Legislature Size and Council Member Diversity:
Evidence from Brazilian Municipalities[*]

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Área 4: Políticas Públicas

Abstract

The Brazilian Constitution of 1988 granted local governments greater autonomy and influence over public services and legislation. Municipal councils serve as crucial intermediaries between communities and the government, shaping policies and representation. This study employs a regression discontinuity design to examine the impact of council size on the diversity of candidates and elected members. The findings indicate an increase in the number of non-white councilors and those with a high school education. However, the effects of gender and age representation remain inconclusive. This research contributes to the existing literature on the impact of legislative size on policy areas.

KEYWORDS: Legislative Size. Municipal Policy. Political Representation. Regression Discontinuity Design.

1   Introduction

The Brazilian Constitution of 1988 strengthened local governments by granting them political and fiscal autonomy, allowing them to pursue their agenda and have a direct impact on the lives of the population, whether in the provision of public services or through the influence of specific municipal laws (Abrucio, 1994; Souza, 1997; Boulding and Brown, 2014; Rocha and Kerbauy, 2014). In this context, municipal councils and their councilors act as crucial channels between the real demands of the community and the government, shaping public services, finances, and laws that affect the daily lives of residents (Mignozzetti and Cepaluni, 2019).

The personal characteristics of elected officials can influence their policy preferences and decisions. For example, black legislators are more likely to support policies that align with the

interests of their communities, while female legislators are more likely to support policies that benefit women (Bratton, 2002). In Brazil, the demographic composition of Brazilian legislators is predominantly male, white, and highly educated (Silva, 2014; Silva and Dantas, 2016).

The size of the municipal council is an important determinant of political representation at the local level. Municipalities with larger councils have more seats available, which can increase the opportunities for candidates from different social groups to be elected. This research examines the impact of municipal council size on the diversity of candidates and elected council members, including variables for age, gender, race, and educational attainment. The results of the research have important implications for public policy, as they can help promote more inclusive political representation.

The definition of the size of municipal councils in Brazil has undergone significant changes. Initially, the 1988 Constitution established a proportional relationship between population and the number of councilors. However, the flexible interpretation of this rule led to distortions, such as municipalities of similar size having significantly different numbers of representatives. In 2004, a new rule directly linked the councils' size to the population. Then, in 2009, a new model introduced limits on the number of councilors based on population tiers. This gave municipalities more autonomy to determine the number of councilors within these limits but also increased the total number of councilors in the country.

To assess the impact of municipal council size on the diversity of candidates and elected councilors, we used the population thresholds established by Constitutional Amendment 58/2009, which dictates the maximum number of councilors per municipality. We used a regression discontinuity design (RDD), which relies on abrupt changes in treatment assignment (council size) near a population threshold. We examined assumptions and potential biases, including the RDD hypothesis that municipalities cannot manipulate the official population count near the cutoff. Because treatment assignment was not a deterministic function of population, we obtained an intention-to-treat (ITT) estimate. We considered diversity in age, gender, race, and educational attainment. Our analysis covered the 2017-2020 and 2021-2024 electoral cycles in Brazilian municipalities with less than 100,000 inhabitants. We used population data from the Brazilian Institute of Geography and Statistics (IBGE) and information on elected councilors and candidates from the Superior Electoral Tribunal (TSE).

Our results indicate that a larger council size leads to an increase of about 1 non-white candidate elected to the city council. For gender representation, we find evidence that council size may increase the number of female candidates, but no statistically significant effect on the election of women, suggesting that council size may not be a determinant of gender representation in local politics. Results for age representation show no significant effect of council size on politicians under 30 or over 60, with a minimal increase in the number of candidates under 30.

Finally, in terms of educational representation, there is an increase in the number of elected council members with at least a high school education, but no significant change in overall educational representation.

This study relates to two different strands of literature. First, it relates to the literature on political identity and political choice. Black legislators appear to have a significantly higher intrinsic motivation to defend black interests (Bratton, 2002; Minta, 2009; Broockman, 2013). Younger politicians behave more strategically in response to electoral incentives, likely because they expect longer political careers (Alesina et al., 2019). The personal characteristics of politicians may also affect socioeconomic outcomes. Countries with higher proportions of women in parliament have faster growing economies (Jayasuriya and Burke, 2013) and invest more in infrastructure directly related to the needs of their gender (Chattopadhyay and Duflo, 2004). Municipalities governed by mayors who are farmers have higher rates of deforestation and $CO2$ emissions, allocate more resources to agriculture, and have more land-related conflicts (Bragança and Dahis, 2022), while younger politicians reduce deforestation and greenhouse gas emissions without significantly affecting local incomes (Dahis et al., 2023).

Second, this research is also related to the literature that examines the impact of legislative size on various policy areas. However, the results are often divergent. Weingast et al. (1981) argue that there is a positive relationship between legislative size and public spending inefficiency, but Freire et al. (2023) points out that there is no robust evidence to suggest that legislative size has a positive or negative effect on government budgets. In fact, some studies suggest a negative effect of legislative size on public spending (Pettersson-Lidbom, 2012; Höhmann, 2017; De Benedetto, 2018; Lewis, 2019), while others suggest a positive effect (Egger and Koethenbuerger, 2010; Halse, 2016; Kresch et al., 2021). In addition, the size of the legislature is an important factor that may influence other contexts. Lewis (2019) shows that an increase in legislative size negatively affects citizens' access to public services in Indonesia, while in Brazil the addition of one legislator improves education and health care (Mignozzetti and Cepaluni, 2019). A larger legislature can also benefit women's representation in politics (Correa and Madeira, 2014; Meireles and Rubim Andrade, 2017), lead to an increase in corruption (Chang and Golden, 2007; Britto and Fiorin, 2020), and has the potential to reduce the electoral power of incumbent parties in the executive (Frey, 2021). Finally, the results on the impact of legislative size on party fragmentation are mixed (Taba, 2021) but may have a positive effect on spatial vote concentration (Silva, 2017).

The remainder of the paper is structured as follows. Section 2 provides the institutional context. Section 3 presents the data and summary statistics. Section 4 explains the empirical strategy. Section 5 contains our results. Section 6 concludes the paper.

2   Institutional Context

Brazil is comprised of more than 5,500 municipalities, which form the basic political and administrative structure of the country. These municipalities are responsible for organizing and providing locally relevant public services such as health care, early childhood education, primary education, and public transportation, among others. To accomplish these tasks, the structure of local government is divided into an executive branch, headed by the mayor, and a legislative branch, represented by the municipal council, both of which are elected by direct vote every four years (Brasil, 1988).

In this context, to serve the interests of the municipality, the Constitution assigns several responsibilities to the Municipal Council. These include deliberating on matters related to municipal taxation, creating, modifying, and abolishing public positions, authorizing credit operations, granting public services, and approving municipal development plans and urban regulations. In addition, councilors are charged with formulating the budget for municipal revenues and expenditures, as well as supervising the financial management of the municipality (Brasil, 1977).

To be elected as a city councilor in Brazil, candidates must meet certain requirements, including being a Brazilian citizen by birth or naturalization, being at least 18 years old, being registered to vote, and being affiliated with a political party (Brasil, 1988). Parties may register up to 150% of the number of seats to be contested, with 30% of these candidates being women (Brasil, 1997)[1].

Regarding the composition of municipal councils, the 1988 Constitution stipulated that the number of councilors should be proportional to the population of the municipality, within certain limits. However, these limits were not specific enough and allowed municipal councils undue discretion in determining the number of seats, which encouraged distortions[2]. Faced with this flexibility, the Federal Supreme Court adopted a new interpretation in 2003, stipulating that the relationship between population and the number of seats should be more precise.

This reinterpretation led to Resolution No. 21.702/2004 of the Superior Electoral Tribunal (TSE), which established a strict ratio between the number of councilors and the population of municipalities. Figure 1A illustrates the number of seats in Brazilian councils for the 2008 elections in municipalities with a population of up to 100,000 inhabitants. According to this new framework, municipalities with up to 47,619 inhabitants would be entitled to 9 councilors,

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[1]For example, if a city council has 9 seats up for election, each party may register up to 14 candidates. If a party registers 14 candidates, 4 of them must be women.

[2]To illustrate the lack of proportionality, consider the following examples: Sumaré (SP), with a population of 168,058, had 13 councilors. São Manuel (SP), with 38,271 inhabitants, had 21 councilors. Guarulhos (SP), with 972,197 inhabitants, had the same number of councilors.

those with a population between 47,620 and 95,238 would have 10 councilors, and so on[3]. This proportional relationship was used in the 2004 and 2008 elections.

However, in 2009, an institutional change occurred with the approval of Constitutional Amendment No. 58/2009. This amendment changed the relationship between the number of councilors and the population, moving away from the principle of proportionality. Instead, the amendment introduced a new model by establishing a maximum number of seats for each municipality, determined by 24 different population ranges. Figure 1B illustrates the number of seats in Brazilian councils for the 2012 municipal elections in municipalities with a population of up to 100,000.

Figure 1: Distribution of council seats by population in 2008 and 2012
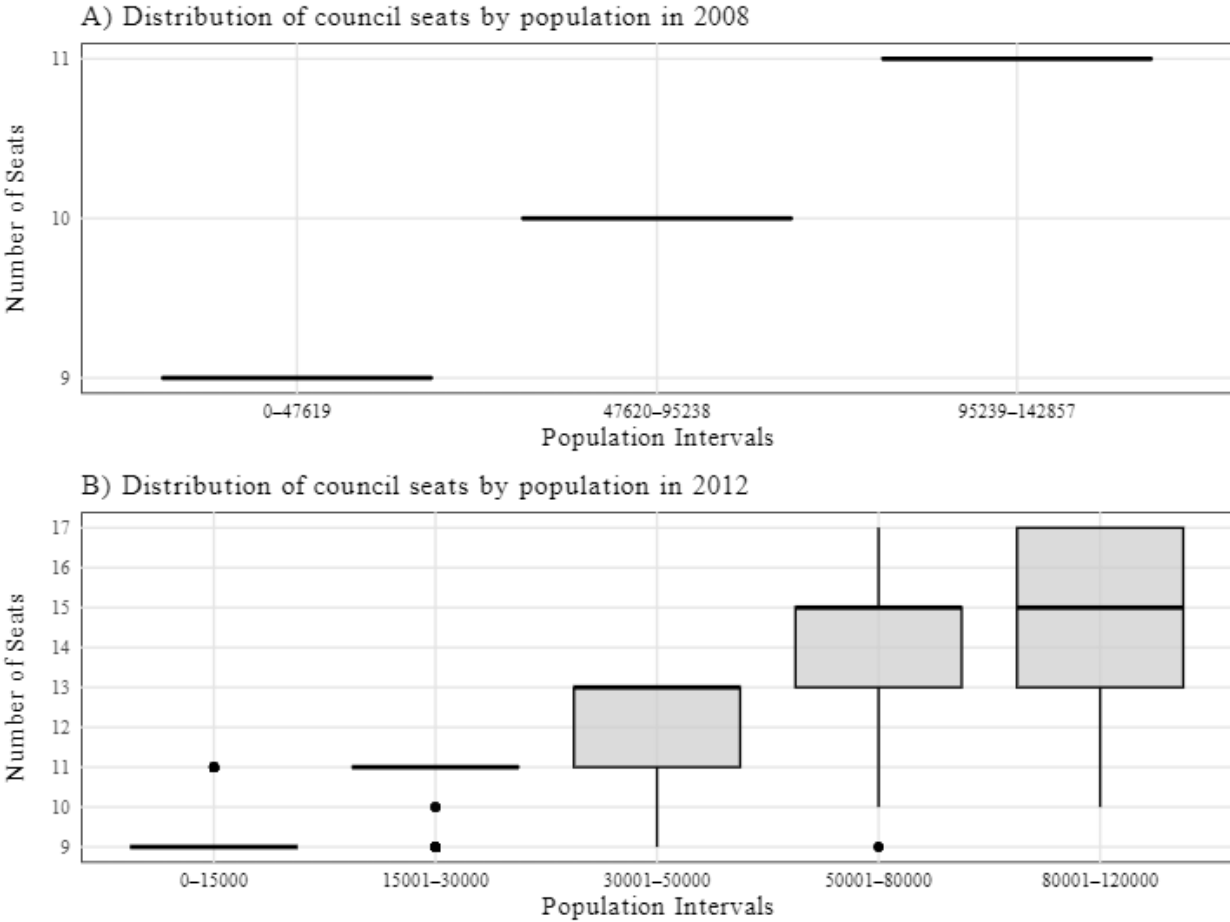
Note: This figure shows the distribution of the council size based on population in municipalities at two different points in time: the 2008 elections (Panel A) and the 2012 elections (Panel B).

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[3]The number 47,619 is obtained by dividing 1,000,000 by 21. The original Constitution defined the first range as "a minimum of nine and a maximum of twenty-one councilors in municipalities of up to one million inhabitants". Therefore, the number 47,619 now represents the lower limit of this range, and for each additional 47,619 inhabitants, the number of councilors increases by one.

This change marked a return to the original decentralization model provided for in the 1988 Constitution. Municipalities with comparable population sizes could now have different numbers of representatives in municipal councils. Consequently, by replacing strict proportionality with a more flexible system, Constitutional Amendment No. 58/2009 resulted in a significant increase in the number of councilors across the country.

Figure 2 shows the distribution of the number of council seats at an intersection of population ranges, including both the rule in place for the 2004 and 2008 elections and the rule in place since 2012.

Figure 2: Distribution of council seats between the 2008 and 2012 rules
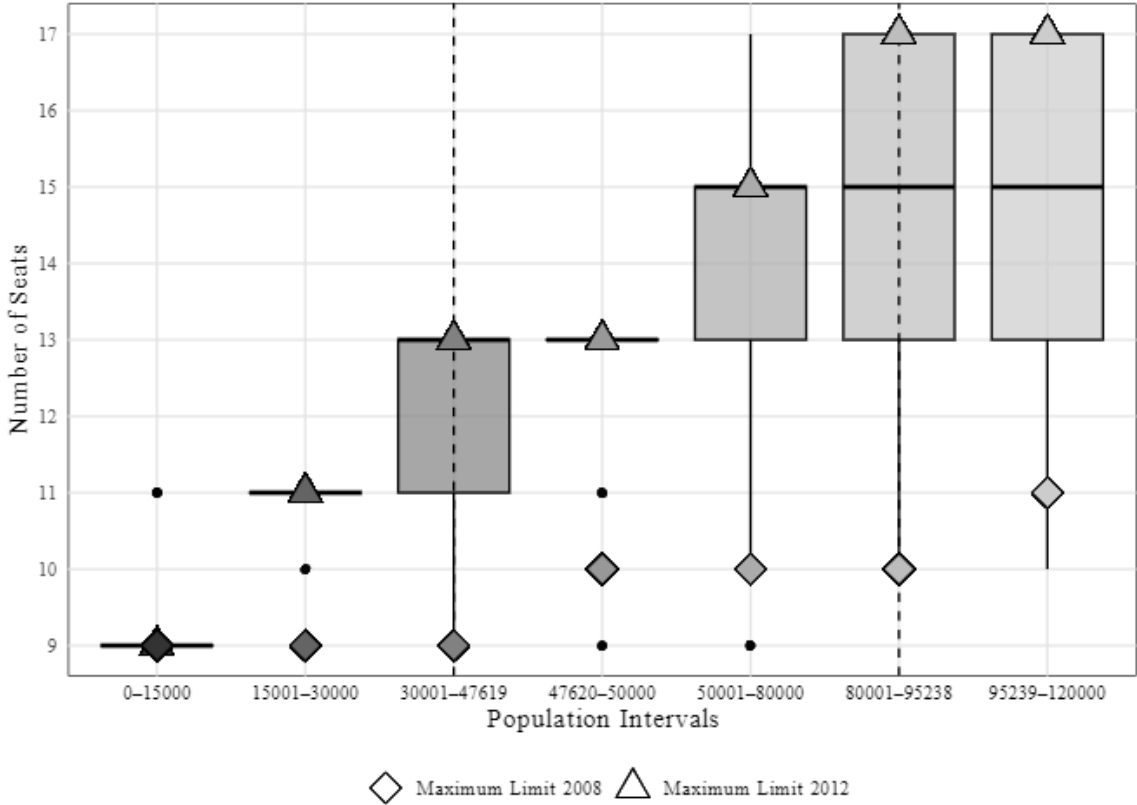
Note: Population data provided by IBGE and the number of council seats provided by TSE were used for this analysis. The dashed vertical line in the graph represents the population ranges of 2008. The x-axis corresponds to the intersections of the population ranges between the 2004/2008 and 2012 electoral rules. The resulting intersections (0-15000, 15001-30000, 30001-47619, 47620-50000, 50001-80000, 80001-95238, and 95239-120000) were used to directly compare the number of councilors in 2012 (y-axis), accounting for population variation within each range.

The number of elected councilors increased from 51,999 in 2008 to 57,434 in 2012. Approximately 30% municipal chambers, representing 1,694 municipalities, opted to increase the

number of legislative seats. In addition, 4,801 municipalities, or about 86% of the total, adhered to the maximum number of seats allowed by the new electoral legislation.

3 Data and Summary Statistics

Our empirical study examines the impact of municipal council size on the representation of different social groups within the council. To do so, we combine electoral records with population estimates. We provide a full description of the sources of this information.

Our main data comes from the open data portal of the Superior Electoral Tribunal (TSE) in Brazil. We obtained detailed records from the 2016 and 2020 municipal elections using this platform. This data allowed us to analyze the number of municipal council seats in each election, as well as the characteristics of the candidates who participated and the councilors who were elected. Using the TSE data, we assessed the number and proportion of candidates and councilors based on age, gender, race, and educational background.

To evaluate the application of the councilor allocation rules in each municipality and to determine our running variable, we obtained population estimates from the Brazilian Institute of Geography and Statistics (IBGE). It is noteworthy that the determination of the number of seats in the 2016 and 2020 elections was based on municipal population data from 2015 and 2019, respectively, according to IBGE data.

In our study, we limit our focus to the 2017-2020 and 2021-2024 electoral cycles[4], focusing on Brazilian municipalities with a population of less than 100,000. This selection is based on the fact that approximately 95% of the country's municipalities fall within this population range (see appendix figure 9). Consequently, our analysis strategically targets areas where observations are most concentrated.

Table 1 presents descriptive statistics for variables related to municipal characteristics, race, education, gender, and age of candidates and elected councilors. The statistics include the mean, standard deviation, minimum, and maximum for each variable.

The average number of seats in municipal chambers is 9.94, highlighting the significant impact of municipalities within the initial population threshold. The average population of the municipalities is 17,000 inhabitants, and there are on average about 7 candidates per seat.

Women represent about 35% of the candidates and only 15% of the elected councilors, showing a significant gap in gender representation. It is important to note that this proportion of female candidates is close to the legal minimum of 30%.

In terms of racial representation, non-white candidates make up almost half of all candidates

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[4]The exclusion of the 2013-2016 election cycle is due to a lack of available data on candidate racial identification during this period.

and are slightly less represented among those elected (about 48%). Age statistics show relatively similar average proportions of candidates under 30 (about 10%) and over 60 (about 9%).

In terms of education, the majority of candidates (59%) and elected councilors (67%) have a high school education. However, the proportions of candidates and elected councilors with higher education (18% and 26%, respectively) suggest a positive influence of higher education on the probability of being elected.

Table 1: Summary Statistics

Variables	Mean	St. Dev.	Min	Max	N
Municipal Characteristics					
Number of Seats	9.94	1.64	7.00	17.00	10479
Population (in thousand)	17.06	17.73	0.78	99.99	10512
Total Candidates	69.94	49.74	9.00	396.00	10510
Candidates per Seat	6.73	3.85	1.00	30.89	10479
Gender					
Women Candidates	24.03	16.66	3.00	129.00	10510
Men Candidates	45.90	33.22	6.00	266.00	10510
Women Elected	1.52	1.16	0.00	8.00	10316
Share of Women Candidates (%)	34.68	2.71	25.93	50.00	10510
Share of Women Elected (%)	15.45	11.68	0.00	77.78	10286
Race					
Non-White Candidates	36.33	35.93	1.00	333.00	10192
Non-White Elected	4.86	3.31	0.00	17.00	9466
Share of Non-White Candidates (%)	49.47	28.76	1.25	100.00	10192
Share of Non-White Elected (%)	48.07	30.92	0.00	100.00	9436
Age					
Candidates Under 30	7.14	5.25	1.00	49.00	10262
Candidates Over 60	6.77	6.12	1.00	62.00	10068
Share of Candidates Under 30 (%)	10.64	5.07	0.93	38.46	10262
Share of Candidates Over 60 (%)	9.44	4.85	0.83	53.33	10068
Elected Under 30	0.77	0.84	0.00	6.00	9682
Elected Over 60	0.83	0.87	0.00	5.00	8456
Share of Elected Under 30 (%)	7.90	8.71	0.00	66.67	9653
Share of Elected Over 60 (%)	8.35	8.63	0.00	55.56	8433
Education					
High School Graduates Candidates	42.13	34.14	2.00	290.00	10510
College Graduates Candidates	12.78	12.11	1.00	112.00	10424
Share of High School Graduates Candidates (%)	58.66	12.30	9.52	100.00	10510
Share of College Graduates Candidates (%)	17.54	8.10	1.25	58.82	10424
High School Graduates Elected	6.73	2.42	0.00	17.00	10510
College Graduates Elected	2.64	1.90	0.00	13.00	10358
Share of High School Graduates Elected (%)	67.14	18.60	0.00	100.00	10479
Share of College Graduates Elected (%)	25.88	16.91	0.00	100.00	10328

Notes: The table presents descriptive statistics on the characteristics of candidates and councilors who were elected. The data cover the 2017-2020 and 2021-2024 electoral cycles for municipalities with a population of up to 100,000, using population figures from IBGE and details on candidates and council members from TSE.

4 Empirical Strategy

We used a regression discontinuity design to estimate the impact of the size of the municipal council on the diversity of candidates and elected councilors, including variables for age, gender, race, and education level. To do so, we examined the population limits established by Constitutional Amendment 58/2009, which determines the maximum number of councilors in each municipality. We analyzed the 2017-2020 and 2021-2024 electoral cycles.

A sharp RDD becomes appropriate when one considers that, although non-compliance is evident - not all municipalities choose to reach the maximum number of councilors allowed - relatively few municipalities deviate from adopting the limit, as shown in table 8. Our basic model is defined as follows:

$$Y_{it} = \alpha + \beta D_{it} + g(X_m) + \mu_{it} \tag{1}$$

where Y_{it} represents the outcome of interest for municipality i in year t; D_{it} is the treatment dummy variable indicating whether the observation is to the right of the threshold; $g(X_m)$ is a polynomial function of the running variable. We normalize and pool the pre-election populations around the first four thresholds to form a single cutoff, following Brollo et al. (2013). Our main specifications are estimated without controls. The coefficient of interest is β, which estimates the effect of having more contested seats on outcomes.

We estimate bias-corrected regression discontinuity coefficients and robust standard errors, using non-parametric functions within narrow windows on either side of the cutoff (Calonico et al., 2014). This approach is more robust to bandwidth choices and valid under weaker conditions than conventional methods. We use a uniform kernel and compute the optimal mean squared error (MSE) bandwidth as in Calonico et al. (2020). The procedure for selecting the optimal bandwidth was implemented using the R package provided by Calonico et al. (2015)[5]. Following Gelman and Imbens (2019), we use a first-degree polynomial in the estimation procedures.

In cases where treatment is not a deterministic function of the running variable, the reduced-form coefficient of interest, as described in equation 4.1, serves as an intention-to-treat (ITT) estimator. To ensure reliable estimates, we rely on bias-corrected coefficients and robust cluster confidence intervals calculated according to Calonico et al. (2018).

A basic assumption of the RD design is that municipalities cannot manipulate the official population count near the cutoff. In addition, other policies associated with the cutoff, or imbalances in outcome determinants between cutoffs, could bias our estimates. We test and discuss these potential threats in Section 5.2.

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[5]Available on January 2024 at https://rdpackages.github.io/rdrobust

5   Results

We first test for an increase in the probability of treatment at the threshold. Then, we estimate the reduced-form effect of the council size on the participation in municipal elections of non-whites, women, those under 30 and over 60, and those with a high school diploma or higher education. Finally, the identification assumptions are discussed. The main reduced-form results are accompanied by graphs of the local linear regression of the outcome on the running variable, without controls.

5.1   Main results

The results presented in Table 2 and Figure 3 show the increased probability of being treated at the specified threshold. On average, municipalities with larger councils show an increase of 0.7 members compared to those with smaller councils, with this result being statistically significant at the 1% level. This finding remains consistent across different bandwidths and kernel choices, reinforcing the robustness of the observed relationship.

In addition, the analysis reveals a relationship between council size and the total number of candidates participating in the elections. While this effect is only statistically significant at the 10% level, it still suggests a positive influence on the size of the candidate pool.

Table 2: Effects of Municipal Council Size on Electoral Outcomes

	(1) Seats	(2) Total Candidates	(3) Candidates per Seat
β bias-correcteds.e.	0.726***	11.494*	0.582
	(0.145)	(5.046)	(0.467)
Bandwidth	1736	1469	1109
Observations	2075	1823	1464

Notes: This table reports the reduced-form effects of council size on the pool of candidates and elected councilors in local elections. The estimates are derived from regression discontinuity (RD) designs, utilizing a local polynomial estimator with a uniform kernel. The optimal bandwidth for each regression, minimizing mean squared error (MSE), was chosen following the method outlined in Calonico et al. (2014, 2018). Significance levels are denoted by: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3 examines the relationship between racial representation and council size. The results of the regression discontinuity analysis indicate a statistically significant positive effect of council size on the number of non-white candidates elected. Specifically, we found an increase of 1.136 in the number of non-white candidates elected (column 2) in larger councils. This finding suggests that municipalities with larger legislative bodies are more likely to elect non-white candidates. We also estimate an increase of 5.7 percentage points in the proportion of non-white

Figure 3: Effects of Municipal Council Size on Electoral Outcomes: RD Plots
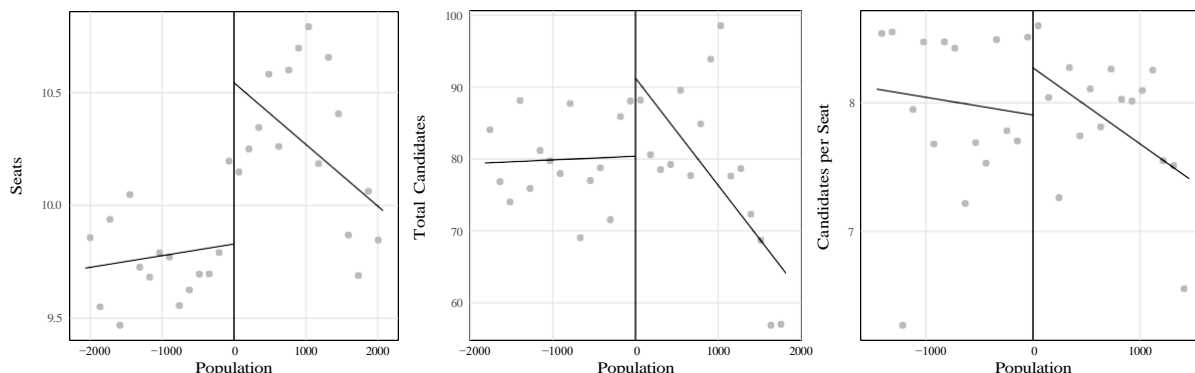
Note: The regression discontinuity plots visually represent the results of the regression discontinuity analysis for the normalized population threshold. Each plot corresponds to specific variables and illustrates changes around the cutoff point of the population threshold.

candidates (column 4), although this effect is only statistically significant at the 90% confidence level. However, the probability of electing at least one non-white candidate is not significantly affected by council size (column 3), and council size has no significant effect on the proportion of non-white candidates elected (column 5). These results suggest that council size may have a limited effect on racial representation in local politics, even if it leads to an increase in the number of non-white council members elected. Figure 4 complements the results in the table by providing RD plots for each outcome variable.

Table 3: Effects of Municipal Council Size on Racial Representation in Local Elections

	(1) Non-White Candidates	(2) Non-White Elected	(3) At Least 1 Non-White Elected	(4) Share of Non-White Candidates	(5) Share of Non-White Elected
β bias-correcteds.e.	7.268	1.136**	0.035	5.715*	5.503
	(3.849)	(0.357)	(0.022)	(2.735)	(3.051)
Bandwidth	1336	1405	2222	1717	1781
Observations	1728	1926	2609	2103	2276

Notes: This table reports the reduced-form effects of council size on the pool of candidates and elected councilors in local elections. The estimates are derived from regression discontinuity (RD) designs, utilizing a local polynomial estimator with a uniform kernel. The optimal bandwidth for each regression, minimizing mean squared error (MSE), was chosen following the method outlined in Calonico et al. (2014, 2018). Significance levels are denoted by: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure 4: Effects of Municipal Council Size on Racial Representation in Local Elections: RD Plots
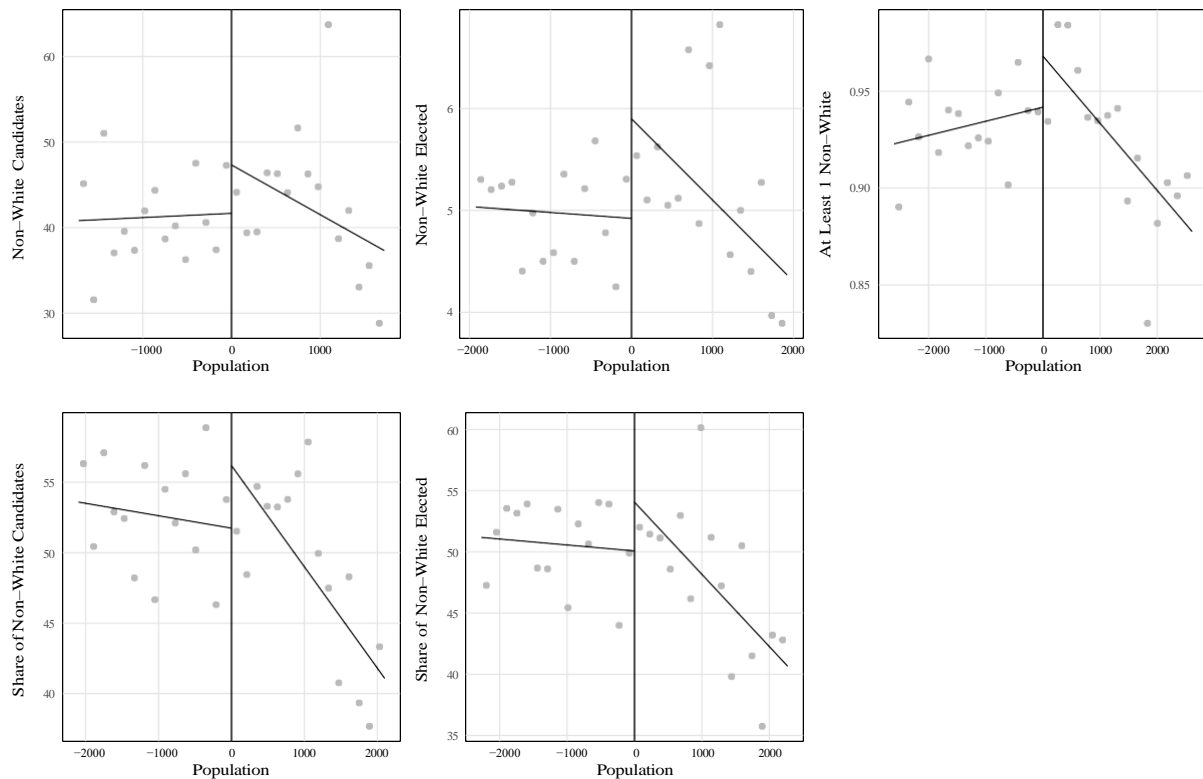
Note: The regression discontinuity plots visually represent the results of the regression discontinuity analysis for the normalized population threshold. Each plot corresponds to specific variables and illustrates changes around the cutoff point of the population threshold.

Table 4 presents the results of the regression discontinuity (RD) analysis that examines the impact of the size of the municipal council on women's participation and representation in local elections. The estimates show that an increase in the number of council seats is associated with a positive, but only marginally significant effect on the number of female candidates (column 1). However, this increase has no statistically significant effect on the number of women elected (column 2), the probability of at least one woman being elected (column 3), or the proportion of female candidates or elected officials (columns 4 and 5). These results suggest that the size of the municipal council is not a determinant of gender representation in local politics. Figure 5 further supports the analysis by showing the RD plots for each outcome variable.

Table 4: Effects of Municipal Council Size on Gender Representation in Local Elections

	(1) Women Candidates	(2) Women Elected	(3) At Least 1 Woman Elected	(4) Share of Women Candidates	(5) Share of Women Elected
β bias-correcteds.e.	3.718*	0.029	0.014	-0.377	-0.473
	(1.745)	(0.097)	(0.036)	(0.241)	(0.754)
Bandwidth	1370	2987	2784	1432	5639
Observations	1725	2918	2795	1788	4552

Notes: This table reports the reduced-form effects of council size on the pool of candidates and elected councilors in local elections. The estimates are derived from regression discontinuity (RD) designs, utilizing a local polynomial estimator with a uniform kernel. The optimal bandwidth for each regression, minimizing mean squared error (MSE), was chosen following the method outlined in Calonico et al. (2014, 2018). Significance levels are denoted by: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure 5: Effects of Municipal Council Size on Gender Representation in Local Elections: RD Plots

Note: The regression discontinuity plots visually represent the results of the regression discontinuity analysis for the normalized population threshold. Each plot corresponds to specific variables and illustrates changes around the cutoff point of the population threshold.
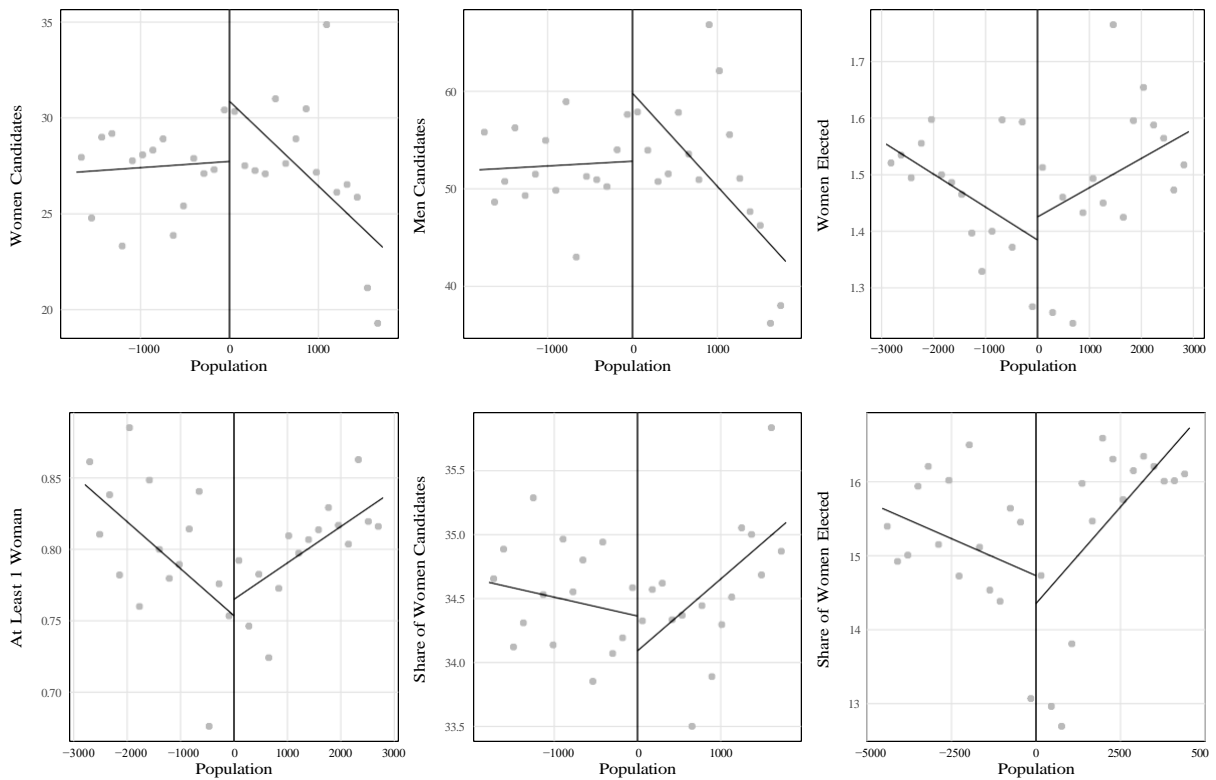
Table 5: Effects of Municipal Council Size on Age Representation in Local Elections

	(1) Candidates Under 30	(2) Share of Candidates Under 30	(3) Elected Under 30	(4) Share of Elected Under 30	(5) Candidates Over 60	(6) Share of Candidates Over 60	(7) Elected Over 60	(8) Share of Elected Over 60
β bias-corrected s.e.	1.636**	0.685	0.000	-0.042	0.911	-0.278	-0.046	-0.974
	(0.531)	(0.360)	(0.069)	(0.670)	(0.665)	(0.406)	(0.066)	(0.796)
Bandwidth	1455	3734	3024	3502	1635	2583	4142	2701
Observations	1831	3424	3070	3396	2015	2705	4182	3144

Notes: This table reports the reduced-form effects of council size on the pool of candidates and elected councilors in local elections. The estimates are derived from regression discontinuity (RD) designs, utilizing a local polynomial estimator with a uniform kernel. The optimal bandwidth for each regression, minimizing mean squared error (MSE), was chosen following the method outlined in Calonico et al. (2014, 2018). Significance levels are denoted by: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5 presents the results of the regression discontinuity (RD) analysis that examines the impact of the size of the municipal council on the participation and representation of younger (under 30 years old) and older (over 60 years old) politicians in local elections. Our results suggest that the size of the municipal council does not have a significant effect on age representation in local politics. The increase in the number of candidates under 30 (column 1), which is the only significant effect identified, is minimal and does not translate into a higher proportion of councilors under 30. This suggests that other factors play a more important role in explaining the representation of different age groups in the local legislative body. Figure 6 completes the analysis.

Table 6 presents the results of the regression discontinuity (RD) analysis that examines the impact of the size of the municipal council on the educational attainment of candidates and councilors elected in local elections. We find an average increase of 0.858 elected councilors with at least a high school education (column 3). In addition, there is a possible increase in the number of candidates with at least a high school education as the size of the council increases (column 1), but this result is only statistically significant at the 10% level. However, this increase does not change the proportion of candidates or elected officials with at least a high school diploma (columns 2 and 4). This finding suggests that increasing the number of candidates and elected officials with at least a high school diploma does not necessarily lead to a change in educational representation in local politics. The results for candidates and elected officials with a college degree are less clear. Figure 7 presents the RD plots for the number of candidates and elected officials by education level to visualize the RD results.

Figure 6: Effects of Municipal Council Size on Age Representation in Local Elections: RD Plots
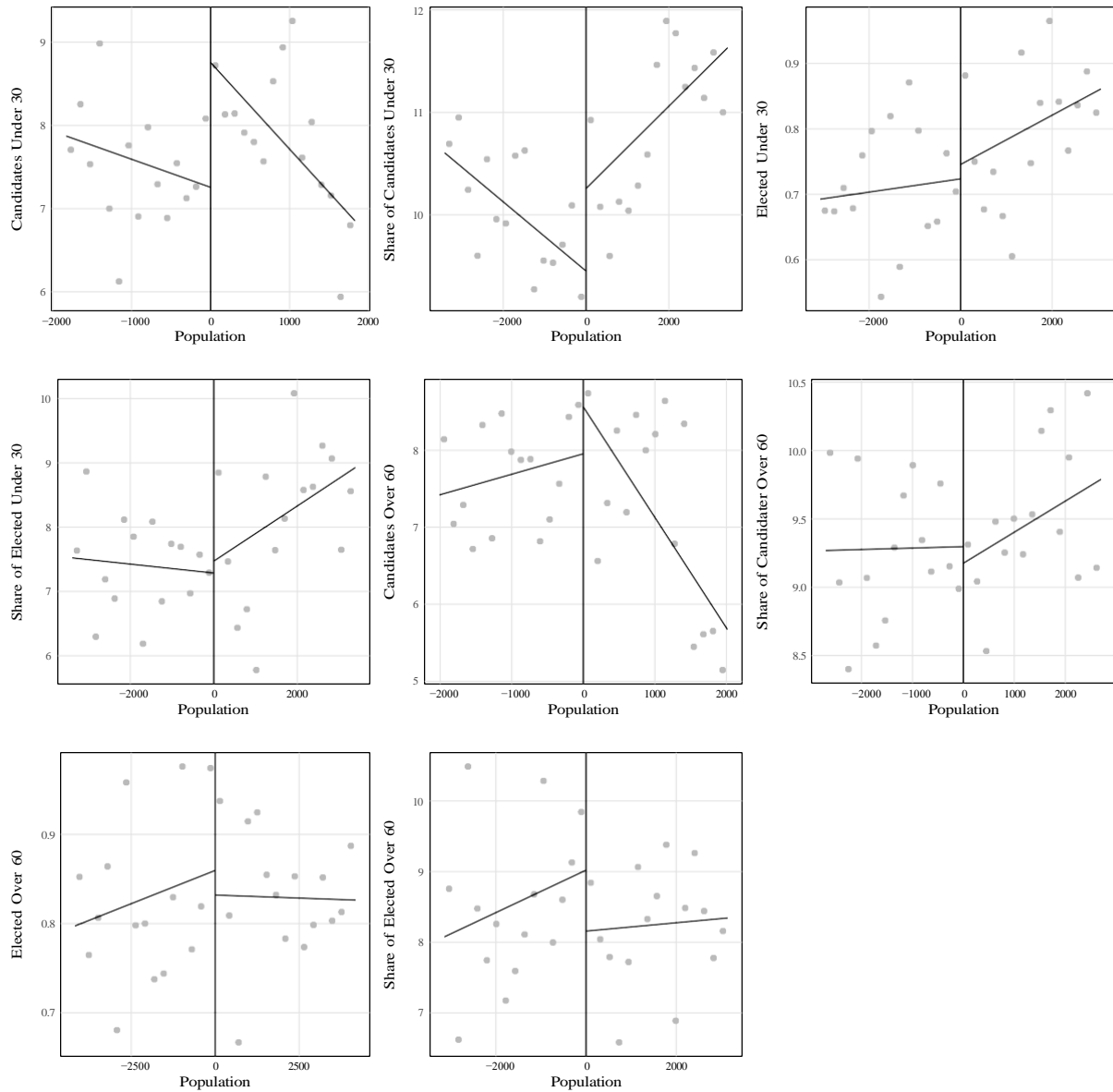
Note: The regression discontinuity plots visually represent the results of the regression discontinuity analysis for the normalized population threshold. Each plot corresponds to specific variables and illustrates changes around the cutoff point of the population threshold.

Table 6: Effects of Municipal Council Size on Educational Attainment Representation in Local Elections

	(1) High School Graduates Candidates	(2) Share of High School Graduates Candidates	(3) High School Graduates Elected	(4) Share of High School Graduates Elected	(5) College Graduates Candidates	(6) Share of College Graduates Candidates	(7) College Graduates Elected	(8) Share of College Graduates Elected
β bias-correcteds.e.	7.358*	0.661	0.858***	2.786	2.147	1.566*	0.497*	3.392
	(3.416)	(1.040)	(0.236)	(1.697)	(1.225)	(0.781)	(0.194)	(1.868)
Bandwidth	1444	2006	1368	1885	1378	1586	1637	1366
Observations	1801	2263	1722	2184	1749	1961	2001	1753

Notes: This table reports the reduced-form effects of council size on the pool of candidates and elected councilors in local elections. The estimates are derived from regression discontinuity (RD) designs, utilizing a local polynomial estimator with a uniform kernel. The optimal bandwidth for each regression, minimizing mean squared error (MSE), was chosen following the method outlined in Calonico et al. (2014, 2018). Significance levels are denoted by: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure 7: Effects of Municipal Council Size on Educational Attainment Representation in Local Elections: RD Plots

Note: The regression discontinuity plots visually represent the results of the regression discontinuity analysis for the normalized population threshold. Each plot corresponds to specific variables and illustrates changes around the cutoff point of the population threshold.
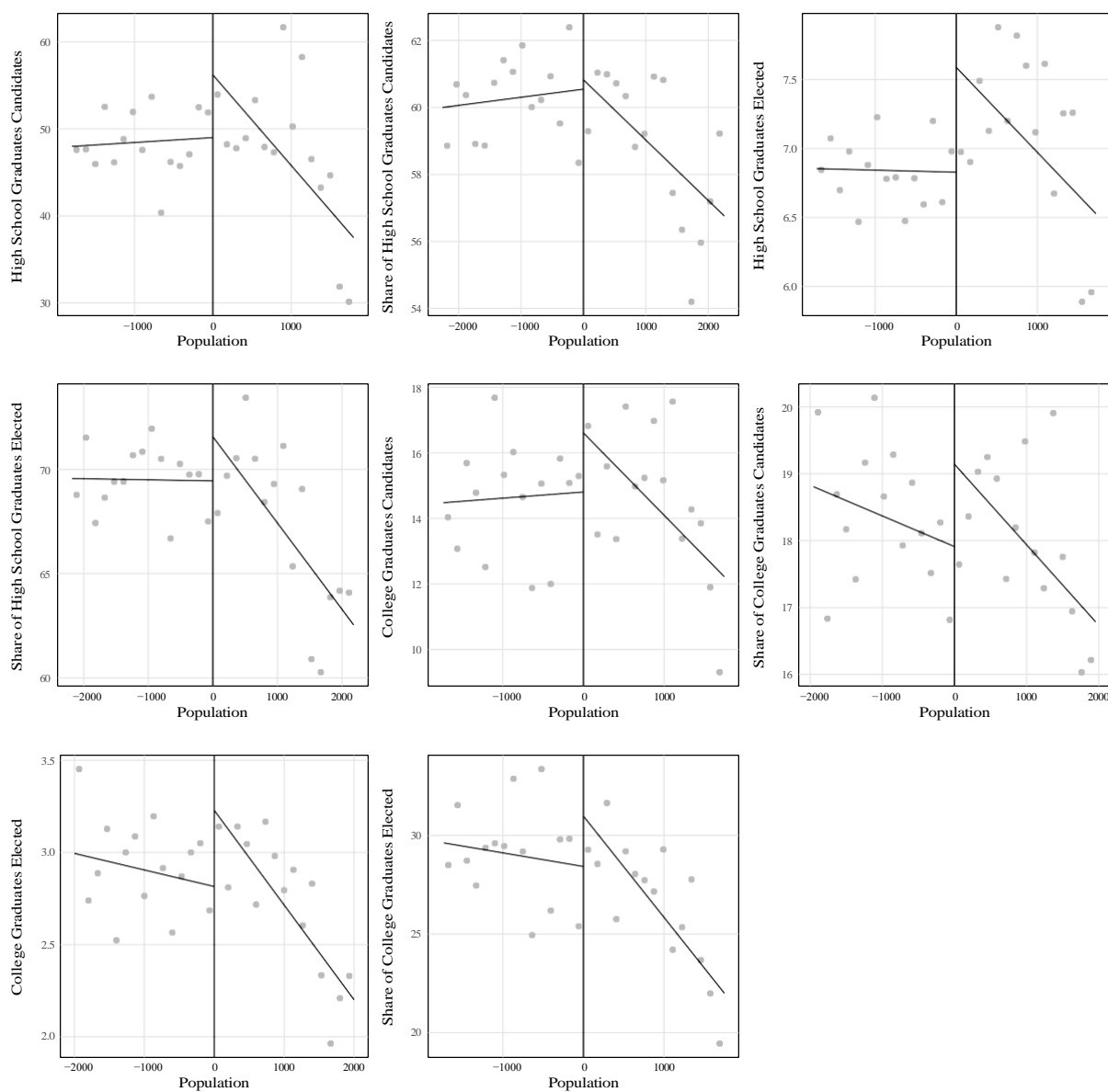
Our results are consistent with previous research examining the relationship between city council size and participation and representation in Brazilian municipal elections Correa and Madeira (2014); Britto and Fiorin (2020); Frey (2021). Specifically, our results suggest that a larger municipal council leads to the election of more non-white councilors. Similarly, we observe an effect on the election of councilors with at least a high school education. However, it

is important to note that this does not translate into a proportional increase in the representation of these groups within the council itself. Finally, our analysis found no significant effect between council size and representation based on gender or age.

5.2 Validity and Robustness

Additional results are presented in the appendix to check the robustness of the results to specification and methodological variations. Table 9 of the appendix presents estimates with year (election cycle) and state fixed effects, while table 10 presents local linear regressions estimated with triangular rather than uniform kernels. These results are consistent with the main results, and these robustness checks provide additional confidence in the validity of our findings.

An essential condition for the validity of identification is that the treated units are similar to the control units on observable attributes near the cutoff. To assess the validity of the regression discontinuity design, four placebo outcomes were used: the percentage of non-whites in the municipal population, the percentage of individuals with a high school education, the percentage of females, and the percentage of individuals aged 18 to 29. These outcomes were chosen based on their independence from the treatment (size of the municipal council). The results of the falsification test are shown in Table 7. None of the placebo outcomes showed statistically significant discontinuities at the cutoff point, suggesting that the regression discontinuity design is valid. In other words, the observed effects on council size in the outcome variable are likely due to the treatment and not to other pre-existing differences between municipalities.

Table 7: Effects of Municipal Council Size on Placebo Outcomes

	(1) Share of Non-White	(2) Share of High School Graduates	(3) Share of Women	(4) Share of People Aged 18-29
β bias-correcteds.e.	3.288	-0.321	0.229	0.310
	(2.460)	(0.501)	(0.133)	(0.208)
Bandwidth	1961	2743	2852	1695
Observations	1601	2732	2912	1332

Notes: This table reports the reduced-form effects of council size on placebo outcomes. The estimates are derived from regression discontinuity (RD) designs, utilizing a local polynomial estimator with a uniform kernel. The optimal bandwidth for each regression, minimizing mean squared error (MSE), was chosen following the method outlined in Calonico et al. (2014, 2018). Significance levels are denoted by: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Data source: IBGE Censo 2010.

We used Cattaneo et al. (2020) manipulation test to check that there are no abrupt changes in the number of observations at the cutoff, indicating a possible manipulation. The test result was a test statistic value of 1.2517 with a p-value of 0.2107, so we do not reject the null hypothesis that there is no difference in the density of treated and control observations at the cutoff, indicating that there is no evidence of manipulation of the running variable. Figure 8 shows the graphical representation of the test. The histogram shows a continuous distribution of the running variable, and the density estimate shows no abrupt change at the cutoff. The validity of the design is strengthened by the fact that the population estimates used to calculate the running variable were provided by the Brazilian Institute of Geography and Statistics (IBGE), an independent national agency, making it unlikely that the population estimates were manipulated.

Figure 8: Histogram and Estimated Density of the Score
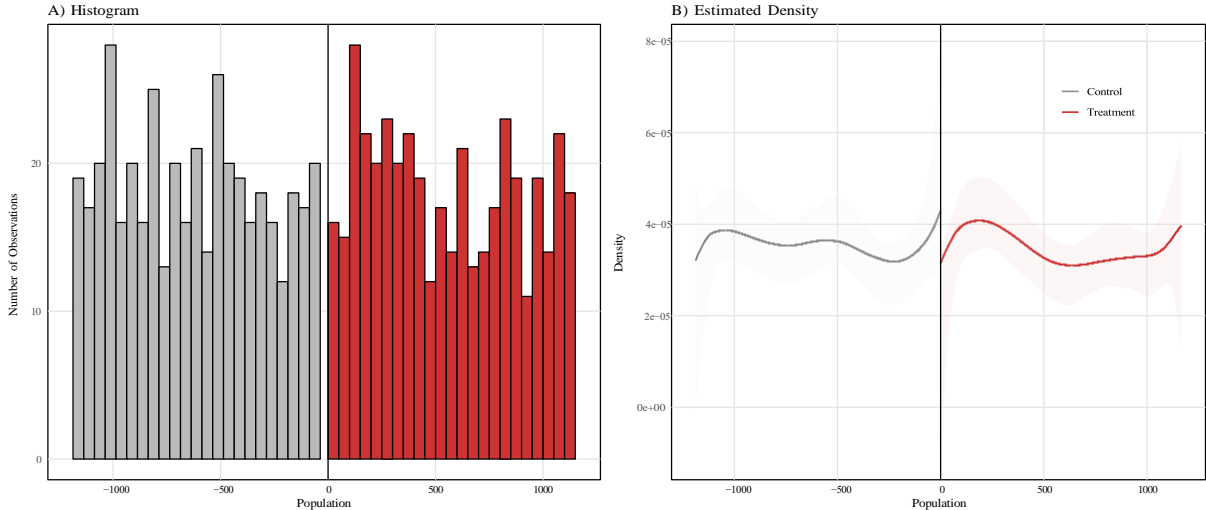
We conducted sensitivity analyses to assess the robustness of our RD results to the choice of bandwidth. We estimated our model with alternative bandwidth choices of 5,000 and 7,500. The results obtained with both bandwidths are similar regarding point estimates, but the confidence intervals are wider for the larger bandwidth. These results are consistent with the literature on the robustness of discontinuous regression results. Tables 11 and 12 present the full estimates of the sensitivity analysis.

6   Conclusion

Municipal councils are representative bodies of civil society with the power to deliberate on a wide range of local issues of interest. They play a fundamental role in promoting civil society participation in local government, allowing citizens to participate in decisions that affect their communities.

Using a regression discontinuity design, we take advantage of a discontinuous rule that links the size of a municipality's population to the maximum number of council members allowed. This approach allows us to estimate the causal effect of council size on the diversity of candidates and elected council members. Analyzing data from the 2017-2020 and 2021-2024 election cycles, we seek to shed light on how council size shapes the demographic landscape of local legislatures.

In summary, we find an increase in the number of non-white elected councilors. We also estimate an increase in the number of councilors with at least a high school education. However, the size of the council does not affect the proportion of candidates or representatives who are non-white or have at least a high school education.

Regarding gender and age representation, the results are inconsistent. We find that council size it does affect the number of female candidates, but only at the 10% significance level and without a statistically significant effect on the election of women. Similarly, council size does not seem to have a significant effect on the representation of council members under 30 or over 60.

These results may occur because candidates from minority demographic groups still face challenges in getting elected, even in larger councils. This suggests that factors other than council size are more important determinants of the demographic composition of municipal chambers.

These findings have important implications for policymakers seeking to promote diversity in political representation. While increasing the size of city councils may increase the diversity of the candidate pool, it appears insufficient to address the systemic barriers that prevent the election of underrepresented groups. Focusing on addressing these systemic issues, such as implicit bias, discriminatory electoral processes, and unequal access to campaign resources, may be more critical to achieving more diverse representation in local legislatures.

A limitation of our study is the lack of systematic data on municipal legislative production, coupled with the lack of comprehensive datasets that aggregate diverse information about municipalities. This prevents us from assessing, for example, whether larger city councils might exhibit differences in legislative production despite no significant effect on council member representation.

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A Tables

Table 8: Municipal Thresholds according to Constitutional Amendment nº 58/2009

Municipal Population	Number of Seats (Maximum Limit)	Municipal Count	Municipalities Adopting Maximum
Up to 15,000	9 (nine)	3262	3224
From 15,001 to 30,000	11 (eleven)	1139	845
From 30,001 to 50,000	13 (thirteen)	496	326
From 50,001 to 80,000	15 (fifteen)	267	149
From 80,001 to 120,000	17 (seventeen)	140	48
From 120,001 to 160,000	19 (nineteen)	81	17
From 160,001 to 300,000	21 (twenty-one)	94	33
From 300,001 to 450,000	23 (twenty-three)	39	8
From 450,001 to 600,000	25 (twenty-five)	17	3
From 600,001 to 750,000	27 (twenty-seven)	11	2
From 750,001 to 900,000	29 (twenty-nine)	6	2
From 900,001 to 1,050,000	31 (thirty-one)	2	0
From 1,050,001 to 1,200,000	33 (thirty-three)	2	0
From 1,200,001 to 1,350,000	35 (thirty-five)	1	0
From 1,350,001 to 1,500,000	37 (thirty-seven)	3	0
From 1,500,001 to 1,800,000	39 (thirty-nine)	2	1
From 1,800,001 to 2,400,000	41 (forty-one)	2	1
From 2,400,001 to 3,000,000	43 (forty-three)	3	2
From 3,000,001 to 4,000,000	45 (forty-five)	1	1
From 4,000,001 to 5,000,000	47 (forty-seven)	0	0
From 5,000,001 to 6,000,000	49 (forty-nine)	0	0
From 6,000,001 to 7,000,000	51 (fifty-one)	1	1
From 7,000,001 to 8,000,000	53 (fifty-three)	0	0
More than 8,000,000	55 (fifty-five)	1	1

Notes: Data refer to the maximum number of seats allowed for Brazilian municipal councils according to Constitutional Amendment No. 58/2009. Data refer to the 2021-2024 electoral cycle.

Table 9: Robustness check: Year and state fixed effects estimates

A) Effects of Municipal Council Size on Electoral Outcomes

	(1) Seats	(2) Total Candidates	(3) Candidates per Seat
β bias-correcteds.e.	0.607***	6.132	0.047
	(0.143)	(4.506)	(0.391)
Bandwidth	2081	1739	1441
Observations	1742	1381	1088

B) Effects of Municipal Council Size on Racial Representation in Local Elections

	(1) Non-White Candidates	(2) Non-White Elected	(3) At Least 1 Non-White Elected	(4) Share of Non-White Candidates	(5) Share of Non-White Elected
β bias-correcteds.e.	4.276	0.655**	0.015	1.431	2.370
	(3.056)	(0.224)	(0.017)	(1.513)	(2.107)
Bandwidth	2098	2523	3657	2357	2312
Observations	1713	2087	3735	2037	1821

C) Effects of Municipal Council Size on Gender Representation in Local Elections

	(1) Women Candidates	(2) Women Elected	(3) At Least 1 Woman Elected	(4) Share of Women Candidates	(5) Share of Women Elected
β bias-correcteds.e.	2.056	0.007	0.008	-0.185	-0.733
	(1.512)	(0.103)	(0.038)	(0.209)	(0.807)
Bandwidth	1733	2490	2461	2103	3826
Observations	1376	2275	2224	1779	4438

D) Effects of Municipal Council Size on Age Representation in Local Elections

	(1) Candidates Under 30	(2) Share of Candidates Under 30	(3) Elected Under 30	(4) Share of Elected Under 30	(5) Candidates Over 60	(6) Share of Candidates Over 60	(7) Elected Over 60	(8) Share of Elected Over 60
β bias-correcteds.e.	1.091*	0.475	-0.025	0.221	0.445	-0.097	-0.035	-1.612+
	(0.476)	(0.362)	(0.070)	(0.655)	(0.597)	(0.354)	(0.064)	(0.894)
Bandwidth	1954	2906	2920	3475	1773	2871	4226	2510
Observations	1569	2942	2803	3630	1378	2842	4204	1869

E) Effects of Municipal Council Size on Educational Attainment Representation in Local Elections

	(1) High School Graduates Candidates	(2) Share of High School Graduates Candidates	(3) High School Graduates Elected	(4) Share of High School Graduates Elected	(5) College Graduates Candidates	(6) Share of College Graduates Candidates	(7) College Graduates Elected	(8) Share of College Graduates Elected
β bias-correcteds.e.	4.480	0.333	0.676**	1.821	1.131	1.270	0.385*	2.073
	(3.134)	(0.914)	(0.209)	(1.600)	(1.160)	(0.759)	(0.181)	(1.822)
Bandwidth	1707	2517	2027	2152	1630	1620	1908	1553
Observations	1347	2355	1690	1850	1254	1245	1531	1179

Notes: This table reports the reduced-form effects of council size on the pool of candidates and elected councilors in local elections. The estimates are derived from regression discontinuity (RD) designs, utilizing a local polynomial estimator with a uniform kernel. The optimal bandwidth for each regression, minimizing mean squared error (MSE), was chosen following the method outlined in Calonico et al. (2014, 2018). Year and state fixed effects are included in all models. Significance levels are denoted by: *** p < 0.01, ** p < 0.05, * p < 0.1.

Table 10: Robustness check: Estimates with triangular kernel

A) Effects of Municipal Council Size on Electoral Outcomes

	(1) Seats	(2) Total Candidates	(3) Candidates per Seat
β bias-correcteds.e.	0.470**	10.602*	0.726
	(0.151)	(4.791)	(0.424)
Bandwidth	2228	2395	2133
Observations	1945	2163	1820

B) Effects of Municipal Council Size on Racial Representation in Local Elections

	(1) Non-White Candidates	(2) Non-White Elected	(3) At Least 1 Non-White Elected	(4) Share of Non-White Candidates	(5) Share of Non-White Elected
β bias-correcteds.e.	7.622*	0.935**	0.051*	3.554	5.442
	(3.411)	(0.339)	(0.023)	(2.819)	(3.294)
Bandwidth	2586	2534	2486	2280	2328
Observations	2364	2103	2037	1946	1837

C) Effects of Municipal Council Size on Gender Representation in Local Elections

	(1) Women Candidates	(2) Women Elected	(3) At Least 1 Woman Elected	(4) Share of Women Candidates	(5) Share of Women Elected
β bias-correcteds.e.	3.572*	0.011	0.007	-0.280	-0.884
	(1.640)	(0.097)	(0.035)	(0.212)	(0.856)
Bandwidth	2384	3547	3556	2568	4378
Observations	2159	3963	3982	2441	5364

D) Effects of Municipal Council Size on Age Representation in Local Elections

	(1) Candidates Under 30	(2) Share of Candidates Under 30	(3) Elected Under 30	(4) Share of Elected Under 30	(5) Candidates Over 60	(6) Share of Candidates Over 60	(7) Elected Over 60	(8) Share of Elected Over 60
β bias-correcteds.e.	1.557**	0.522	0.020	-0.160	0.712	-0.411	-0.050	-1.416
	(0.492)	(0.366)	(0.067)	(0.667)	(0.630)	(0.390)	(0.071)	(0.842)
Bandwidth	2444	3839	3906	4079	2691	3302	4468	3418
Observations	2186	4455	4334	4630	2555	3478	4514	3036

E) Effects of Municipal Council Size on Educational Attainment Representation in Local Elections

	(1) High School Graduates Candidates	(2) Share of High School Graduates Candidates	(3) High School Graduates Elected	(4) Share of High School Graduates Elected	(5) College Graduates Candidates	(6) Share of College Graduates Candidates	(7) College Graduates Elected	(8) Share of College Graduates Elected
β bias-correcteds.e.	6.783*	1.354	0.694**	3.022	2.219	1.385	0.405*	3.141
	(3.250)	(1.062)	(0.212)	(1.736)	(1.142)	(0.739)	(0.199)	(1.856)
Bandwidth	2412	2506	2517	2436	2502	2530	2295	2185
Observations	2191	2337	2355	2222	2301	2345	2009	1854

Notes: This table reports the reduced-form effects of council size on the pool of candidates and elected councilors in local elections. The estimates are derived from regression discontinuity (RD) designs, utilizing a local polynomial estimator with a triangular kernel. The optimal bandwidth for each regression, minimizing mean squared error (MSE), was chosen following the method outlined in Calonico et al. (2014, 2018). Significance levels are denoted by: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 11: RD estimates using bandwidth of 5,000

A) Effects of Municipal Council Size on Electoral Outcomes

	(1) Seats	(2) Total Candidates	(3) Candidates per Seat
β bias-correcteds.e.	0.759***	14.224***	1.007***
	(0.087)	(2.784)	(0.229)
Bandwidth	5000	5000	5000
Observations	6481	6496	6481

B) Effects of Municipal Council Size on Racial Representation in Local Elections

	(1) Non-White Candidates	(2) Non-White Elected	(3) At Least 1 Non-White Elected	(4) Share of Non-White Candidates	(5) Share of Non-White Elected
β bias-correcteds.e.	9.199***	0.916***	0.025	2.271	4.410*
	(2.086)	(0.206)	(0.016)	(1.702)	(1.940)
Bandwidth	5000	5000	5000	5000	5000
Observations	6261	5774	5774	6261	5760

C) Effects of Municipal Council Size on Gender Representation in Local Elections

	(1) Women Candidates	(2) Women Elected	(3) At Least 1 Woman Elected	(4) Share of Women Candidates	(5) Share of Women Elected
β bias-correcteds.e.	4.727***	-0.052	-0.010	-0.177	-1.514*
	(0.941)	(0.071)	(0.025)	(0.150)	(0.712)
Bandwidth	5000	5000	5000	5000	5000
Observations	6496	6369	6369	6496	6355

D) Effects of Municipal Council Size on Age Representation in Local Elections

	(1) Candidates Under 30	(2) Share of Candidates Under 30	(3) Elected Under 30	(4) Share of Elected Under 30	(5) Candidates Over 60	(6) Share of Candidates Over 60	(7) Elected Over 60	(8) Share of Elected Over 60
β bias-correcteds.e.	1.966***	0.686*	0.034	-0.074	0.874*	-0.327	-0.023	-1.043
	(0.305)	(0.289)	(0.051)	(0.530)	(0.378)	(0.292)	(0.059)	(0.597)
Bandwidth	5000	5000	5000	5000	5000	5000	5000	5000
Observations	6350	6350	6019	6006	6203	6203	5179	5167

E) Effects of Municipal Council Size on Educational Attainment Representation in Local Elections

	(1) High School Graduates Candidates	(2) Share of High School Graduates Candidates	(3) High School Graduates Elected	(4) Share of High School Graduates Elected	(5) College Graduates Candidates	(6) Share of College Graduates Candidates	(7) College Graduates Elected	(8) Share of College Graduates Elected
β bias-correcteds.e.	8.581***	-0.181	0.613***	0.797	2.749***	0.689	0.230*	0.580
	(1.892)	(0.694)	(0.133)	(1.078)	(0.664)	(0.466)	(0.111)	(1.017)
Bandwidth	5000	5000	5000	5000	5000	5000	5000	5000
Observations	6496	6496	6496	6481	6425	6425	6400	6386

Notes: This table reports the reduced-form effects of council size on the pool of candidates and elected councilors in local elections. The estimates are derived from regression discontinuity (RD) designs, utilizing a local polynomial estimator with a uniform kernel. Significance levels are denoted by: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 12: RD estimates using bandwidth of 7,500

A) Effects of Municipal Council Size on Electoral Outcomes

	(1) Seats	(2) Total Candidates	(3) Candidates per Seat
β bias-correcteds.e.	0.740***	4.472*	-0.067
	(0.067)	(2.127)	(0.173)
Bandwidth	7500	7500	7500
Observations	9914	9940	9914

B) Effects of Municipal Council Size on Racial Representation in Local Elections

	(1) Non-White Candidates	(2) Non-White Elected	(3) At Least 1 Non-White Elected	(4) Share of Non-White Candidates	(5) Share of Non-White Elected
β bias-correcteds.e.	3.851*	0.326*	0.002	-3.160*	-2.357
	(1.599)	(0.160)	(0.013)	(1.336)	(1.517)
Bandwidth	7500	7500	7500	7500	7500
Observations	9622	8917	8917	9622	8892

C) Effects of Municipal Council Size on Gender Representation in Local Elections

	(1) Women Candidates	(2) Women Elected	(3) At Least 1 Woman Elected	(4) Share of Women Candidates	(5) Share of Women Elected
β bias-correcteds.e.	1.391	0.045	0.020	0.117	-0.420
	(0.717)	(0.054)	(0.019)	(0.120)	(0.551)
Bandwidth	7500	7500	7500	7500	7500
Observations	9940	9754	9754	9940	9729

D) Effects of Municipal Council Size on Age Representation in Local Elections

	(1) Candidates Under 30	(2) Share of Candidates Under 30	(3) Elected Under 30	(4) Share of Elected Under 30	(5) Candidates Over 60	(6) Share of Candidates Over 60	(7) Elected Over 60	(8) Share of Elected Over 60
β bias-correcteds.e.	1.031***	0.741**	0.057	0.168	0.180	0.115	-0.015	-0.885
	(0.236)	(0.229)	(0.040)	(0.413)	(0.287)	(0.229)	(0.045)	(0.462)
Bandwidth	7500	7500	7500	7500	7500	7500	7500	7500
Observations	9693	9693	9180	9156	9499	9499	7941	7922

E) Effects of Municipal Council Size on Educational Attainment Representation in Local Elections

	(1) High School Graduates Candidates	(2) Share of High School Graduates Candidates	(3) High School Graduates Elected	(4) Share of High School Graduates Elected	(5) College Graduates Candidates	(6) Share of College Graduates Candidates	(7) College Graduates Elected	(8) Share of College Graduates Elected
β bias-correcteds.e.	3.220*	-0.653	0.461***	-0.714	1.174*	0.244	-0.001	-1.892*
	(1.455)	(0.549)	(0.105)	(0.849)	(0.512)	(0.365)	(0.085)	(0.786)
Bandwidth	7500	7500	7500	7500	7500	7500	7500	7500
Observations	9940	9940	9940	9914	9854	9854	9788	9763

Notes: This table reports the reduced-form effects of council size on the pool of candidates and elected councilors in local elections. The estimates are derived from regression discontinuity (RD) designs, utilizing a local polynomial estimator with a triangular kernel. Significance levels are denoted by: *** p < 0.01, ** p < 0.05, * p < 0.1.

B Figures

Figure 9: Population density distribution