shares - Quadratic | | | | | | | | | |
| Coef. | 0.0184* | -0.0054 | -0.0005 | 0.0067 | 0.0004 | 0.0146* | 0.0009 | -0.0088* | -0.0005 |
| Robust p-value | (0.010) | (0.010) | (0.002) | (0.006) | (0.001) | (0.009) | (0.001) | (0.005) | (0.001) |
| Std. Error. | 0.071 | 0.569 | 0.783 | 0.243 | 0.636 | 0.088 | 0.433 | 0.081 | 0.354 |
| Remarks | 3,976 | 3,976 | 3,976 | 3,976 | 3,976 | 3,976 | 3,976 | 3,976 | 3,976 |
| Bandwidth | 0.116 | 0.135 | 0.147 | 0.117 | 0.155 | 0.131 | 0.155 | 0.142 | 0.134 |
| Eff. Obs. Left | 1089 | 1243 | 1325 | 1093 | 1383 | 1212 | 1387 | 1290 | 1232 |
| Eff. Obs. Right | 980 | 1063 | 1123 | 988 | 1159 | 1052 | 1160 | 1098 | 1059 |

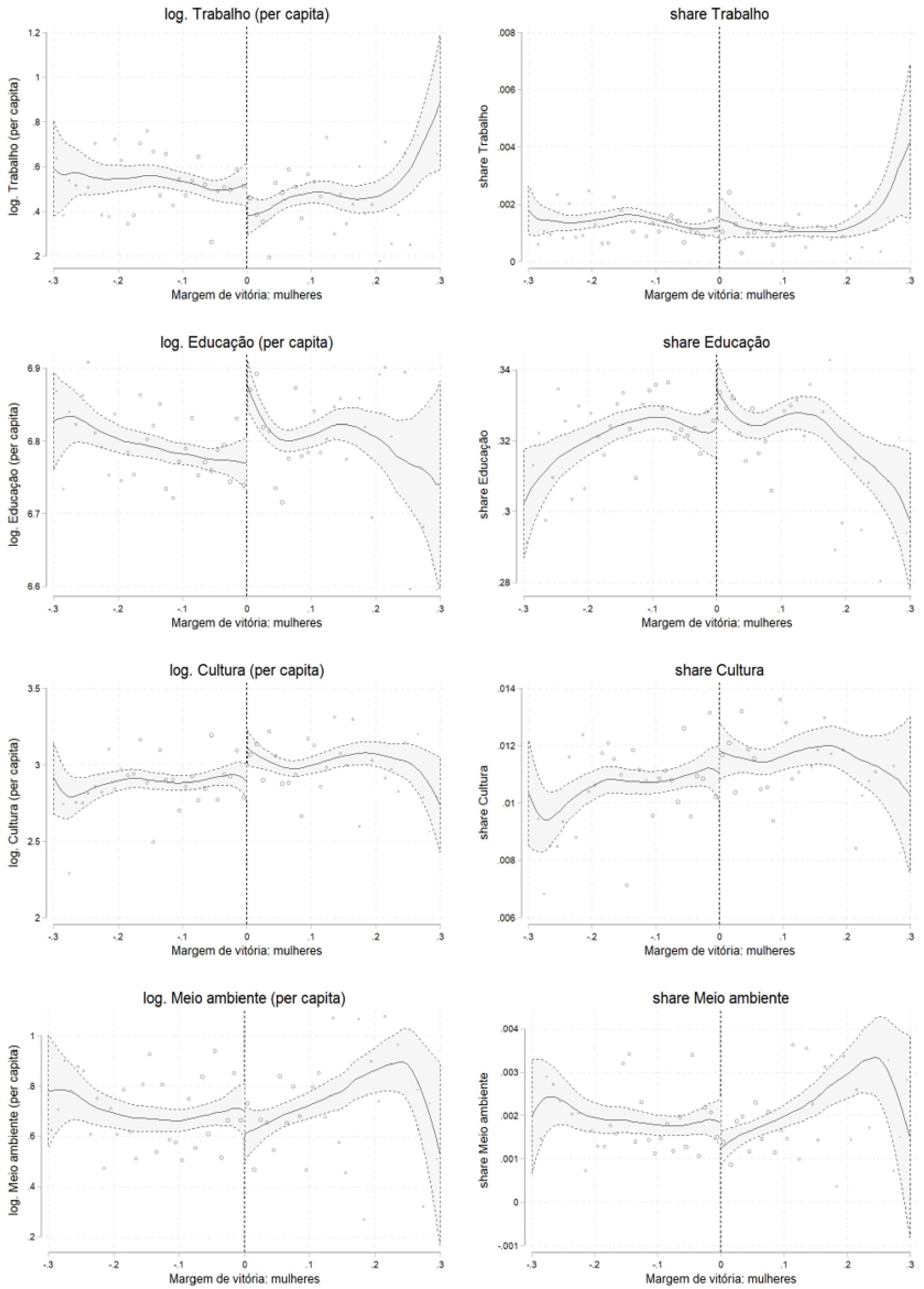
Note: This table presents the results for the discontinuity estimated around the cutoff by polynomial approximation. Errors are robust. Triangular Kernel and Bandwidth selected by CER-Optimal (Calonico, Cattaneo, and Farrell, 2019). *** p<0.01, ** p<0.05, * p<0.1

**Picture 1.6** - RDD Results on Budget Functions - Graphical Analysis - Part 1




Note: the Picture plots the result of the discontinuity in fiscal variables around the cutoff. Male mayors ($MV < 0$) and Women Mayors ($MV > 0$). Circles represent the mean of the dependent variable with 1pp. Bins with size proportional to their relative frequency. Robust standard error and $p < 0.05$.

**Picture 1.7** - RDD Results on Budget Functions - Graphical Analysis - Part 2




Note: the Picture plots the result of the discontinuity in fiscal variables around the cutoff. Male mayors ($MV < 0$) and Women Mayors ($MV > 0$). Circles represent the mean of the dependent variable with 1pp. Bins with size proportional to their relative frequency. Robust standard error and $p < 0.05$.

### 1.4.3.3 Mechanisms

The results pointed out that the election of women increases social spending and the share of personnel expenditures in the municipality. To identify the mechanisms that explain this phenomenon, I analyze data from the Annual Social Information Report - RAIS[3] to verify whether there is discontinuity of the election of Women Mayors in the municipal public sector workers in the social area.

The explanatory variables, therefore, use RAIS data and consider reported workers from the municipal administration quantifying employees in education (CNAE - Education) and health (CNAE - Human Health and Social Services).

*Table 1.8 below...*

3 Data obtained by the Data Base project accessed, https://basedosdados.org, on 05/01/2022.

**Table 1.8 -** Result of the election of women in municipal public employees in health and education

| Variables | Education | | | | Health | | | |
|---|---|---|---|---|---|---|---|---|
| | qty. | log. qty. | medium salary | log. mean salary | qty. | log. qty. | medium salary | log. mean salary |
| Panel (A) - Linear | | | | | | | | |
| Coef. | 10.7563*** | 0.0505*** | 0.1215* | 0.0205 | 2.7889*** | 0.0378 | 0.0493*** | -0.0086 |
| Robust p-value | 0.000 | 0.000 | 0.081 | 0.149 | 0.000 | 0.387 | 0.004 | 0.351 |
| Std. Error. | (0.263) | (0.009) | (0.070) | (0.014) | (0.258) | (0.044) | (0.017) | (0.009) |
| Remarks | 3,555 | 3,555 | 3,555 | 3,555 | 3,582 | 3,582 | 3,582 | 3,582 |
| Bandwidth | 0.0303 | 0.0397 | 0.0489 | 0.0509 | 0.0434 | 0.0671 | 0.0489 | 0.0648 |
| Eff. Obs. Left | 311 | 415 | 501 | 518 | 447 | 689 | 501 | 665 |
| Eff. Obs. Right | 314 | 399 | 476 | 496 | 434 | 649 | 477 | 624 |
| Panel (B) - Quadratic | | | | | | | | |
| Coef. | 10.9200*** | 0.0478*** | 0.0603 | 0.0115 | 2.5922*** | 0.0549 | 0.0354* | -0.0089 |
| Robust p-value | 0.000 | 0.000 | 0.474 | 0.513 | 0.000 | 0.224 | 0.095 | 0.426 |
| Std. Error. | (0.305) | (0.012) | (0.084) | (0.018) | (0.346) | (0.045) | (0.021) | (0.011) |
| Remarks | 3,555 | 3,555 | 3,555 | 3,555 | 3,582 | 3,582 | 3,582 | 3,582 |
| Bandwidth | 0.0322 | 0.0473 | 0.0611 | 0.0635 | 0.0563 | 0.0734 | 0.0649 | 0.0728 |
| Eff. Obs. Left | 331 | 485 | 626 | 652 | 567 | 749 | 666 | 744 |
| Eff. Obs. Right | 331 | 455 | 594 | 615 | 552 | 701 | 624 | 696 |

Note: This table presents the results for the discontinuity estimated around the cutoff by polynomial approximation. (i) qtd - represents the average number of public servants hired in the municipality; (ii) avg. salary - average remuneration in minimum wages. Errors are robust. Triangular Kernel and Bandwidth selected by CER-Optimal (Calonico, Cattaneo, and Farrell, 2019). }. *** p<0.01, ** p<0.05, * p<0.1

The estimated results are reported in Table 1.8 and indicate an increase of municipal servers in the area of education and health, with the improvement in the average salary of these professionals. Thus, it is noted that the main mechanism of the results pointed out in the previous section, higher personnel expenditures and in the social area occur due to the increase in the number of municipal professionals in education and health.

#### 1.4.3.4 Robustness and Placebo Tests

Given the found result of discontinuity between male and Women Mayors in social spending per capita, some exercises are conducted to test its robustness. Detraz and Peksen (2018) point out that government fiscal commitment to social policies is positively related to female participation in the total labor force and in national politics. Therefore, discontinuity among Women Mayors may be occasioned in municipalities that already carried out more social spending before their tenure. In this sense, two tests are performed.

The first follows Gouvêa and Girardi (2021) and analyzes an intertemporal heterogeneity of the discontinuity effect. Table - 1.9 presents the effect on social spending per capita in each year of the term. In the first year, the effect is not statistically significant. This may be a result of the peculiarities of the Brazilian budget cycle. Generally, in the first year of office, the mayor executes a budget that was prepared and planned by his predecessor. Even with the possibility of making changes - through additional credits - the budget would not be fully prepared according to his government project.

**Table 1.9** - Women's election results in social spending - annual - RDD

| Panel (A) - Linear | (1) log Average - mandate | (2) log Year 1 | (3) log Year 2 | (4) log Year 3 | (5) log Year 4 |
|---|---|---|---|---|---|
| Coef. | 0.1204** | 0.0422 | 0.0875* | 0.1208** | -0.0033 |
| Robust p-value | 0.031 | 0.618 | 0.062 | 0.027 | 0.968 |
| Std. Error. | (0.056) | (0.085) | (0.047) | (0.055) | (0.081) |
| Remarks | 3,977 | 3,889 | 3,885 | 3,896 | 2,750 |
| Bandwidth | 0.101 | 0.102 | 0.0915 | 0.109 | 0.101 |
| Eff. Obs. Left | 973 | 949 | 862 | 1010 | 671 |
| Eff. Obs. Right | 882 | 870 | 805 | 912 | 614 |

| Panel (B) - Quadratic | (1) log Average - mandate | (2) log Year 1 | (3) log Year 2 | (4) log Year 3 | (5) log Year 4 |
|---|---|---|---|---|---|
| Coef. | 0.1311** | 0.0484 | 0.0952* | 0.1511** | -0.0359 |
| Robust p-value | 0.035 | 0.628 | 0.095 | 0.025 | 0.668 |
| Std. Error. | (0.062) | (0.100) | (0.052) | (0.067) | (0.084) |
| Remarks | 3,977 | 3,889 | 3,885 | 3,896 | 2,750 |
| Bandwidth | 0.170 | 0.157 | 0.0980 | 0.108 | 0.130 |
| Eff. Obs. Left | 1470 | 1358 | 925 | 1002 | 830 |
| Eff. Obs. Right | 1212 | 1140 | 849 | 907 | 731 |

Note: This table presents the results for the discontinuity estimated around the cutoff by polynomial approximation. Variables in log represent the log of per capita spending. Errors are robust. Triangular Kernel and Bandwidth selected by CER-Optimal (Calonico, Cattaneo and Farrell, 2019). *** p<0.01, ** p<0.05, * p<0.1

In turn, in the second and third year, the result found is positive and consistent in the estimates. This fact makes the incremental budget hypothesis, that women would only execute a budget that previously spent more on the social area, not applicable in the estimation performed.

To check the consistency of this finding, a second test consists in manipulating the data and considering as expenditures of that electoral period the amounts of the previous mandate. For example, in the 2009-2012 mandate the expenditures from 2005-2008 are considered, observing if there is any discontinuity. The results are presented in Tables 1.10 and 1.11 and there is no statistically significant discontinuity, indicating that social spending occurs during the mayor's term.

**Table 1.10 -** Result of the election of women in budget functions - log. per capita - RDD - Previous term variable

| Variables | Social | General Administration | Social Welf. | Health | Work | Education | Culture | Urbanism | Envir. |
|---|---|---|---|---|---|---|---|---|---|
| Panel (A) - Log of per capita expenditures - Linear | | | | | | | | | |
| Coef. | 0.0277 | 0.0166 | -0.0068 | 0.0269 | 0.0289 | 0.0221 | 0.0435 | -0.0941 | -0.0209 |
| Robust p-value | 0.459 | 0.789 | 0.911 | 0.533 | 0.833 | 0.554 | 0.753 | 0.422 | 0.871 |
| Std. Error. | (0.037) | (0.062) | (0.061) | (0.043) | (0.137) | (0.037) | (0.138) | (0.117) | (0.129) |
| Remarks | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 |
| Bandwidth | 0.0808 | 0.0872 | 0.101 | 0.0864 | 0.0991 | 0.0875 | 0.0916 | 0.118 | 0.101 |
| Eff. Obs. Left | 589 | 628 | 715 | 626 | 708 | 630 | 652 | 814 | 713 |
| Eff. Obs. Right | 534 | 569 | 635 | 567 | 626 | 572 | 589 | 715 | 633 |
| Panel (B) - Log of per capita expenditures - Quadratic | | | | | | | | | |
| Coef. | 0.0163 | 0.0305 | -0.0352 | 0.0248 | 0.0001 | 0.0196 | 0.0169 | -0.1452 | -0.0541 |
| Robust p-value | 0.702 | 0.674 | 0.655 | 0.588 | 1.000 | 0.625 | 0.918 | 0.408 | 0.737 |
| Std. Error. | (0.043) | (0.072) | (0.079) | (0.046) | (0.171) | (0.040) | (0.164) | (0.176) | (0.161) |
| Remarks | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 |
| Bandwidth | 0.121 | 0.121 | 0.114 | 0.163 | 0.123 | 0.164 | 0.125 | 0.107 | 0.129 |
| Eff. Obs. Left | 829 | 829 | 802 | 1043 | 834 | 1045 | 849 | 756 | 873 |
| Eff. Obs. Right | 726 | 726 | 702 | 840 | 730 | 843 | 740 | 662 | 754 |

Note: This table presents the results for the discontinuity estimated around the cutoff by polynomial approximation. Variables in log represent the log of average per capita spending. Errors are robust. Triangular Kernel and Bandwidth selected by CER-Optimal (Calonico, Cattaneo and Farrell, 2019). *** p<0.01, ** p<0.05, * p<0.1

**Table 1.11 -** Result of the election of women in budget functions - share - RDD - Previous term variable

| Variables | Social | General Administration | Social Welf. | Health | Work | Education | Culture | Urbanism | Envir. |
|---|---|---|---|---|---|---|---|---|---|
| Panel (A) - share of expenditures - Linear | | | | | | | | | |
| Coef. | 0.0044 | 0.0049 | -0.0003 | 0.0028 | 0.0014 | 0.0026 | -0.0004 | 0.0012 | -0.0004 |
| Robust p-value | 0.601 | 0.475 | 0.838 | 0.618 | 0.189 | 0.688 | 0.775 | 0.806 | 0.477 |
| Std. Error. | (0.008) | (0.007) | (0.002) | (0.006) | (0.001) | (0.006) | (0.001) | (0.005) | (0.001) |
| Remarks | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 |
| Bandwidth | 0.0831 | 0.0964 | 0.110 | 0.0862 | 0.107 | 0.134 | 0.0906 | 0.111 | 0.0896 |
| Eff. Obs. Left | 607 | 686 | 779 | 624 | 753 | 896 | 647 | 782 | 639 |
| Eff. Obs. Right | 543 | 613 | 679 | 567 | 660 | 761 | 585 | 683 | 581 |
| Panel (B) - Expenditure shares - Quadratic | | | | | | | | | |
| Coef. | -0.0026 | 0.0094 | -0.0012 | 0.0022 | 0.0013 | 0.0015 | -0.0004 | -0.0007 | -0.0006 |
| Robust p-value | 0.806 | 0.254 | 0.579 | 0.747 | 0.224 | 0.879 | 0.763 | 0.921 | 0.376 |
| Std. Error. | (0.011) | (0.008) | (0.002) | (0.007) | (0.001) | (0.010) | (0.001) | (0.007) | (0.001) |
| Remarks | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 | 2,857 |
| Bandwidth | 0.108 | 0.139 | 0.134 | 0.112 | 0.146 | 0.119 | 0.173 | 0.121 | 0.111 |
| Eff. Obs. Left | 759 | 936 | 896 | 786 | 964 | 821 | 1085 | 829 | 782 |
| Eff. Obs. Right | 667 | 781 | 761 | 683 | 800 | 716 | 865 | 726 | 683 |

Note: This table presents the results for the discontinuity estimated around the cutoff by polynomial approximation. Errors are robust. Triangular Kernel and Bandwidth selected by CER-Optimal (Calonico, Cattaneo, and Farrell, 2019). *** p<0.01, ** p<0.05, * p<0.1

Another mechanism to validate the effect of mayors on social spending is to perform a placebo test and find some type of expenditure that should not be, as a rule, affected by the mayor of the city. By constitutional provision, the bodies of the Legislative Branch must have budgetary and financial autonomy. So, in principle, there should be no effect of a mayor (male or female) on the expenditures of this branch. Table 1.12 brings the results on legislative spending per capita and as a ratio of total expenditures. In all specifications there were no statistically significant results, indicating the robustness of the results found. Nevertheless, Table 1.13 shows that the effect does not differ significantly to differences in region - with the exception of the Southern Region which finds no result - and population.

**Table 1.12** - Results of the election of women in the Legislative Branch

| log. of per capita spending | | | | | |
|---|---|---|---|---|---|
| **Panel (A) - Linear** | **(1) average** | **(2) Year 1** | **(3) Year 2** | **(4) Year 3** | **(5) Year 4** |
| Coef. | 0.1013 | -0.0692 | -0.0060 | 0.0889 | 0.1496 |
| Robust p-value | 0.324 | 0.629 | 0.967 | 0.546 | 0.363 |
| Std. Error. | (0.103) | (0.143) | (0.145) | (0.147) | (0.164) |
| Remarks | 3,977 | 3,889 | 3,885 | 3,896 | 2,750 |
| Bandwidth | 0.124 | 0.113 | 0.0983 | 0.120 | 0.140 |
| Eff. Obs. Left | 1146 | 1037 | 926 | 1078 | 887 |
| Eff. Obs. Right | 1023 | 938 | 850 | 977 | 760 |
| **Panel (B) - Quadratic** | **(1) average** | **(2) Year 1** | **(3) Year 2** | **(4) Year 3** | **(5) Year 4** |
| Coef. | 0.1538 | -0.0827 | -0.0173 | 0.1181 | 0.0807 |
| Robust p-value | 0.304 | 0.657 | 0.912 | 0.557 | 0.707 |
| Std. Error. | (0.150) | (0.186) | (0.156) | (0.201) | (0.215) |
| Remarks | 3,977 | 3,889 | 3,885 | 3,896 | 2,750 |
| Bandwidth | 0.128 | 0.129 | 0.173 | 0.129 | 0.176 |
| Eff. Obs. Left | 1183 | 1146 | 1453 | 1163 | 1043 |
| Eff. Obs. Right | 1044 | 1026 | 1196 | 1025 | 844 |

| Share of Legislative Expenditures | | | | | |
|---|---|---|---|---|---|
| **Panel (C) - Linear** | **(1) average** | **(2) Year 1** | **(3) Year 2** | **(4) Year 3** | **(5) Year 4** |
| Coef. | -0.0002 | -0.0012 | -0.0013 | 0.0010 | -0.0013 |
| Robust p-value | 0.859 | 0.474 | 0.399 | 0.484 | 0.569 |
| Std. Error. | (0.001) | (0.002) | (0.002) | (0.001) | (0.002) |
| Remarks | 3,976 | 3,879 | 3,884 | 3,895 | 2,748 |
| Bandwidth | 0.126 | 0.0846 | 0.124 | 0.129 | 0.0744 |
| Eff. Obs. Left | 1166 | 807 | 1107 | 1151 | 509 |
| Eff. Obs. Right | 1040 | 756 | 996 | 1023 | 472 |
| **Panel (D) - Quadratic** | **(1) average** | **(2) Year 1** | **(3) Year 2** | **(4) Year 3** | **(5) Year 4** |
| Coef. | 0.0008 | 0.0002 | 0.0009 | 0.0016 | -0.0023 |
| Robust p-value | 0.640 | 0.934 | 0.642 | 0.425 | 0.359 |
| Std. Error. | (0.002) | (0.002) | (0.002) | (0.002) | (0.003) |
| Remarks | 3,976 | 3,879 | 3,884 | 3,895 | 2,748 |
| Bandwidth | 0.116 | 0.105 | 0.135 | 0.125 | 0.127 |
| Eff. Obs. Left | 1087 | 973 | 1213 | 1124 | 812 |
| Eff. Obs. Right | 980 | 885 | 1046 | 1005 | 727 |

Note: This table presents the results for the discontinuity estimated around the cutoff by polynomial approximation. Variables in log represent the log of average per capita spending. Errors are robust. Triangular Kernel and Bandwidth selected by CER-Optimal (Calonico, Cattaneo and Farrell, 2019). *** p<0.01, ** p<0.05, * p<0.1

**Table 1.13** - Outcome of women's election in budget share in social spending

| **Panel (A) Region - Linear** | **Share of social spending** | | | | |
|---|---|---|---|---|---|
| | **North** | **Northeast** | **South** | **Southeast** | **Midwest** |
| Coef. | 0.0250** | 0.0217* | -0.0013 | 0.0263* | 0.0226*** |
| Robust p-value | (0.011) | (0.013) | (0.019) | (0.011) | (0.007) |
| Std. Error. | 0.042 | 0.090 | 0.946 | 0.041 | 0.001 |
| Remarks | 394 | 1,622 | 604 | 1,005 | 351 |
| Bandwidth | 0.102 | 0.113 | 0.0843 | 0.107 | 0.151 |

| | | | | | |
|---|---|---|---|---|---|
| Eff. Obs. Left | 97 | 479 | 134 | 211 | 115 |
| Eff. Obs. Right | 83 | 406 | 128 | 218 | 90 |
| Order. Poli. | 1 | 1 | 1 | 1 | 1 |
| **Panel (B) Region - Quadr.** | **Share of social spending** | | | | |
| | **North** | **Northeast** | **South** | **Southeast** | **Midwest** |
| Coef. | 0.0305** | 0.0261* | -0.0246 | 0.0273*** | 0.0198*** |
| Robust p-value | (0.014) | (0.011) | (0.024) | (0.012) | (0.001) |
| Std. Error. | 0.021 | 0.071 | 0.307 | 0.147 | 0.397 |
| Remarks | 394 | 1,622 | 604 | 1,005 | 351 |
| Bandwidth | 0.144 | 0.139 | 0.0901 | 0.135 | 0.163 |
| Eff. Obs. Left | 132 | 569 | 140 | 270 | 121 |
| Eff. Obs. Right | 106 | 466 | 135 | 250 | 91 |
| Order. Poli. | 2 | 2 | 2 | 2 | 2 |
| **Panel (C) Population - Linear** | **Share of social spending** | | | | |
| | | **x < 25%** | 25% < x < 50% | 50% < x < 75% | **75% < x** |
| Coef. | | 0.012** | 0.0306*** | 0.0221*** | 0.0394*** |
| Robust p-value | | 0.031 | 0.003 | 0.001 | 0.003 |
| Std. Error. | | (0.07) | (0.010) | (0.009) | (0.013) |
| Remarks | | 996 | 990 | 994 | 996 |
| Bandwidth | | 0.106 | 0.0975 | 0.120 | 0.113 |
| Eff. Obs. Left | | 241 | 259 | 300 | 240 |
| Eff. Obs. Right | | 245 | 219 | 252 | 219 |
| Order. Poli. | | 1 | 1 | 1 | 1 |

Note: This table presents the results for the discontinuity estimated around the cutoff by polynomial approximation. (i) qtd - represents the average of the quantity of public servants hired in the municipality; (ii) average salary - average remuneration in minimum wages. Errors are robust. Triangular Kernel and Bandwidth selected by CER-Optimal (Calonico, Cattaneo and Farrell, 2019). *** p<0.01, ** p<0.05, * p<0.1

## 1.5 Conclusion

This paper investigated whether there is an effect of Women Mayors on public finances in Brazilian municipalities. The results indicated that there was no effect on the levels of fiscal balance and total budget size. In analyzing the structure of expenditures, it found an increase in the level of personnel expenditures with no increase in the proportion to net current revenue. Inspecting the budget functions, it found that social expenditures increased by 2% in the budget share due to the election of women mayors. The effects found were robust to several specifications used in the paper.

This article made several contributions to the literature on gender and public finance. The main result of the paper went in the opposite direction of recent research addressing this issue in developed countries (Geys and Sørensen, 2019; Casarico, Lattanzio, and Profeta, 2021; Bagues and Campa, 2021). In addition, it captures mechanisms identifying that the increase in social spending occurs as a result of the hiring of health and education professionals, in addition to the increase in the average wage.

It is worth noting, however, some limitations. The Brazilian public finance structure is not very flexible and leaves little power for municipalities to increase their size unilaterally. In addition, several interactions with the Legislative Branch shape the behavior of municipalities and this factor was not explored in this research. Finally, the past and previous background of elected mayors was also not addressed. It is suggested that further updates address these issues to identify new mechanisms of the results found in this research.

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