Fairness without Equality: Effect of Election System Proportionality on Female Representation*

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Abstract

Proportional electoral systems—often lauded for their inclusivity—do not automatically translate into higher women's representation. Exploiting population-based thresholds that exogenously change district magnitude in Brazil and Finland, we use regression discontinuity designs to show that increasing "seat inclusivity" does not yield statistically significant gains for female candidates. As larger district magnitude may relax how constrained parties are in responding to voters demand, our zero results are consistent with candidate supply—rooted in party gate-keeping or self-selection into candidacy—being the critical bottleneck for female representation, rather than voter bias. Our findings challenge the assumption that electoral system reform alone can close gender gaps in politics and underscore the need for complementary measures targeting party nomination strategies and broader social barriers.

Keywords: candidate selection, district magnitude, electoral systems, female representation, nomination bias, proportional representation

JEL: D72, J16, P16

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1 Introduction

Women remain significantly underrepresented in political office worldwide, holding only about a quarter of parliamentary seats despite comprising half the population (Inter-Parliamentary Union and UN Women 2025). Understanding which institutional features can help close this gender gap is, therefore, a pressing question with important implications for economic and political outcomes (Beaman et al. 2012; Clots-Figueras 2012; Bhalotra and Clots-Figueras 2014; Brollo and Troiano 2016; Baskaran and Hessami 2023), and the quality of democratic representation (Besley et al. 2017).

Electoral system design, in particular, is thought to play a key role in shaping opportunities for female candidates (Wängnerud 2009; Fujiwara, Hilbig and Raffler 2025). A substantial literature has converged on two widely accepted patterns regarding the relationship between electoral systems and female representation: proportional representation (PR) systems typically increase women's representation compared to majoritarian systems, and closed-list systems yield better outcomes for women compared to open-list systems (Matland 1998; Norris 2006; Thames and Williams 2010; Valdini 2012; Gonzalez-Eiras and Sanz 2021). These findings generally hinge on three mechanisms: voter bias, party bias, and electoral competitiveness . While voter bias influences outcomes via individual voter preferences, party bias arises from the strategic candidate nomination choices by political parties or personal biases of party gatekeepers, and competition reflects the strategic environment shaping these nominations. We focus on an electoral rule that influences competitiveness, and thus, the core question motivating our research is: To what extent does increasing district magnitude *causally* boost female political representation?

In particular, we explore the effects of district magnitude—often employed as a proxy for electoral proportionality in PR systems (Benoit 2000)—on women's candidacy and successful election. Prior literature suggests mixed channels through which district magnitude might affect female representation. Larger district magnitudes might positively impact female representation through a party-size channel, as more candidates per party list increase the likelihood of female candidates' inclusion despite voter biases (Lucardi and Micozzi 2022). The logic is intuitive: larger district magnitudes lower the effective vote threshold for parties, increase the likelihood of getting more candidates elected, and encourage broader candidate lists, presumably including more women. Conversely, larger magnitudes could negatively impact female representation overall through a party-number channel, as smaller parties gaining marginal seats might prefer selecting male candidates, who are perceived as more electorally viable at the margin, or may want their only elected candidate to be male due to discrimination.

In this paper, we address this question by isolating the effect of district magnitude on women's electoral success using an regression discontinuity design (RDD) that leverages within-country, quasi-experimental variation in district magnitude in Brazil and Finland. We exploit an institutional feature of the electoral system that causes some electoral districts to have different magnitudes (i.e., municipal council sizes in at-large elections) across elections due to an exogenous rule (sharp population thresholds). This setup provides a credible source of exogenous variation in the number of representatives elected from a district that is unrelated to underlying voter demographics and preferences, number of potential candidates, or potential candidates' quality.

Finland and Brazil provide contrasting yet complementary cases: On the one hand, Finland demonstrates relatively high gender inclusion in candidate lists (approximately 40% female candidates) and elected positions (around 31%), whereas Brazil represents a context with significantly lower gender inclusivity (around 20% female candidates and 13% elected women). Additionally, these contexts differ significantly in terms of party institutionalization and strength, and coalition formation practices, enriching the comparative insight into institutional effects. On the other hand, they have similar election rules, allowing comparisons of conceptually same estimands.

Our findings provide evidence that increased district magnitude does not significantly alter either the share of female candidates or their electoral success in these open-list proportional representation contexts. Specifically, while proportionality increases markedly at population thresholds, we observe negligible and statistically insignificant changes in the proportion of women who stand as candidates or are elected as representatives. Moreover, we observe a small positive effect on the number of parties in Brazil but no effects in Finland. Overall, these findings allow us to challenge the previous claims in the literature regarding positive effects from the party-size channel. In Finland, we can also rule out the countervailing party-number channel (Lucardi and Micozzi 2022). Instead, we highlight the significance of candidate supply (Barros and Schmeisser 2024). Our analyses suggest that even when proportionality increases substantially at critical thresholds, the (theoretically) predicted positive impacts on women's representation fail to materialize. This points towards the role of supply side—either due to strategic party behavior, party gate-keeping, or due to women's self-selection—as the critical bottleneck (see also Fujiwara, Hilbig and Raffler 2025).

Our study makes three key contributions. First, we show that increasing district magnitude—often assumed to benefit women—does not automatically yield gains in open-list systems. Second, we refine theories of gender representation by shifting attention from electoral institutional factors to gendered biases, highlighting importance of biases in party-driven candidate selection and gendered decisions to participate in elections as candidates (the supply side), compared to voter biases (the demand side). Third, by comparing countries with high (Finland) and low (Brazil) baseline representation, we reveal that institutional reforms can have strikingly similar effects despite different context, giving external validity to our findings within open-list PR systems.

These findings caution against treating electoral reform as a silver bullet. The modest effect sizes we detect imply that meaningful gains in women's representation require not only permissive institutions but also complementary interventions, such as gender quotas or internal party strategies to recruit and support female candidates. Furthermore, our results highlight the importance of addressing incumbency advantages and male-dominated political networks in tandem with electoral reforms. In many democracies, long-serving male incumbents and their networks act as gatekeepers, making it difficult for newcomers, especially women, to win nominations or seats. Increasing district magnitude can somewhat loosen this stranglehold by creating more seats that incumbents cannot monopolize, thereby providing opportunities for new candidates. However, those opportunities often get channeled through existing power structures and networks, which can limit their transformative potential.

Relation with the Literature Our study speaks to several strands of academic literature. First, we add to the extensive research on electoral systems and women's descriptive representation (see Wängnerud 2009 for a survey). By providing new causal evidence on the specific role of district magnitude, we help clarify an important debate within this literature. Previous comparative studies have documented a correlation between multi-member PR systems and higher female representation, but questions remained about causality and mechanism. Recent works have begun to unpack this relationship (e.g., Gonzalez-Eiras and Sanz 2021; Lucardi and Micozzi 2022; Cakir, Erbay and Matakos 2024), and our findings reinforce and refine their insights. In particular, we corroborate the role of supply constraints in female representation identified by Gonzalez-Eiras and Sanz (2021), while also supporting the argument of Lucardi and Micozzi (2022) that the overall effect may be muted due to countervailing factors, yet in contrast to them, arguing for the role of supply. Our contribution lies in using a research design that achieves identification within a single country, thereby sidestepping many confounders that complicate cross-national studies. In doing so, we demonstrate that the ambiguous net effect reported by Lucardi and Micozzi (2022) is not merely an artifact of observational comparisons—it holds even under closer causal scrutiny.

Second, our work speaks to the literature on political parties and candidate selection. Studies highlight that parties' internal decisions, especially under competitive pressure, can significantly impact the diversity of candidates who get elected (Esteve-Volart and Bagues 2012; Besley et al. 2017; Cakir, Erbay and Matakos 2024). Building on this perspective, we connect to recent work by Fujiwara, Hilbig and Raffler (2025), who show that gendered nomination practices systematically disadvantage female candidates. Using German mixed-member elections, they find that women are more likely to be nominated in districts where their party is less popular, which fully explains women's electoral under-performance. Their findings shift attention from voter bias to party gate-keeping and the recruitment behavior of local, male-dominated party networks. Related research using surveys (Butler and Preece 2016; Fox and Lawless 2010) and actual nominations (Hennings and Urbatsch 2015; Cheng and Tavits 2011; Weeks et al. 2023; Goyal 2024) emphasizes similar mechanisms: recruitment practices and nomination decisions by party elites and local selectors can reproduce gender inequalities even when formal barriers are absent.

Our results corroborate this perspective from a different angle: we show that an identical institutional change (increasing district magnitude) does not lead to gains for women if parties do not respond. This finding contributes to a growing recognition that formal institutions and party norms may interact in shaping representational outcomes. However, the finding could also imply that party gate-keeping choices per se are not the main supply-side bottleneck, but rather the main supply-side constraint could be simply that enough women are not willing to run as candidates, turning the focus on recruitment practices, inclusive party cultures, and wider labor market and family life considerations.

In sum, our analysis adds to the arguments that any beneficial effects of proportionality on gender representation primarily arise in closed-list systems (Gonzalez-Eiras and Sanz 2021). In open-list systems, the anticipated proportionality benefits do not automatically translate into increased female representation unless parties actively manage the supply side of candidate recruitment. Together with recent evidence on gender-biased nominations (Fujiwara, Hilbig and Raffler 2025), our results underscore that institutional reforms focusing solely on electoral proportionality, without addressing the deeper issue of candidate supply and party nomination behavior, are unlikely to yield substantive improvements in women's political representation.

2 Context and Data

2.1 Brazil

In total around 5,500 municipalities in Brazil belong to 26 different states and to the Federal District, municipality councils being the legislative branch of the local government. Municipal councils vote for the budget proposed by the mayor (the executive branch), dictating how tax revenue collected at the municipality level is spent. In addition to collecting property taxes, municipal councilors set service tax rate—constitutionally limited to between 2% and 5%—for local services. In addition to setting tax rates and the municipal budget, councilors submit bills and requests for public works and monitor the executive branch for the use of the public resources (Schneider and Veras 2023). They serve four-year terms, typically having an outside job as they are required to be in the council, on average, four days per month and report councilor duties taking at maximum four hours per day (Ferraz and Finan 2009). The councilors are elected by an open-list PR election system.

In 2004, a reform was introduced and the number of seats for the council was fixed based on population thresholds. Municipalities with a population of 47,169 or less were assigned a total of nine seats. For every extra 47,189 inhabitants, an extra seat was added, thus making the legislature size a step-wise function of the population. In order to avoid manipulation, 2003 population was used for determining the number of seats for municipality councils. Around 90% of the municipalities were assigned with the minimum number of nine seats. We focus on the first three population thresholds, as the number of observations is very low for the larger municipalities.

We use election data for the 2004 elections from *Tribunal Superior Eleitoral*. The population data comes from *Instituto Brasileiro de Geografia e Estatistica*. After matching the municipalities from these two data sources and dropping municipalities where the number of elected councilors do not match the expected number given by the population, we are left with around 334,000 candidate level observations. The final data set includes $5,411$ municipality-electoral term observations.

Women are heavily under-represented in Brazilian local councils and municipal elections. In our data, the average female seat share is less than 13%. On average, 20% of candidates are women.

2.2 Finland

Municipalities in Finland are led by elected local councils in which the decisions are taken by a simple majority of the council members.[1] Similar to the Brazilian case, Finnish local councils are elected in elections that use PR with open lists. Parties control candidate nomination and are thus the gatekeepers at the candidate nomination stage. But given the open-list system, who gets elected is entirely at the hands of voters (Jokela et al. 2025).

There are no gender quotas in elections to the local council, nor does any party have country-wide recommendations to field candidate lists with equal representation of candidates of different genders. Although Finland is widely considered a pioneer of gender equality (Haavio-Mannila 1979; Anttonen 2001), women's political representation is still lagging behind from full gender parity (Araico Cordero et al. 2024). On average, slightly less than 40% of local election candidates are women, and women hold about one-third of local council seats. There is also significant variation in female representation across municipalities in our data: women's seat share varies between as little as 4.8% and as much as two-thirds of local council seats.

The number of council seats is a step-wise function of the population, and in our data, it varies between 13 and 85. We use these population thresholds in a regression discontinuity design. These cutoffs have been show in previous studies to affect intra-party ideological cohesion (Matakos et al. 2024) and turnout (Lyytikäinen and Tukiainen 2019).[2] We leave out large municipalities with more than 22,500 inhabitants out of our sample, as there are not sufficiently many municipalities to use them in our analysis, and focus on four population thresholds. Municipalities with 2,000 or less inhabitants may choose their council size to be either 13, 15, or 17. Municipalities with 2,001-4,000 must have 21 council seats. The number of council seats increases to 27 at a cutoff of 4,001 inhabitants, to 35 at the cutoff of 8,001 inhabitants, and to 43 at the cutoff 15,001 inhabitants.

We have information on municipal election candidates for five local government elections held in 1996, 2000, 2004, 2008, and 2012.[3] These data come from the Finnish Ministry of Justice. In total, we have almost $200,000$ candidate-election year observations, which we use

[1]The local councils are responsible for handling annual budgets of more than 5,500 euros per capita. Municipalities have diverse statutory responsibilities, such as organizing health care and primary and secondary education. To cover their expenditures, the municipalities are allowed to collect income and property taxes. They also receive a share of corporate taxes and fiscal grants from the central government. Thus, local governments have important policy responsibilities.

[2]These studies demonstrate that council size can affect many outcomes. Having an effect of council size on other outcomes is, however, not a confounder for our analysis, but should be kept in mind when interpreting the possible mechanisms of our findings.

[3]The median number of candidates in our data is 69, and the median number of candidates per party is 10. The number of parties is also large: eight parties are represented in the national parliament and dominate the political field in municipalities, the median number of parties fielding candidates being six.

to compute the share of female candidates and women's seat share for each municipal election. We further combine these data with information on municipality population acquired from Statistics Finland. The final data set is composed of $1,692$ municipality-electoral term observations.[4]

3 Empirical Analysis

3.1 Regression Discontinuity Design

Suppose that we are interested in estimating the relationship between district magnitude and female representation in elections and local councils. Comparing local councils of different sizes with each other might, however, be misleading. We resolve such issues by exploiting the population discontinuities, described in the previous setting, as a RDD.

The RDD compares municipalities that are comparable in terms of their population size and other (observable and unobservable factors) but happen to have different council sizes due to barely falling to the left or to the right side of the population threshold for changing the council size. Importantly, in Brazil and Finland, there are no other policies that would change at the population cutoffs where council size changes (Lyytikäinen and Tukiainen 2019; Schneider and Veras 2023). This allows us to avoid pitfalls associated with population-based RDDs in many other contexts (Eggers et al. 2018).

To estimate an RDD, we first assign each municipality in Brazil and Finland to its closest population threshold and then compute our running variable as the population distance from this threshold. The treatment variable $\mathbf{1}[Normalized\ population \geq 0]_{mt}$ is defined as an indicator for the distance being greater than or equal to zero; that is, municipalities with a negative running variable are in the control group. We pool together all cutoffs in the main text but present cutoff-specific results in the appendix. More formally, we estimate

$$Y_{mt} = \alpha + \beta \mathbf{1}[Normalized\ population \geq 0]_{mt} + f(Normalized\ population_{mt}) + \epsilon_{mt},$$

where β is the coefficient of interest. $f(\cdot)$ is the control polynomial. If it is correctly specified, all covariates evolve smoothly at the cutoff, and there is no precise manipulation of the running variable, $\hat{\beta}$ can be interpreted as the intent-to-treat (ITT) estimate of the effect of increasing the council size on our dependent variable of interest.

We perform our main analyses using an uniform kernel and an MSE-optimal bandwidth. To conduct statistical inference, we estimate robust bias-corrected confidence

[4]This sample excludes a small number of merged municipalities in which the council size did not follow the population-based rules strictly.

intervals following Calonico, Cattaneo and Titiunik (2014). We set the main and bias bandwidths to be the same in all of our analyses. Our implementation of the RDD analysis follows recommendations from Hyytinen et al. (2018) and De Magalhães et al. (2025).

3.2 Main Results

We first provide a visualization of our RDD analysis in Figure 1. The figure plots binned averages and a local linear fit within the MSE-optimal bandwidth. First, it is apparent that local council size increases in both Brazil and Finland as we pass the cutoff. Second, it appears that if the share of female candidates and women's seat share increase discontinuously at the cutoff— these jumps are rather small and not visibly clear when looking at the scatter plot.

We confirm these visual findings in Table 1. In Brazil, local council size increases by around 1.4 seats when passing the threshold (column 1 of Panel A), whereas in Finland the jump is around 4.8 seats (column 1 of Panel B). These jumps are statistically significant with $p < 0.01$ and sizable relative to the control group means (i.e., the value of the control polynomial estimated exactly on the left-hand-side of the cutoff).

Despite these notable discontinuities in council size, we fail to reject the null hypothesis of no discontinuous jumps in the share of female candidates or women's seat share in both Brazil and Finland. The estimates are very small in magnitude. Similarly, there is no effect on women's seat share. Combining the estimates in columns (1) and (3) suggests that a one-seat increase in council size leads to 3.58 and 0.25 percentage points higher seat share of women in Brazil and Finland, respectively. However, the estimates in column (3) are statistically insignificant. These results provide evidence that an increase in district magnitude is not enough to expand female representation through the party-size channel in open-list PR systems. Our findings should have external validity within open-PR countries, as Brazil and Finland could be seen as polarized cases of existing female representation and distinctly different political institutions.

Next, we examine the effects of changes in district magnitude on the number of parties. In Figure 2, we visualize the RDD results for the number of parties fielding candidates in elections and the number of parties that gain representation in local councils. The graphical representation of the RDD indicates a small jump in the number of parties in an election and in a council in the case of Brazil. In Finland, there are no discernible discontinuities.

Columns (1) and (2) in Table 2 report the corresponding RDD estimates. For Finland, the estimates are small in magnitude and not statistically significant. In the case of Brazil, we find that increasing district magnitude results in approximately 1.2 additional parties contesting the election and one additional party winning a seat. The latter increase is statistically significant at the 5% error level. This, along with the lower share of female candidates among smaller parties in Brazil (see Online Appendix Figure OA1), suggests that our finding of no increase in female representation in Brazil when the number of available seats increases may, at least in part, be explained by the party-number channel. However, as the estimated increase in number of represented parties is not large, our results overall point out towards the importance of candidate supply as a mechanism preventing more equal gender representation.

To indirectly study whether the main supply constraint is party gate-keeping or strategic behavior we analyze the effect heterogeneity between the left- and right-wing parties, and competitive and non-competitive political environments. If different parties have different gate-keeping cultures and biases, we could observe different effects in different parties. Similarly, if women are absent from the lists due to strategic concerns, increasing council size could have differing effects in different competitive environments. We do not find any evidence of effect heterogeneity in these dimension (Tables OA6 and OA7), indicating that female citizens' willingness to run as candidates may be the main supply-side bottleneck. However, we lack sufficient statistical power in this exercise to confidently rule out heterogeneous effects, and thus, the role of parties.

3.3 Robustness and Validity Analyses

The Online Appendix contains a number of robustness and validity checks. We confirm that our results are robust to using different bandwidths or a second-order polynomial. In addition, we estimate the effect of change in district magnitude to proportionality. We also show that our set-up passes the conventional density discontinuity and covariate smoothness tests, suggesting that there is no manipulation of the running variable. Finally, we conduct a placebo cutoff analysis which shows no discontinuities at artificially chosen thresholds for treatment. These observations support the validity of our empirical design.

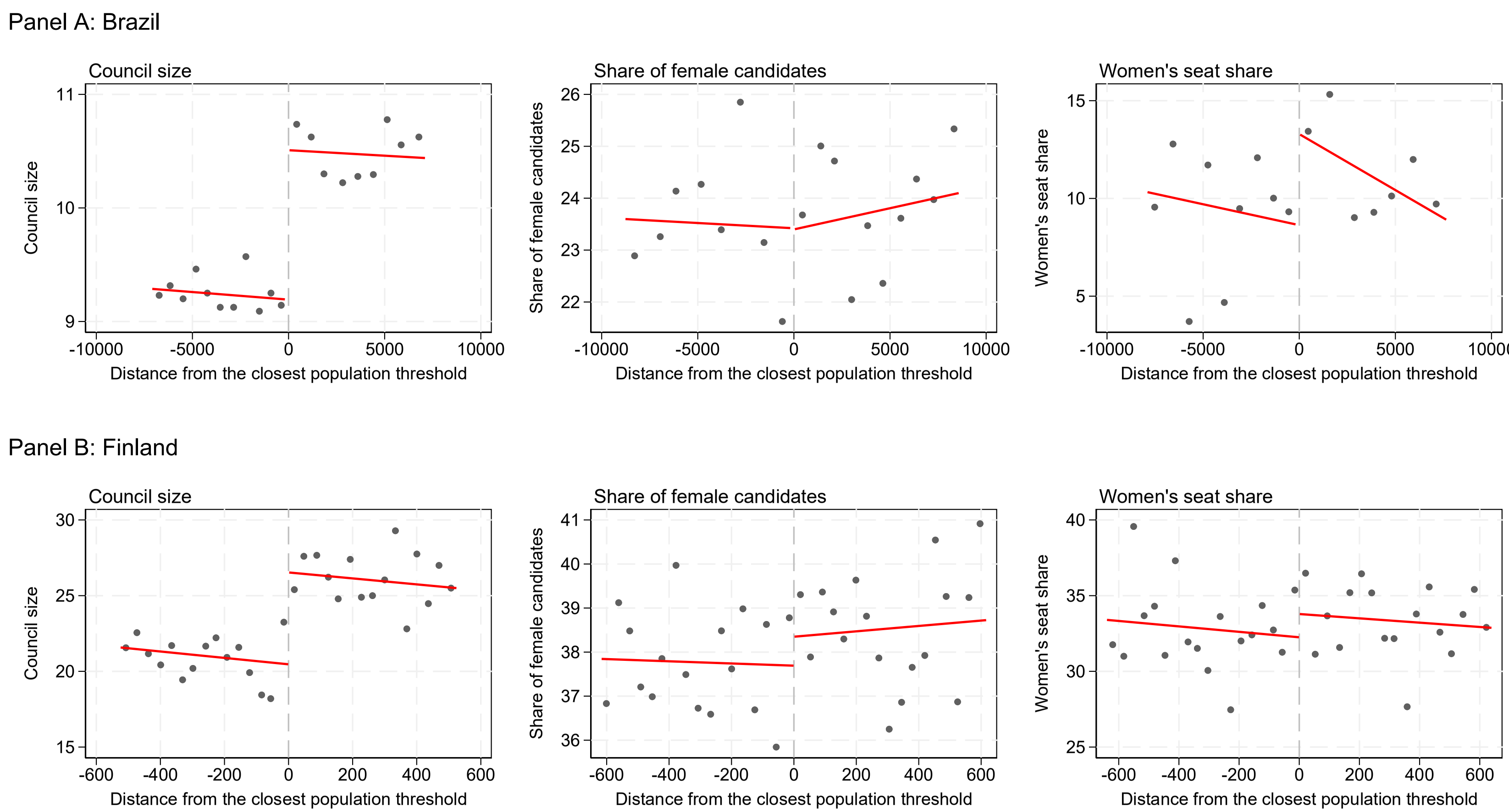

Figure 1. Graphical illustration of the regression discontinuity design. Panel A uses data from Brazil and Panel B uses data from Finland. The dependent variables are the council size, the share of female candidates, and the seat share of women in the first, the second, and the third column, respectively. The graphs show local linear fits within the MSE-optimal bandwidth and evenly-spaced binned averages constructed mimicking the variance in the underlying data (see Calonico, Cattaneo and Titiunik 2015). We account for clustering at the municipality level when choosing the optimal bandwidth.

Table 1. RDD estimates—council size and female representation.

	Council size	Share of female candidates	Women's seat share
	(1)	(2)	(3)
Panel A: Brazil			
RD estimate	1.316**	-0.022	4.660
	[1.206,2.169]	[-0.159,6.971]	[-3.494,11.873]
N	252	304	268
Bandwidth	7109	8770	7906
Control group mean	9.19	23.42	8.64
Panel B: Finland			
RD estimate	6.066**	0.657	1.538
	[2.618,8.909]	[-1.333,4.487]	[-3.781,4.851]
N	579	684	713
Bandwidth	524	617	639
Control group mean	20.47	37.69	32.25

Notes: Panel A uses data from Brazil and Panel B uses data from Finland. The dependent variables are the council size, the share of female candidates, and the seat share of women in the first, the second, and the third column, respectively. The RD estimate is based on a local linear regression using an uniform kernel within the MSE-optimal bandwidth. We account for clustering when choosing the optimal bandwidth and in statistical inference. We report 95% robust confidence intervals obtained following Calonico, Cattaneo and Titiunik (2014), fixing main and bias bandwidths to be the same. * and ** denote statistical significance at the 5% and 1% levels, respectively.

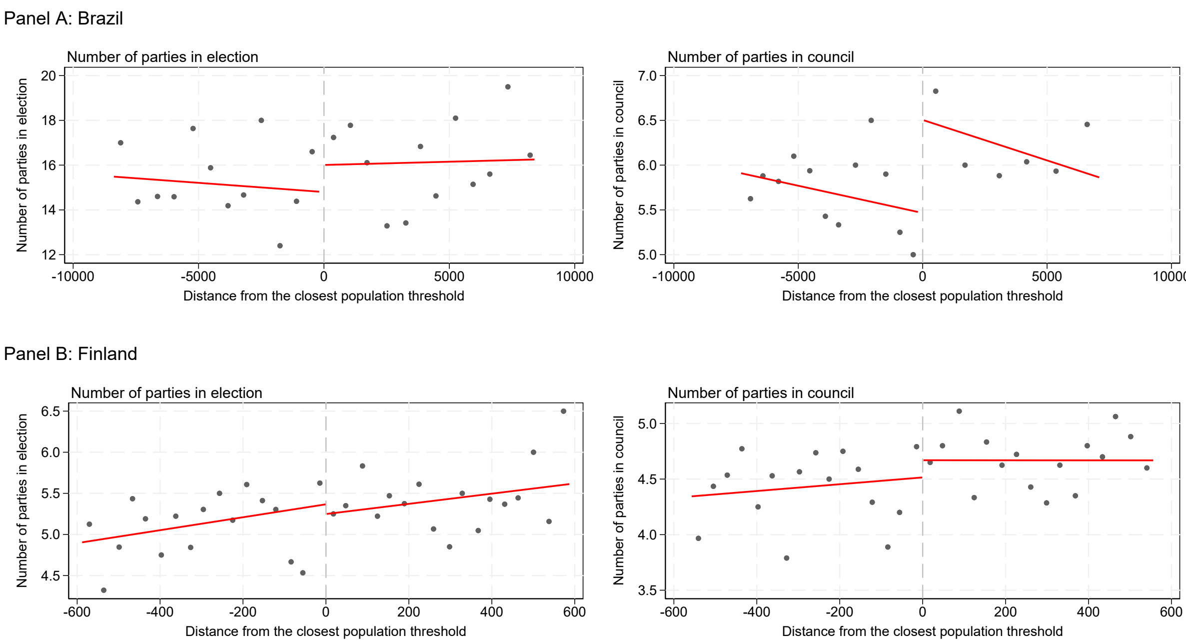

Figure 2. Graphical illustration of the regression discontinuity design for the number of parties. Panel A uses data from Brazil and Panel B uses data from Finland. The dependent variables are the number of parties in the election and the number of parties with representation in the local council in the first and the second column, respectively. The graphs show local linear fits within the MSE-optimal bandwidth and evenly-spaced binned averages constructed mimicking the variance in the underlying data (see Calonico, Cattaneo and Titiunik 2015). We account for clustering at the municipality level when choosing the optimal bandwidth.

Table 2. RDD estimates—the number of parties.

	Number of parties in election	Number of parties in council
	(1)	(2)
Panel A: Brazil		
RD estimate	1.208	1.039**
	[-1.310,5.113]	[0.660,2.919]
N	286	254
Bandwidth	8410	7330
Control group mean	14.8	5.47
Panel B: Finland		
RD estimate	-0.118	0.155
	[-0.222,1.079]	[-0.170,1.053]
N	659	624
Bandwidth	591	559
Control group mean	5.37	4.51

Notes: Panel A uses data from Brazil and Panel B uses data from Finland. The dependent variables are the number of parties running in the election in a municipality for the first column and number of parties with at least one seat in the council for the second column. The RD estimate is based on a local linear regression using an uniform kernel within the MSE-optimal bandwidth. We account for clustering when choosing the optimal bandwidth and in statistical inference. We report 95% robust confidence intervals obtained following Calonico, Cattaneo and Titiunik (2014), fixing main and bias bandwidths to be the same. * and ** denote statistical significance at the 5% and 1% levels, respectively.

4 Conclusions

This study provides evidence that increasing district magnitude in open-list PR systems does not significantly enhance women's political representation. Leveraging population thresholds in Brazil and Finland—two countries with notably different levels of existing female representation—and employing RDD, we demonstrate that increases in district magnitude do not lead to significant improvements in the share of elected female councilors or the proportion of women candidates. This finding challenges the conventional wisdom that merely enhancing the proportionality of the electoral system is sufficient to boost female representation. The positive effects of proportionality on gender representation appear limited to closed-list systems within PR institutions (Gonzalez-Eiras and Sanz 2021).

Given increasing district magnitude relaxes mainly the constraints arising from voter biases and demand, our findings highlight the crucial role candidate supply as an obstacle for balanced representation. Whether this arises from women deciding not to run due to perceived gender biases and constraints or from party elites acting as gatekeepers, our results carry policy relevance in addition to theoretical importance. Given that electoral system reforms alone may not suffice to increase the proportion of elected women, complementary policies targeting candidate supply such as gender quotas or practices to encourage females to become candidates are necessary to effectively enhance female political representation. Future research should explore which potential candidate supply mechanisms, self-selection or gate-keeping, explain why women's participation as electoral candidates remains considerably lower than men's.

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Fairness without Equality: Effect of Election System Proportionality on Female Representation

Online Appendix

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A Additional Results

A.1 Results at Each Cutoff

In the main analysis, we pool together all cutoffs in our data. However, we could also run a separate RDD for each threshold. We do so for Brazil in Tables OA1 and OA3 where we consider three cutoffs: $47,691$ where council size increases from 9 to 10, $95,238$ where council size increases from 10 to 11, and $142,857$ where council size increases from 11 to 12. We do not find any evidence of discontinuities in female candidate share or women's seat share at the first cutoff (column 1 of Panels A and B, respectively).

There is some indication that female candidate share would increase when the council size increases from 10 to 11 (column 2), but this result is based merely on a small number of observations and should be taken with a grain of salt. We similarly see an increase in women's seat share at the largest cutoff, but this estimate is only marginally significant and based on a even smaller number of observations. Overall, we may conclude that there is no strong evidence that the discontinuous increases in district magnitude would lead to changes in female representation in elections and elected local councils in Brazil.

Furthermore, the result on an increased number of parties with seats in a local council appears to be driven by the first two results.

Tables OA2 OA4 then shows cutoff-specific results for Finland. We consider four cutoffs: council size increases from 13, 15, or 17 to 21 at the first cutoff, from 21 to 27 at the second cutoff, from 27 to 35 at the third cutoff, and from 35 to 43 at the fourth cutoff. While the increases in council size are more substantial than in Brazil, we do not detect any changes in female candidate share or women's seat share, and the number of parties in an election or a local council at any of these thresholds.

Table OA1. RDD estimates for Brazil—female representation in elections and councils.

	(1)	(2)	(3)
Panel A: Share of female candidates			
RD estimate	-0.734	3.488**	7.505
	[-3.810,5.225]	[2.793,16.089]	[-7.371,7.174]
Cutoff	47619	95238	142857
N	202	53	15
Bandwidth	8285	7339	6506
Control group mean	22.98	22.89	18.86
Panel B: Women's seat share			
RD estimate	4.911	2.180	-0.168
	[-3.250,15.882]	[-22.201,9.941]	[-6.327,44.837]
Cutoff	47619	95238	142857
N	195	55	15
Bandwidth	7831	7876	6614
Control group mean	8.01	11.18	13.01

Notes: The table shows cutoff-specific RD estimates for Brazil. The dependent variable is the share of female candidates in Panel A and women's seat share in Panel B. The RD estimate is based on a local linear regression using an uniform kernel within the MSE-optimal bandwidth. We account for clustering when choosing the optimal bandwidth and in statistical inference. We report 95% robust confidence intervals obtained following Calonico, Cattaneo and Titiunik (2014), fixing main and bias bandwidths to be the same. * and ** denote statistical significance at the 5% and 1% levels, respectively.

Table OA2. RDD estimates for Finland—female representation in elections and councils.

	(1)	(2)	(3)	(4)
Panel A: Share of female candidates				
RD estimate	3.251	0.021	0.355	2.321
	[-3.474,6.294]	[-6.388,8.158]	[-6.379,1.589]	[-3.738,10.768]
Cutoff	2000	4000	8000	15000
N	188	101	135	47
Bandwidth	357	284	680	956
Control group mean	38.33	36.95	37.2	35.56
Panel B: Women's seat share				
RD estimate	-1.048	-2.231	3.180	18.284
	[-8.947,6.598]	[-8.931,5.971]	[-9.955,4.287]	[-2.508,40.828]
Cutoff	2000	4000	8000	15000
N	153	96	78	45
Bandwidth	292	265	451	921
Control group mean	35.52	32.15	32.19	24.5

Notes: The table shows cutoff-specific RD estimates for Finland. The dependent variable is the share of female candidates in Panel A and women's seat share in Panel B. The RD estimate is based on a local linear regression using an uniform kernel within the MSE-optimal bandwidth. We account for clustering when choosing the optimal bandwidth and in statistical inference. We report 95% robust confidence intervals obtained following Calonico, Cattaneo and Titiunik (2014), fixing main and bias bandwidths to be the same. * and ** denote statistical significance at the 5% and 1% levels, respectively.

Table OA3. RDD estimates for Brazil—the number of parties.

	(1)	(2)	(3)
Panel A: Number of parties in election			
RD estimate	-0.633	0.383	-0.972
	[-2.812,4.690]	[-5.356,7.833]	[-5.949,10.594]
Cutoff	47619	95238	142857
N	199	62	15
Bandwidth	7944	8807	6891
Control group mean	14.33	17.84	22.13
Panel B: Number of parties in council			
RD estimate	1.012**	2.404*	-2.837*
	[0.429,3.014]	[0.015,5.900]	[-6.056,-0.720]
Cutoff	47619	95238	142857
N	166	55	17
Bandwidth	6648	7980	8534
Control group mean	5.40	4.90	9.46

Notes: The table shows cutoff-specific RD estimates for Brazil. The dependent variable is the share of female candidates in Panel A and women's seat share in Panel B. The RD estimate is based on a local linear regression using an uniform kernel within the MSE-optimal bandwidth. We account for clustering when choosing the optimal bandwidth and in statistical inference. We report 95% robust confidence intervals obtained following Calonico, Cattaneo and Titiunik (2014), fixing main and bias bandwidths to be the same. * and ** denote statistical significance at the 5% and 1% levels, respectively.

Table OA4. RDD estimates for Finland—the number of parties.

	(1)	(2)	(3)	(4)
Panel A: Number of parties in election				
RD estimate	-0.035	-0.096	-0.018	-0.496
	[-1.363,1.101]	[-1.700,1.242]	[-1.845,0.613]	[-4.615,5.620]
Cutoff	2000	4000	8000	15000
N	143	106	90	27
Bandwidth	262	300	490	582
Control group mean	5.08	5.25	6.45	6.58
Panel B: Number of parties in council				
RD estimate	0.074	0.260	-0.379	0.464
	[-1.106,1.242]	[-1.253,1.312]	[-1.231,0.613]	[-3.127,1.514]
Cutoff	2000	4000	8000	15000
N	147	137	85	39
Bandwidth	281	398	473	783
Control group mean	4.34	4.50	5.79	5.68

Notes: The table shows cutoff-specific RD estimates for Finland. The dependent variable is the share of female candidates in Panel A and women's seat share in Panel B. The RD estimate is based on a local linear regression using an uniform kernel within the MSE-optimal bandwidth. We account for clustering when choosing the optimal bandwidth and in statistical inference. We report 95% robust confidence intervals obtained following Calonico, Cattaneo and Titiunik (2014), fixing main and bias bandwidths to be the same. * and ** denote statistical significance at the 5% and 1% levels, respectively.

A.2 Results for Proportionality

We also examine the effect of changes in district magnitude on proportionality. We use the Modified Gallagher Index (Koppel and Diskin 2009) as the outcome variable, given by the following formula:

$$MG = \left\{ \frac{1}{2} \sum_{j=1}^{p} \left[\left(\frac{s_j}{\left(\sum_{j=1}^{p} s_j^2\right)^{0.5}} - \frac{v_j}{\left(\sum_{j=1}^{p} v_j^2\right)^{0.5}} \right)^2 \right] \right\}^{0.5} .$$

Here, summation over j includes all parties running in the municipality, with v_j representing the vote share and s_j the seat share of party j. The index measures the distortion between vote shares and seat shares, taking a value of zero when each party receives a share of seats exactly equal to its share of votes.

As expected (see Table OA5), there is a statistically significant increase in proportionality for Finland. However, the estimate for Brazil is not statistically different from zero and has the opposite sign of what was anticipated. This may be explained by pre-electoral coalitions strategically responding to changes in the number of available seats.

Table OA5. RDD estimates—proportionality.

	Brazil	Finland
	(1)	(2)
RD estimate	0.001	-0.005*
	[-0.095,0.066]	[-0.018,-0.002]
N	314	794
Bandwidth	9078	703
Control group mean	0.18	0.05

Notes: Column (1) uses data from Brazil and column (2) uses data from Finland. The dependent variables is Modified Gallagher Index. The RD estimate is based on a local linear regression using an uniform kernel within the MSE-optimal bandwidth. We account for clustering when choosing the optimal bandwidth and in statistical inference. We report 95% robust confidence intervals obtained following Calonico, Cattaneo and Titiunik (2014), fixing main and bias bandwidths to be the same. * and ** denote statistical significance at the 5% and 1% levels, respectively.

A.3 Party Size and Female Candidates

In Figure OA1, we use party-level data to illustrate the relationship between party size, measured by the number of candidates, and the supply of female candidates, measured as the share of female candidates amongst all party candidates. We see that in Brazil, smaller parties tend to field less female candidates relative to party size. In Finland, there is no notable correlation.

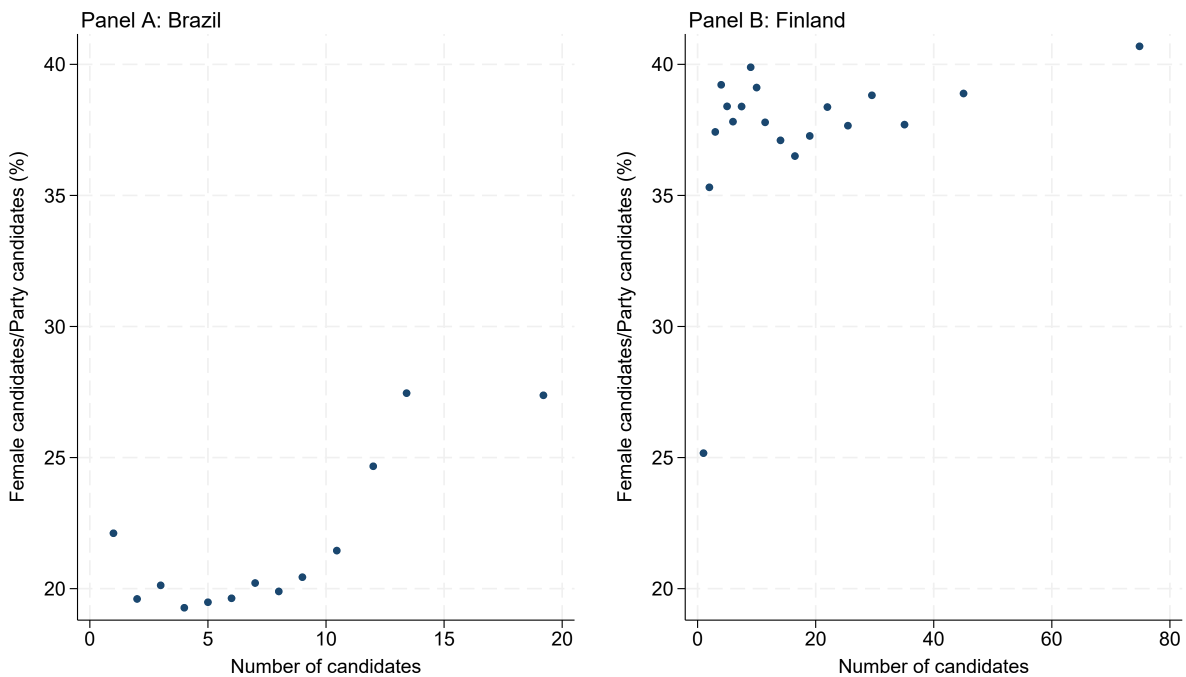

Figure OA1. Party size and the share of female candidates. The figure shows binned averages of the share of female candidates out of all party candidates in Finland and Brazil.

A.4 Estimate Heterogeneity by Party Orientation and Competition

In order to study the role of gatekeeping and strategic behavior by parties for supply constraints, we estimate our results for left-wing and right-wing parties separately, and we split the sample by political competitiveness in the municipality. If the political orientation of the parties matters for their gatekeeping culture and biases, we could see different effects along the left-right ideological spectrum. Similarly, if strategic concerns are limiting female participation, we could see differences in estimates between high and low competitive environments.

We used estimates from Zucco and Power (2024) for year 2013 to classify Brazilian parties as left-wing and right-wing parties. For Finland we classify the Social Democratic Party, the Left Alliance, and the Green Party as left-wing, and the Center Party, the National Coalition Party, the Christian Democrats, the Finns Party, and the Swedish People's Party as right-wing. Dependent variables candidate and seat share of women, are calculated for left- and right-wing parties at the municipality level. We are using Herfindahl–Hirschman index computed from parties' seat shares as a measure for political competition, and we use the median values to split the samples.

As can be seen from Tables OA6 and OA7, we do not find any statistically significant effect heterogeneity. However, estimates are not very precise and thus we cannot confidentially rule out possible differences.

Table OA6. RDD estimates—by party orientation.

	Share of female candidates		Women's seat share	
	(1) Left-wing parties	(2) Right-wing parties	(3) Left-wing parties	(4) Right-wing parties
Panel A: Brazil				
RD estimate	-1.614	2.014	5.787	5.408
	[-3.517,9.346]	[-2.907,6.877]	[-9.634,23.650]	[-3.026,16.107]
N	271	346	259	253
Bandwidth	7975	9741	8858	7287
Control group mean	23.32	22.83	6.46	7.51
Differences	-3.628		0.379	
	[-7.151,9.010]		[-18.728,19.663]	
Panel B: Finland				
RD estimate	2.213	0.665	2.680	0.738
	[-1.798,10.888]	[-1.355,5.427]	[-12.714,13.811]	[-4.282,5.362]
N	726	718	758	681
Bandwidth	655	643	687	613
Control group mean	36.57	37.72	35.69	31.18
Differences	1.548		1.942	
	[-4.684,9.701]		[-14.103,14.121]	

Notes: Panel A uses data from Brazil and Panel B uses data from Finland. The dependent variables are; the share of female candidates in left-wing parties column (1), the share of female candidates in right-wing parties column (2), the seat share of women in left-wing parties column (3), and the seat share of women in right-wing parties column (4). All are measured at the municipality level. The RD estimate is based on a local linear regression using an uniform kernel within the MSE-optimal bandwidth. We account for clustering when choosing the optimal bandwidth and in statistical inference. We report 95% robust confidence intervals obtained following Calonico, Cattaneo and Titiunik (2014), fixing main and bias bandwidths to be the same. Confidence intervals for differences are computed using bias-corrected estimates and the Z-distribution. * and ** denote statistical significance at the 5% and 1% levels, respectively.

Table OA7. RDD estimates—by Herfindahl–Hirschman index.

	Share of female candidates		Women's seat share	
	(1)	(2)	(3)	(4)
	≥ median HHI	< median HHI	≥ median HHI	< median HHI
Panel A: Brazil				
RD estimate	6.368	0.501	3.412	3.631
	[-1.430,13.237]	[-2.963,6.354]	[-13.418,13.211]	[-0.185,17.704]
N	61	199	97	186
Bandwidth	5443	8814	8349	8388
Control group mean	23.08	22.44	9.82	8.64
Differences	5.867		-0.219	
	[-4.480,12.895]		[-24.903,7.177]	
Panel B: Finland				
RD estimate	-0.080	3.210	-2.374	4.519
	[-4.417,3.838]	[-1.294,6.111]	[-9.832,3.564]	[-0.386,10.997]
N	347	352	297	314
Bandwidth	548	727	474	645
Control group mean	38.32	36.11	34.82	31.27
Differences	-3.290		-6.893	
	[-8.243,2.847]		[-17.229,0.350]	

Notes: Panel A uses data from Brazil and Panel B uses data from Finland. The dependent variables are the share of female candidates in columns (1) and (2), and seat share of women in columns (3) and (4). The samples are split by the median of Herfindahl–Hirschman index from party seat shares. The RD estimate is based on a local linear regression using an uniform kernel within the MSE-optimal bandwidth. We account for clustering when choosing the optimal bandwidth and in statistical inference. We report 95% robust confidence intervals obtained following Calonico, Cattaneo and Titiunik (2014), fixing main and bias bandwidths to be the same. Confidence intervals for differences are computed using bias-corrected estimates and the Z-distribution. * and ** denote statistical significance at the 5% and 1% levels, respectively.

B Robustness of the Results

B.1 Robustness to Alternative Bandwidths

In Figures OA2 and OA3, we estimate our RDD using alternative bandwidths. The point estimates for discontinuities in council size are stable and remain statistically significant across a range of bandwidths in both Brazil (Panel A) and Finland (Panel B). The estimates for the share of female candidates tend to become larger as the bandwidth decreases in the Brazilian data; however, the point estimates remain statistically insignificant throughout. We also see that there is a stable jump in women's seat share that is around 5 percentage points, but this discontinuity is statistically insignificant.

In Brazil, there appear to be robust positive effects of a larger council size on the number of parties nominating candidates in an election and the number of parties represented in a local council, although the former is systematically statistically insignificant. In Finland, the point estimates are robustly both economically and statistically insignificant.

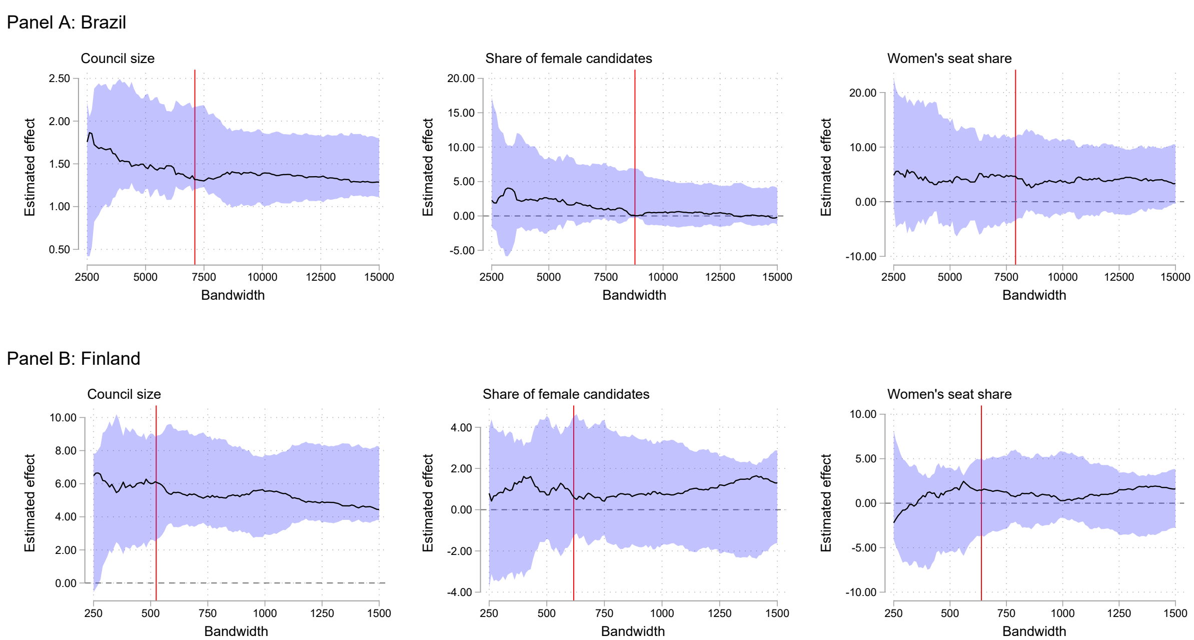

Figure OA2. Robustness to alternative bandwidths—council size and female representation. The RD estimates are based on local linear regressions using an uniform kernel. The red vertical line shows the MSE-optimal bandwidth that is selected accounting for clustering at the municipality level. The blue shaded area shows the 95% robust and bias-corrected confidence interval (Calonico, Cattaneo and Titiunik 2014) that is based on standard errors clustered at the municipality level.

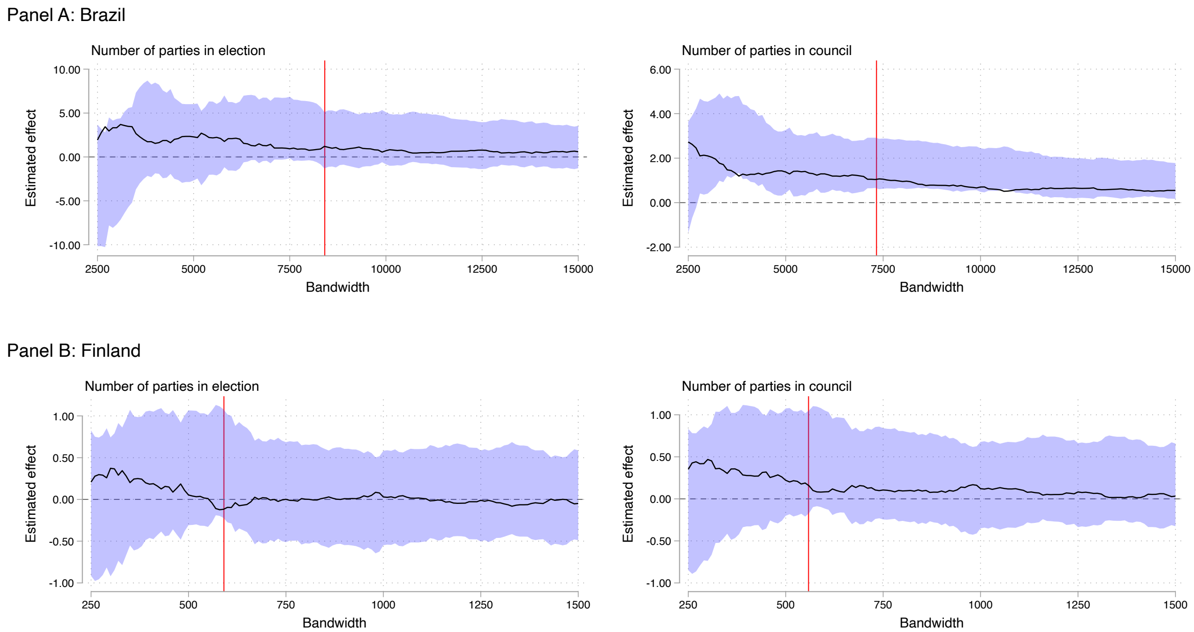

Figure OA3. Robustness to alternative bandwidths—the number of parties. The RD estimates are based on local linear regressions using an uniform kernel. The red vertical line shows the MSE-optimal bandwidth that is selected accounting for clustering at the municipality level. The blue shaded area shows the 95% robust and bias-corrected confidence interval (Calonico, Cattaneo and Titiunik 2014) that is based on standard errors clustered at the municipality level.

B.2 Robustness to Alternative Polynomials

Tables OA8 (council size and female representation) and OA9 (the number of parties in an election or a council) present estimation results using a quadratic polynomial. Similar to the main analysis, we use an uniform kernel and MSE-optimal bandwidths adjusted for clustering at the municipality level. Our findings are robust to this specification.

Table OA8. RDD estimates with a quadratic control polynomial—council size and female representation.

	Council size	Share of female candidates	Women's seat share
	(1)	(2)	(3)
Panel A: Brazil			
RD estimate	1.503**	1.061	4.192
	[1.012,1.902]	[-1.339,5.007]	[-2.102,11.686]
N	604	808	672
Bandwidth	15556	19259	16901
Control group mean	9.16	23	8.62
Panel B: Finland			
RD estimate	5.354**	0.547	0.887
	[3.109,9.163]	[-1.708,4.057]	[-2.761,5.960]
N	1115	1176	1162
Bandwidth	1054	1180	1161
Control group mean	20.91	38.22	33.25

Notes: Panel A uses data from Brazil and Panel B uses data from Finland. The dependent variables are the council size, the share of female candidates, and the seat share of women in the first, the second, and the third column, respectively. The RD estimate is based on a local quadratic regression using an uniform kernel within the MSE-optimal bandwidth. We account for clustering when choosing the optimal bandwidth and in statistical inference. We report 95% robust confidence intervals obtained following Calonico, Cattaneo and Titiunik (2014), fixing main and bias bandwidths to be the same. * and ** denote statistical significance at the 5% and 1% levels, respectively.

Table OA9. RDD estimates with a quadratic control polynomial—the number of parties.

	Number of parties in election	Number of parties in council
	(1)	(2)
Panel A: Brazil		
RD estimate	1.273	0.769**
	[-1.418,4.299]	[0.546,2.544]
N	780	667
Bandwidth	18679	16758
Control group mean	14.76	5.6
Panel B: Finland		
RD estimate	0.006	0.190
	[-0.475,0.836]	[-0.293,0.905]
N	1107	1102
Bandwidth	1041	1034
Control group mean	5.37	4.51

Notes: Panel A uses data from Brazil and Panel B uses data from Finland. The dependent variable is the number of parties in an election in column (1) and the number of parties in a local council in column (2). The RD estimate is based on a local quadratic regression using an uniform kernel within the MSE-optimal bandwidth. We account for clustering when choosing the optimal bandwidth and in statistical inference. We report 95% robust confidence intervals obtained following Calonico, Cattaneo and Titiunik (2014), fixing main and bias bandwidths to be the same. * and ** denote statistical significance at the 5% and 1% levels, respectively.

C Validity Checks

C.1 Covariate Smoothness

A crucial assumption for identification is that potential outcomes evolve smoothly at the cutoff for treatment. To assess how credible this assumption is, we study discontinuities in lagged dependent variables in Table OA10. Note that our data for Finland starts in 1996, so we lose one election year when conducting this analysis.

There are no systematic discontinuities in the lagged dependent variables. We do not see any discontinuities in council size. This is reassuring, as this is the only outcome variable for which we detected effects in the current-term data in both countries. There appear to be discontinuities in the share of female candidates and the number of parties represented in the local council for Brazil but not for Finland. Note that we did not find an effect on the share of female candidates in the current term in Brazil. The effect on the lagged number of parties represented in a local council is perhaps more concerning, but at least the estimate is smaller in magnitude than what we find in the main text. The lagged women's seat share and the number of parties in an election evolve smoothly at the cutoff.

C.2 Manipulation of the Running Variable

In both Brazil and Finland, precise manipulation of the running variable seems unlikely. We confirm this more formally by testing whether there are discontinuities in the density of the running variable at the cutoff. Figure OA4 visualizes the McCrary (2008) density test. We do not find large and/or statistically significant discontinuities in Brazil (Panel A) or Finland (Panel B), supporting the validity of our empirical design. The estimated discontinuity (standard error in parentheses) is 0.37 (0.36) in Brazil and −0.03 (0.19) in Finland.

Table OA10. Covariate smoothness—lagged dependent variables.

	Council size	Share of female candidates	Women's seat share	Number of parties in election	Number of parties in council
	(1)	(2)	(3)	(4)	(5)
Panel A: Brazil					
RD estimate	0.877	3.448**	-0.643	2.924	0.760*
	[-1.394,2.584]	[1.427,8.273]	[-1.570,10.335]	[-0.522,5.840]	[0.122,2.645]
N	241	264	272	204	234
Bandwidth	6876	7703	8065	6133	6684
Control group mean	14.27	17.41	10.00	11.34	6.77
Panel B: Finland					
RD estimate	1.495	0.835	2.298	-0.412	-0.285
	[-0.646,6.175]	[-2.364,3.119]	[-0.685,9.676]	[-0.796,0.721]	[-0.418,0.868]
N	548	647	428	540	501
Bandwidth	649	773	510	640	587
Control group mean	23.67	37.43	31.63	5.52	4.67

Notes: Panel A uses data from Brazil and Panel B uses data from Finland. The dependent variables are the lagged council size, the lagged share of female candidates, and the lagged seat share of women in the first, the second, and the third column, respectively. The RD estimate is based on a local quadratic regression using an uniform kernel within the MSE-optimal bandwidth. Standard errors clustered at the municipality level are shown in parentheses. We account for clustering when choosing the optimal bandwidth and in statistical inference. We report 95% robust confidence intervals obtained following Calonico, Cattaneo and Titiunik (2014), fixing main and bias bandwidths to be the same. * and ** denote statistical significance at the 5% and 1% levels, respectively.

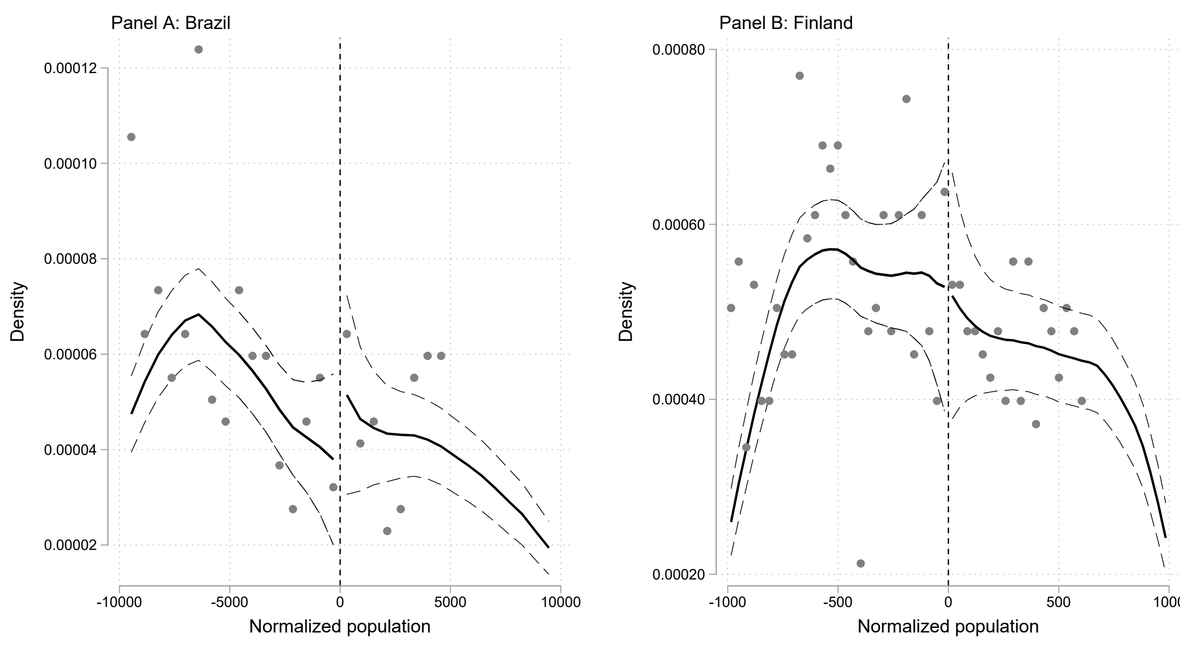

Figure OA4. McCrary density test. We limit the value of the running variable between -10,000 and 10,000 in Brazil (Panel A) and between -1,000 and 1,000 in Finland (Panel B). The estimated discontinuity (standard error in parentheses) is 0.37 (0.36) in Brazil and -0.03 (0.19) in Finland. We operationalize the test using `DCdensity` command on Stata (McCrary 2008).

C.3 Placebo Threshold Test

Last, we analyze whether there are discontinuities at artificial cutoffs where council size does not change. We do so by varying the location of the cutoff and then estimating a local linear specification with an uniform kernel within the MSE-optimal bandwidth. Hyytinen et al. (2018) and De Magalhães et al. (2025) suggest that this test can be helpful in detecting model misspecification. The patterns in both Brazil (Panel A of Figures OA5 and OA6) and Finland (Panel B of Figures OA5 and OA6) support the validity of our approach. We only detect systematic discontinuities in council size close to the cutoff in both countries and an effect on the number of parties represented in a local council in the case of Brazil, while there are no (false) discontinuities in any of the outcomes at the placebo cutoffs.

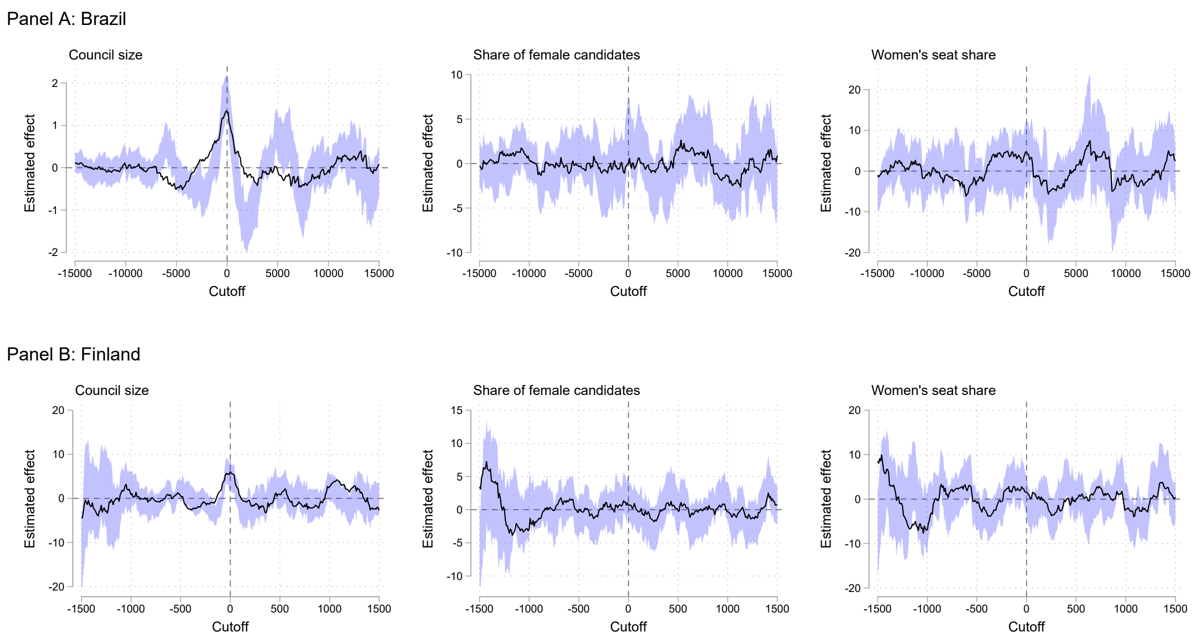

Figure OA5. Placebo cutoff test—council size and female representation. The figures show local linear RD estimates at different cutoffs. We re-estimate the MSE-optimal bandwidth for each cutoff. The blue shaded area shows the 95% robust and bias-corrected confidence interval (Calonico, Cattaneo and Titiunik 2014) that is based on standard errors clustered at the municipality level.

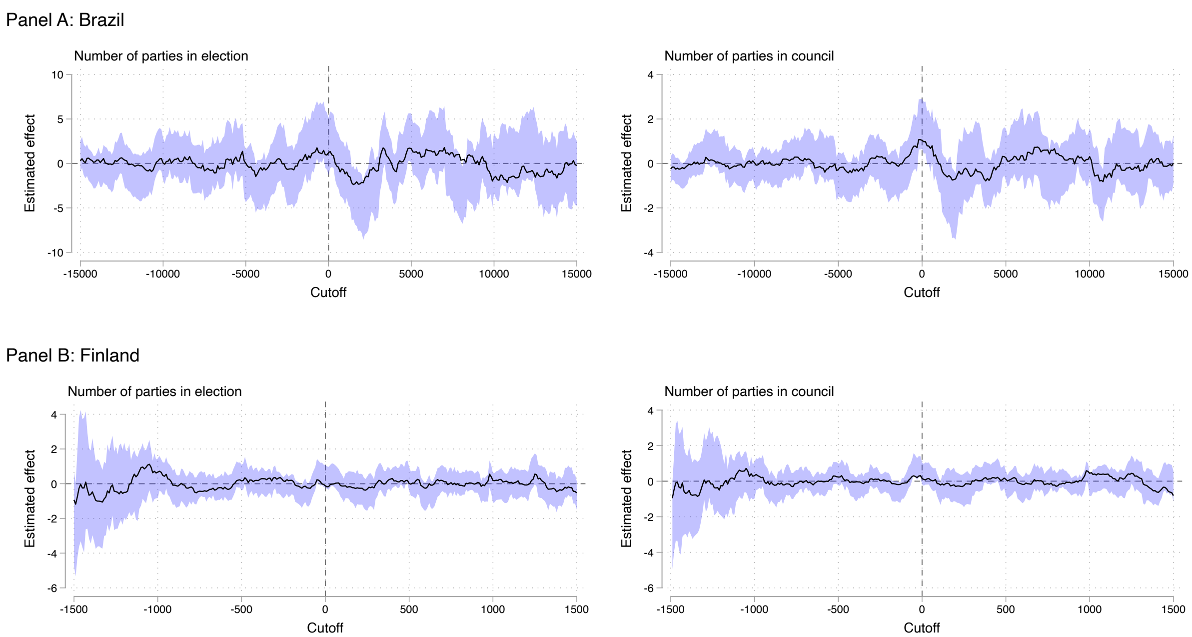

Figure OA6. Placebo cutoff test—the number of parties. The figures show local linear RD estimates at different cutoffs. We re-estimate the MSE-optimal bandwidth for each cutoff. The blue shaded area shows the 95% robust and bias-corrected confidence interval (Calonico, Cattaneo and Titiunik 2014) that is based on standard errors clustered at the municipality level.

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