Party incumbency advantage and female exposure effect in French municipal elections

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Abstract

This thesis estimates the party incumbency advantage and female exposure effect in the 2008 and 2014 French municipal elections, using a regression discontinuity design.

First, I find that incumbency increases the vote share of the Left by 8 percentage points in the first round of the 2014 election. Results for the Right, the 2008 election, and other outcome variables, are insignificant. Thus, the existence of an incumbency advantage is highly dependent on the electoral context.

Secondly, the presence of a female incumbent increases the vote share of the top female candidate by 22 percentage points, and her probability of victory by 32 points. These results are statistically significant, and point to the existence of a substantial female exposure effect.

Finally, I show that a personal incumbency advantage drives both the party incumbency advantage (when it exists) and the female exposure effect. When controlling for repeat candidates, both these effects disappear.

Sommaire

Ce mémoire évalue les avantages du parti sortant et l'effet d'exposition aux femmes politiques durant les élections municipales françaises de 2008 et 2014, utilisant la méthode de régression sur discontinuité.

Tout d'abord, le parti en place bénéficie d'un gain de 8 points de pourcentage de la part des votes durant le premier tour de l'élection de 2014. Ces résultats sont statistiquement significatifs pour la gauche. Cependant, les résultats sont statistiquement négligeables pour la droite, l'élection de 2008, et d'autres variables de résultat. Par conséquent, l'existence d'un avantage du parti sortant dépend du contexte électoral.

Par ailleurs, la présence d'une maire sortante augmente la part des voix de la meilleure candidate de 22 points de pourcentage et sa probabilité de victoire de 32 points. Ces résultats sont statistiquement significatifs et indiquent l'existence d'un effet d'exposition aux femmes politiques substantiel.

Enfin, je montre qu'un avantage de l'élu sortant est à l'origine à la fois de l'avantage du parti sortant (quand il existe) et de l'effet d'exposition aux femmes politiques. Ces deux effets disparaissent lorsque j'inclus une variable pour les candidats répétés.

Contents

1 Introduction

Incumbent candidates and parties in congressional elections in the United States enjoy a higher electoral success than non-incumbents (Lee, 2008). This is true for candidates themselves: the probability of winning the next election (conditional on running) is about 90% for incumbents. This is also true for political parties: the reelection rate of incumbent parties between 1948 and 1998 was fairly stable at around about 90%, with a two-party vote share at about 60-70% (Lee, 2008). Thus, incumbency is a key factor in determining electoral outcomes in modern democracies.

However, the relationship between incumbency and electoral success might not be causal. Levitt and Wolfram (1997) decompose the sources of the incumbency advantage into three components: direct officeholder benefits, the ability of incumbents to deter high-quality challengers, and higher average quality of incumbents compared to open-seat candidates. If incumbents are more likely to stay in office because they are more competent, the incumbency advantage is not problematic per se, as it does not undermine democracy. However, if incumbents are more likely to be reelected simply because they are the incumbents (that is, if there is a causal relationship between incumbency and vote shares), this could lead to a lack of electoral competition (Abramowitz, Alexander and Gunning, 2006), which can have long-term consequences for election results and roll-call representation (Fowler and Hall, 2015). A high incumbency advantage could be symptomatic of deeper problems with the election system.

The personal incumbency advantage might also be related to the lack of women in politics, which affects policy decisions. In France, in 2014, women comprised of only 16% of elected mayors (Maury and Simon, 2017). Men also represent the majority of incumbents. If incumbents are more likely to be reelected, this could contribute to the persistence of female underrepresentation. This has broad implications, as the gender of politicians has an impact on policy outcomes. Using political reservations for women in India, Chattopadhyay and Duflo (2004) show that female leaders elected under the reservation policy invest more in the public goods directly relevant to women. Brollo and Troiano (2016) find that, in Brazilian municipalities, female mayors are less likely to be involved in corruption and patronage. Finally, Baskaran and Hessami (2019) show that a female victory for the last council seat accelerates the expansion of public child care provision by 40% in German municipalities. Thus, increasing female political representation could increase gender equality more broadly, through the pursuit of policies that women support.

This thesis aims to answer two research questions, using data from French municipal elections between 2001 and 2014. First, what is the causal effect of being the incumbent party on vote shares and the probability of reelection in recent French municipal elections? Secondly, does the election of a female mayor increase the probability that the following

mayor will be female? Does it increase the vote share of the top female candidate in the following election?

First, I estimate the causal effect of being the incumbent party on vote shares and probability of reelection, for first-round and final-round results. I find that party incumbency increases the vote share of the Left by 8 percentage points on average in the first round of the 2014 election. Results are insignificant for other political parties, elections, and outcomes. This is in line with Eggers and Spirling's (2017) finding that the incumbency advantage interacts with partisanship preferences, and suggests that the existence of an incumbency advantage is highly dependent on the electoral context. Note that the 2014 municipal election was a defeat for the Left, and marked the resurgence of the Extreme Right (see figures B.1 to B.5 of the appendix for descriptive statistics). Thus, it is possible that an incumbency advantage can be found only in the loss domain for French municipal elections. Alternatively, it could be that the incumbency advantage is stronger for the Left than for the Right. Further research is needed to understand the factors driving the heterogeneity of these results.

Secondly, I find evidence of a positive female exposure effect, which I define as the causal impact of having a female incumbent in a municipality on the vote share (and probability of victory) of the top female candidate in the municipal election. The average female incumbency effect corresponds to a 22 percentage point increase in first-round vote shares, and a 24 percentage point increase in final-round vote shares. Moreover, having a female incumbent increases the probability of election of a female candidate in the final round by 32%. I also investigate the causal impact of a female victory of the number and proportion of female candidates in the subsequent election. The coefficients are positive, and statistically significant for the proportion of female candidates. Overall, these results point to the existence of a substantial female exposure effect in French municipal elections.

I explore a possible mechanism through which the party incumbency advantage and female exposure effect might operate: a personal incumbency effect. When controlling for repeat candidates, the party incumbency advantage for the Left in the first round of the 2014 election disappears. The coefficient on the repeat-candidate dummy is highly statistically significant. This suggests that having the same candidate running again is associated with a 7 percentage point increase in vote shares for challengers, and a 13 percentage point increase for incumbents. I repeat the same approach for the female exposure effect. The effect of female incumbency on female vote share drops from 21 percentage points to 14 to 18 percentage points, and is no longer statistically significant. Having a repeat candidate is associated with a 31 percentage point increase in vote shares for challengers, and 20 percentage point increase for incumbents. These results suggest that both the party incumbency advantage (when it exists) and the female exposure effect are driven by repeat candidates. However, this effect cannot be interpreted causally, as the strategic exit of weaker candidates would bias the estimates upwards.

This thesis contributes to the literature on the incumbency advantage and the female exposure effect by focusing on French municipal elections. Most studies of the incumbency advantage have focused on legislative elections, in first-past-the-post electoral systems (Lee, 2008; Kendall and Rekkas, 2012; Eggers and Spirling, 2017). In contrast, this thesis contributes to the growing literature about incumbency effects in local elections, as opposed to legislative elections (Trounstine, 2011; Klašnja and Titiunik, 2017). It also explores the incumbency advantage in a two-round electoral system, and extends the set of studies about voting procedures other than first-past-the-post (Ferlenga and Galasso, 2019).

As for the female exposure effect, most research focuses on countries that are perceived as relatively male-dominated, such as India[1] (Beaman et al., 2009; Bhalotra, Clots-Figueras and Iyer, 2017) or Brazil[2] (Brollo and Troiano, 2016). This thesis expands the literature on the female exposure effect in more gender-equal countries[3], complementing previous studies done in Germany[4] (Baskaran and Hessami, 2018) and the United States[5] (Ferreira and Gyourko, 2014).

The thesis is organised as follows. Section 2 reviews the literature on the incumbency advantage and female exposure effect. Section 3 provides some background on the French municipal election system and presents the data. Section 4 explains the empirical strategy and estimation method, and present some validity tests. Results for the incumbency advantage and female exposure effects are discussed in section 5 and 6 respectively. Finally, section 7 concludes.

2 Literature review

This section reviews the existing literature on the incumbency advantage and female exposure effects. First, I present different methods and estimates of the incumbency advantage, for different countries and types of elections. Secondly, I summarise the literature on female exposure effects, which explores how the election of a woman impacts female political participation.

2.1 Estimates of the incumbency advantage

The electoral advantage that incumbent politicians enjoy in the United States congressional elections is well-documented, and has been heavily studied (Gelman and King, 1990). Early research focused on intuitive measures of the *personal* incumbency advan-

[1]India ranked 122nd out of 160 countries in the UNDP's (2019) Gender Inequality Index.
[2]Brazil ranked 89th in the Gender Inequality Index (UNDP, 2019).
[3]France ranked 8th in the Gender Inequality Index (UNDP, 2019).
[4]Germany ranked 19th in the Gender Inequality Index (UNDP, 2019).
[5]The United States ranked 42nd in the Gender Inequality Index (UNDP, 2019).

tage, such as the sophomore surge or the retirement slump. The sophomore surge is "the average vote gain for freshman winners in election 1 who run again in election 2" (Gelman and King, 1990). The retirement slump is "the average vote loss for the parties whose candidates won election 1 and did not run in election 2" (Gelman and King, 1990). However, Gelman and King (1990) have shown that both of these measures are biased: the sophomore surge tends to underestimate the true incumbency advantage, whereas the retirement slump tends to overestimate it.

New methods have been introduced to offer an unbiased estimate of the personal incumbency advantage. Gelman and King (1990) propose an indicator which estimates how a party would perform if a new candidate ran for the party, while controlling for the lagged vote share. Alternatively, Ansolabehere, Snyder and Stewart (2000) use the decennial redistricting in the US as a natural experiment to estimate the personal vote. It is defined as "the vote that an incumbent receives because he or she represented the voters in the past" (Ansolabehere, Snyder and Stewart, 2000).

More recently, Lee (2008) uses a regression discontinuity (RD) design to estimate the *party* incumbency advantage (as opposed to the personal incumbency advantage). It is defined as "the overall causal impact of being the current incumbent party in a district on the votes obtained in the district's election". The detailed method is explained in section 4. Using electoral data for the United States House of Representatives for the period 1946–1998, Lee (2008) finds a party incumbency advantage of about 8% of the vote share.

This approach has been used to document the party incumbency effect in other countries. Eggers and Spirling (2017) look at the interaction between incumbency effect and partisan preferences in British parliamentary elections. They show that incumbency effects exist, and that they are larger in close contests between Conservatives and Liberals (up to 7 percentage points of the vote share) than in close contests between Conservatives and Labour (2 percentage points). This suggests that the incumbency effect differs across parties. Using data from the French legislative elections for the period 1958-2012, Ferlenga and Galasso (2019) find a large incumbency advantage in the first-round vote shares. However, this does not translate in a higher probability of winning the election. These differing results suggest that the electoral system (two-round vs one-round first-past-the-post) is an important moderator for understanding the impact of incumbency on vote share and probability of reelection.

The RD approach has also been used to estimate the incumbency advantage in local and mayoral elections. Using data from four cities in the United States between 1915 and 1985, Trounstine (2011) finds that incumbency increases the vote share in the next election by about 22 percentage points, and the effect is statistically significant. Klašnja and Titiunik (2017) apply this approach to Brazilian mayoral elections between 1996 and 2012. Contrary to US results, they find that being the incumbent party decreases the probability of winning by 15 percentage points. This could be due to a combination of term limits and

Table 1: Summary of the literature: Party incumbency advantage

Study	Context	Findings
Lee (2008)	US House of Representative elections, 1946-1998	Vote share: +8 percentage points
Eggers and Spirling (2017)	British parliamentary elections, 1950-2010	Vote share: +2 percentage points (Conservative vs Labour), up to +7 percentage points (Conservative vs Liberal)
Ferlenga and Galasso (2019)	French legislative elections, 1958-2012	First-round vote share: +5 percentage points. Probability of winning: No effect
Trounstine (2011)	US local elections, 1915-1985	Vote share: +22 percentage points
Klašnja and Titiunik (2017)	Brazilian mayoral elections, 1996-2012	Probability of winning: −15 percentage points

weak party affiliation, which reduces accountability. These two conflicting results suggest that the incumbency effect is likely to differ across countries and institutional settings.

Table 1 summarises the literature. Overall, studies have shown that there exists a large and statistically significant party incumbency advantage in the United States, both for congressional (Lee, 2008) and local (Trounstine, 2011) elections. The evidence from other countries is mixed. There is a party incumbency advantage for parliamentary elections in the United Kingdom (Eggers and Spirling, 2017), but not in France (Ferlenga and Galasso, 2019). There is even an incumbency disadvantage in Brazilian mayoral elections (Klašnja and Titiunik, 2017). This thesis aims to contribute to the literature by testing for the existence of a party incumbency advantage in French municipal elections.

2.2 Female exposure effect and women's political participation

The lack of women in politics might influence the stereotype of what a "typical politician" looks like for voters, which might therefore be biased against female politicians. Beaman et al. (2009) show that, in Indian village councils, prior exposure to a female leader is associated with higher electoral success for women. They underline changes in voter attitudes as a possible mechanism, based on experimental and survey evidence. Similarly, using a sample of local council elections in Germany for the period 2001-2016, Baskaran and Hessami (2018) show that female council candidates advance more from their initial list rank when the mayor is female. This seems to suggest that exposure to women in politics increases women's representation in local elections, creating a virtuous circle.

However, other studies have suggested that the election of a woman does increase female political participation. Using data from India's state legislative assemblies, Bhalotra, Clots-Figueras and Iyer (2017) find that the election of a woman leads to a decrease in

Table 2: Summary of the literature: Female exposure effect

Study	Context	Findings
Beaman et al. (2009)	Indian village councils, 2008	Positive female exposure effect
Baskaran and Hessami (2018)	German local councils, 2001-2016	Positive female exposure effect
Bhalotra, Clots-Figueras and Iyer (2017)	Indian state legislative assemblies, 1980-2007	Decrease or no effect in entry of new female candidates
Ferreira and Gyourko (2014)	US mayoral elections, 1950-2005	Female mayors are more likely to be reelected, but no spillover effects to other women
Brollo and Troiano (2016)	Brazilian mayoral elections, 2001-2005	Female mayors are less likely to be reelected
Lippmann (2019)	French municipal elections (in small towns), 2014	Female candidates less likely to be elected after a female incumbent (who cannot run again)

the entry of new female candidates (in the less gender-equal states), or has no statistically significant effect (in the more gender-equal states). This is because female incumbents are more likely to run for office again compared to male incumbents, crowding out the presence of new female candidates. For mayoral elections in the United States, Ferreira and Gyourko (2014) find that electing a woman as a mayor does not increase the probability that other women will be elected in the short or long run. For Brazil, Brollo and Troiano (2016) show that female mayors are equally likely to run again, but less likely to be re-elected than males, despite being less corrupt. This could be because male mayors are more likely to engage in patronage and more able to attract campaign donations, which strengthens their chances of reelection. Thus, evidence from India, the United States, and Brazil, suggests that there is no female exposure effect.

Finally, using data from French municipal elections in small towns, Lippmann (2019) shows that female candidates are less likely to be elected after a female incumbent (who cannot run for office again). When incumbent mayors cannot run for reelection, about 23% of male incumbents are replaced by women, compared to 13% for female incumbents. This is consistent with a stereotype threat effect penalising women: female candidates might face an electoral backlash after a relatively unsuccessful female incumbent.

To conclude, the evidence on female exposure effects is mixed. A summary of the literature can be found in table 2. Studies based on local elections in India (Beaman et al., 2009) and Germany (Baskaran and Hessami, 2018) find a positive effect, whereas others based on legislative elections in India (Bhalotra, Clots-Figueras and Iyer, 2017) and mayoral elections in the United States (Ferreira and Gyourko, 2014) find no effect. Finally, studies based on mayoral elections in Brazil (Brollo and Troiano, 2016) and France (Lippmann, 2019) find a negative female exposure effect. This thesis contributes to the

literature by estimating the female exposure effect for larger towns in French municipal elections.

3 Background and data

This section provides some background information on the voting rules in French municipal elections and presents the data.

3.1 Background

This subsection describes the voting procedure for French municipal elections, which depends on the size of the town. For towns with less than 1000 inhabitants, the voting procedure consists of a block vote with panachage[6]. For larger municipalities, there is proportional representation with a majority premium. Special rules apply for associated towns (*communes associées*) and new towns (*communes nouvelles*), which are divided into multiple electoral sections, with a deputy mayor (*maire délégué*) in each. Finally, Paris, Marseilles, and Lyon also follow a unique system: the cities are divided in electoral areas, which follow the same voting rules as large towns. Here, I restrict my sample to towns in metropolitan France which followed the rules of larger municipalities - excluding Paris, Marseilles, Lyon, and towns with multiple electoral sections.

For larger municipalities which are the focus of this study, the election of councillors follows a list system in two rounds with proportional representation. Party lists have to alternate men and women, to ensure equal gender representation. If a party gets the absolute majority in the first round, the election is limited to a single round. In other cases, lists that have obtained at least 10% of the vote remain for the second round, and candidates from a list who has obtained more than 5% may join another list (which could lead to a change in the order of candidates). The list which obtained the most votes in the final round gets assigned half of the council seats. The remaining seats are distributed among all the lists present in the final round which obtained more than 5% of the vote. This includes the majority list. The elected council then elects the mayor, which is traditionally the lead candidate of the majority list.

3.2 Data

3.2.1 Election results

The main data consists of the the 2001, 2008, and 2014 municipal election results, which are provided by the Ministère de l'Intérieur (2013*a*, 2013*b*, 2014*a*, 2014*b*). The data set contains, for each town, the following variables of interest: name of the town and

[6]The previous threshold, which applies for the 2001 and 2008 elections, was 3500 inhabitants.

department, total number of people on the voting list, number of people who voted, and number of valid votes. For each list in the town, the political nuance of the list and the number of votes obtained are available. This makes it possible to link parties across elections, and estimate a party incumbency advantage. Specifically, I classify the political nuances into six main party families: Extreme Left, Left, Centre, Right, Extreme Right, and Other. I use this new variable to link parties across elections. I am therefore able to obtain two sets of results: one for the 2001-2008 elections, and one for the 2008-2014 elections. I estimate the incumbency advantage for each set of elections separately, to allow the effect to vary over time.

The 2008 and 2014 data sets also contain additional information for each list, including the gender of the lead candidate, and the name and first name of the lead candidate. For these elections, it is therefore also possible to link the gender of the lead candidates across elections, and quantify the female exposure effect.

I focus on first-round outcomes in the main analysis. Second-round results are harder to interpret, as lists are allowed to merge between towns, and the political nuance of a list becomes less clear. They are also subject to a self-selection bias, as only towns with relatively tight races (and more than two lists) move onto the second round. For the independent variable, I use final-round outcomes as they are the most relevant for the analysis of the party incumbency advantage.

Finally, when estimating the party incumbency advantage, I restrict my sample to towns in which the top two parties are the Left and the Right, as they are the main parties in the relevant elections, winning in over 90% of towns (see figure B.4 in the appendix for descriptive statistics).

3.2.2 Town characteristics

To check for the validity of the RD approach, I gather additional data on town characteristics for the year 2007. Specifically, I obtain information on town population, active population, debt and tax revenues for each town, and the structure and distribution of income. This data comes from Insee, the French national institute of statistics (2009, 2010*a*, 2019, 2010*b*).

3.2.3 Summary statistics

Table 3 presents some summary statistics for the full sample of Left-Right elections in 2008. In the final round of the 2008 election, the mean vote shares for the Left and the Right were relatively close, standing at 47.75% and 45.74% respectively. However, the 2014 results are very different: the mean first-round vote share for the Left is 38.22%, compared to 47.12% for the Right. Thus, the 2014 election was considered a defeat for the Left (see also figures B.2 to B.4 in the appendix).

Table 3: Incumbency advantage: Summary statistics

Statistic	N	Mean	St. Dev.	Min	Max
Left vote share in 2008 (final round)	1,770	47.75	14.11	14.10	88.87
Right vote share in 2008 (final round)	1,770	45.74	14.04	10.07	83.15
Left vote share in 2014 (first round)	1,628	38.22	18.08	5.27	100.00
Left vote share in 2014 for incumbents	892	47.42	17.66	6.72	100.00
Left vote share in 2014 for challengers	736	27.08	10.91	5.27	100.00
Right vote share in 2014 (first round)	1,598	47.12	18.06	6.60	100.00
Right vote share in 2014 for incumbents	811	57.17	16.42	9.73	100.00
Right vote share in 2014 for challengers	787	36.76	13.15	6.60	100.00
Repeat Left candidate	1,770	0.44	0.50	0	1
Repeat Right candidate	1,770	0.41	0.49	0	1
Number of lists in 2008 (final round)	1,770	2.55	0.84	2	8
Number of lists in 2014 (first round)	1,628	3.28	1.44	1	10

Notes: Summary statistics for the sample of Left-Right elections in 2008.

The 2014 first-round vote share for the incumbent party is higher than for the challenger party, both for the Left and the Right. On average, the Left received 47.42% of the vote share in 2014 in towns where it won in 2008, compared to 27.08% for towns where it lost, a difference of 20 percentage points. Similarly, the Right's vote share was also 20 percentage points higher in towns where it was the incumbent party. Thus, incumbent parties tend to perform much better than challenger parties, in line with the evidence from the United States (Lee, 2008). However, this effect cannot be interpreted causally, as candidates and municipalities might have different unobservable characteristics.

Table 4 presents summary statistics for the sample of mixed-gender elections (which are elections in which the top two candidates are of different gender). The evidence is suggestive that men do better than women in mixed-gender elections, although this cannot be causally interpreted. First, the top male candidate's vote share is higher than the top female candidate's vote share in both the 2008 and 2014 elections. Male vote share was on average 10 percentage points higher in the final round of the 2008 election, and 11 percentage points higher in the first round of the 2014 election. Moreover, only 66% of towns with a mixed-gender race in 2008 had at least one female candidate in 2014, compared to 96% of towns with at least one male candidate. This suggests that women do worse in terms of vote share, and are less likely to run for office (even in towns that had mixed-gender races in 2008) than men.

Looking at repeat candidates, 47% of men who were candidates in 2008 decide to run again for office in 2014, compared to 33% of women. However, the proportion of male and female incumbents running again for office is very close (62% for men and 63% for women), and similarly for challengers (20% for male challengers, and 17% for female

Table 4: Female exposure effect: Summary statistics

Statistic	N	Mean	St. Dev.	Min	Max
Female vote share in 2008 (final round)	595	41.31	13.05	11.58	80.96
Male vote share in 2008 (final round)	595	50.86	13.38	14.18	88.42
Female victory in 2008 (final round)	595	0.35	0.48	0	1
Male victory in 2008 (final round)	595	0.65	0.48	0	1
Female vote share in 2014 (first round)	390	37.08	19.80	1.20	100.00
Female vote share in 2014 for female incumbents	184	46.62	19.80	3.03	100.00
Female vote share in 2014 for female challengers	206	28.55	15.47	1.20	100.00
Male vote share in 2014 (first round)	573	48.13	18.14	0.00	100.00
Male vote share in 2014 for male incumbents	379	53.92	17.39	8.14	100.00
Male vote share in 2014 for male challengers	194	36.80	13.73	0.00	74.85
Repeat female candidate	595	0.33	0.47	0	1
Repeat female candidate for female incumbents	210	0.63	0.48	0	1
Repeat female candidate for female challengers	385	0.17	0.38	0	1
Repeat male candidate	595	0.47	0.50	0	1
Repeat male candidate for male incumbents	385	0.62	0.49	0	1
Repeat male candidate for male challengers	210	0.20	0.40	0	1
Number of lists in 2008 (final round)	595	2.62	0.82	2	7
Number of lists in 2014 (first round)	390	3.52	1.58	1	10
At least one female candidate in 2014	595	0.66	0.48	0	1
At least one female candidate for female incumbents	210	0.88	0.33	0	1
At least one female candidate for female challengers	385	0.54	0.50	0	1
At least one male candidate in 2014	595	0.96	0.19	0	1

Notes: Summary statistics for mixed-gender elections (in which the top two candidates are of different gender) in 2008. Female refers to the top female candidate, and similarly for male.

challengers). The difference in the average running rates is therefore driven by the higher share of male incumbents in the sample: men won 65% of the mixed-gender elections in 2008, compared to 35% of the elections for women.

The gender of the incumbent matters for vote shares, for both men and women. The top female candidate enjoys a 18 percentage points higher vote share when the incumbent mayor is female. Similarly, the effect for male candidates is 17 percentage points. Interestingly, this is similar in magnitude to the difference in vote shares between incumbent and challenger party, shown in table 3. It is therefore possible that a similar mechanism (a personal incumbency advantage) might be driving these differences.

4 Empirical strategy

This section presents the empirical approach used to estimate the party incumbency advantage and the female exposure effect, and some validity tests.

4.1 RD design for incumbency advantage

The method used to estimate the incumbency advantage is based on Lee (2008), and relies on a regression discontinuity (RD) design, comparing winners and losers in close elections. In the case of French municipal elections in larger municipalities, the "incumbency advantage" is defined as the overall causal impact of being the current incumbent party in a given town on the votes obtained in the municipal election. The unit of observation is the town, and the incumbency effect is estimated for the party, not for an individual politician.

The structure of elections can be used as a quasi-experiment, in a sharp RD setting. Let V_{it} be the vote share margin of victory (MOV) in town i in election t. It is defined as the difference between the vote share of the party of reference (say the Left party) and its strongest opponent (which would be the Right party in most cases). Let D_{it} be an indicator variable equal to 1 if the reference party is also the incumbent party in election t. Note that D_{it} depends on $Y_{i,t-1}$ the vote share in the previous election, and therefore on $V_{i,t-1}$ the vote share margin of victory: $D_{it} = 1$ if the reference party received a positive vote share margin of victory in the previous election, and 0 otherwise. (For simplification, I assume that if the margin is exactly 0, the party of reference wins.)

$$D_{it} = \begin{cases} 1, & \text{if } V_{i,t-1} \geq 0 \\ 0, & \text{otherwise} \end{cases} \tag{1}$$

In other words, the treatment status D_{it} is a deterministic and discontinuous function of the running variable $V_{i,t-1}$, with a threshold at $V_{i,t-1} = 0$.

Let us now consider the model:

$$Y_{it} = \alpha W_{it} + f(V_{i,t-1}) + \gamma D_{it} + \epsilon_{it} \tag{2}$$

where W_{it} represents town- or party-specific characteristics in town i for election t, $f(V_{i,t-1})$ is a smooth function which is continuous in the neighbourhood of $V_{i,t-1} = 0$, and ϵ_{it} is an error term. Note that Y_{it} is allowed to depend continuously on $V_{i,t-1}$: for example, a higher margin of victory in election $t-1$ could deter high-quality challengers, which could in turn boost the vote share for the incumbent in election t. However, there is a discontinuity in how $V_{i,t-1}$ impacts Y_{it}: this is captured by γ, which represents the causal impact of incumbency on vote shares for close elections.

If all these quantities can be observed, then the ordinary least squares (OLS) estimates from a regression of vote share on incumbency status are unbiased and consistent. However, if the researcher is not able to observe the party-specific characteristics W_{it}, OLS will suffer from an omitted variable bias if W_{it} is correlated with D_{it}. For example, let W_{it} be the degree of liberalness of a town. A liberal town might have an unobserved preference

for the Left, making W_{it} correlated with D_{it}. That is, the incumbent Left party might be reelected not because of an inherent incumbency effect ($\gamma = 0$), but simply because the town prefers and has always preferred the Left. A simple comparison of election results between towns is therefore likely to be biased and overestimate the incumbency effect.

A RD design can overcome these limitations by focusing on tight races. The model is the same as in equation (2), but omitting W_{it} (which cannot be observed):

$$Y_{it} = f(V_{i,t-1}) + \gamma D_{it} + \epsilon_{it} \tag{3}$$

For simplification, let us assume that the top two political parties in a very close election at $t-1$ are the Left and the Right. The key assumption is that there exists a random chance component to the final vote share margin of victory $V_{i,t-1}$. Even though parties might be able to broadly influence $V_{i,t-1}$ (such as by choosing a more experienced candidate, or spending more time and money on campaigning), they are unable to precisely manipulate the final vote shares. Thus, at the threshold $V_{i,t-1} = 0$, treatment assignment is as good as random: whether the Left or the Right is elected is determined by chance. For example, let us assume that, by chance, the Left wins election $t-1$ and becomes the incumbent in election t. Comparing the vote shares of the Left and the Right in election t gives an estimate of the causal party incumbency advantage. Thus, if the assumption of independence at the threshold is satisfied, the RD estimates are unbiased and capture the local average treatment effect (LATE), that is, the effect of being the incumbent party when the race is a tie.

4.2 RD design for female exposure effect

Using a similar RD design as Baskaran and Hessami (2018), Bhalotra, Clots-Figueras and Iyer (2017), and Broockman (2014), I focus on estimating the female exposure effect, which I define as the impact of the election of a female mayor on the vote share of the top female candidate in subsequent elections. I restrict the sample to (close) mixed-gender races, which are elections in which the top two lead candidates are of opposite gender.

The RD equation is the same as equation (3) for the incumbency advantage:

$$Y_{it} = f(V_{i,t-1}) + \gamma D_{it} + \epsilon_{it} \tag{4}$$

where $V_{i,t-1}$ is the female margin of victory (the vote share of the list with a female lead candidate, minus the vote share of the list with a male lead candidate, for the top two lists) in election $t-1$. D_{it} is a dummy variable equal to one if a list headed by a woman won the most votes in election $t-1$, making it the incumbent list. The dependent variable Y_{it} is the vote share of the female candidate for election t in town i. $f(V_{i,t-1})$ is a flexible continuous function which is allowed to differ on each side of the discontinuity, and ϵ_{it} is

a random error term.

The rationale behind using a RD design is the same as with the party incumbency advantage: simply comparing towns with female mayors to towns with male mayors will lead to biased estimates, as there might be unobserved characteristics that make a given town more female-friendly for example. Looking at close mixed-gender races makes it possible to estimate the LATE, which is the effect of electing a woman when the race is a tie.

4.3 Estimation methods

I estimate the RD regressions in two ways. First, I estimate equations (3) and (4) using OLS, restricting the sample to observations with $|V_{i,t-1}| \leq h$. I impose the functional form:

$$f(V_{i,t-1}) = \alpha + \beta V_{i,t-1} + \delta D_{it} V_{i,t-1} \tag{5}$$

Note that this is strictly equivalent to estimating a local linear regression with a uniform kernel, where h is the bandwidth used (Lee and Lemieux, 2010).

Secondly, I estimate the equation using local polynomial regressions of order 0, 1, and 3. I use a triangular kernel, as it is optimal for estimating local linear regressions at the boundary (Fan and Gijbels, 1996).

4.4 Validity tests

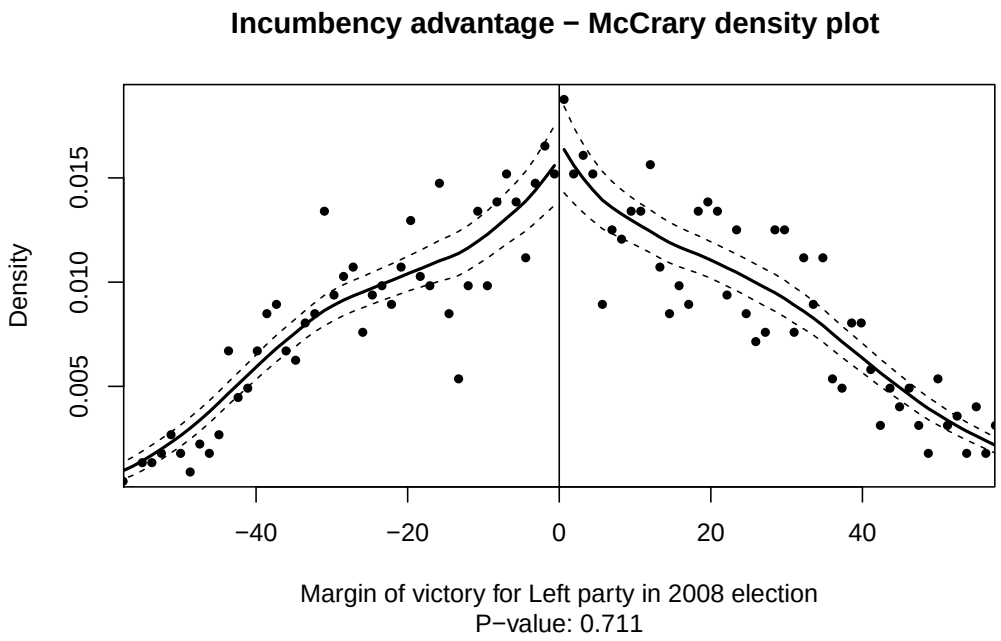
To check the validity of the RD design in the context of the party incumbency advantage and the female exposure effect, I conduct three different tests. First, I look for differences in pre-treatment characteristics on either side of the threshold. Secondly, I conduct a McCrary (2008) density test and check that there is no significant discontinuity in the density of the running variable at the threshold. Finally, I check whether women (for the female exposure effect) or a specific party (for the incumbency advantage) is significantly more or less likely to win close mayoral elections. This subsection presents the results of these tests, first for the party incumbency advantage, and then for the female exposure effect.

4.4.1 Validity of RD design for incumbency advantage

First, I test the validity of the RD design for estimating the party incumbency advantage.

Difference in pre-treatment characteristics I run a series of tests to check for differences in various town characteristics, for municipalities in which the Left won in 2008, compared to municipalities in which the Right won. These are town characteristics for the year 2007, and therefore unconfounded by the 2008 election. I compute the t-tests

Figure 1: Incumbency advantage - McCrary density plot



Notes: McCrary (2008) density plot for the margin of victory of the Left over the Right, in the final round of the 2008 election.

using a bandwidth of 20%, 10%, and 5%, and report the results for the 5% bandwidth in table A.2 in the appendix.

When using a 20% bandwidth, which is close to the optimal bandwidth calculated by Calonico, Cattaneo and Titiunik's (2014) selection procedure, the differences are statistically significant at the 5% level for almost half of the variables. This suggests that these towns are not comparable, and a smaller bandwidth should be used. I therefore reproduce the tests using a bandwidth of 10%. 4 variables remain statistically significant at the 5% level. Given the large number of tests performed, it is unclear whether the statistical significance of these results is driven by chance or by fundamental differences between the towns compared. To avoid any ambiguity, I finally compute the tests for a bandwidth of 5% and show the results in table A.2. None of the variables are statistically or economically significant.

These results suggest that a bandwidth of less than 10% is preferable, as some of the core RD assumptions seem to be violated with a bandwidth larger than 10%.

McCrary density test Figure 1 shows the McCrary (2008) density plot for the margin of victory of the Left over the Right. There is no statistically significant discontinuity at the threshold, and therefore no evidence of precise manipulation. Identical tests for the 2001 election and other party combinations are available upon request, and also show

Table 5: Incumbency advantage - Probability of victory by incumbency status

	Full sample	$\|MOV\| \leq 20\%$	$\|MOV\| \leq 10\%$	$\|MOV\| \leq 5\%$
	(1)	(2)	(3)	(4)
Incumbent	0.517***	0.232***	0.111***	0.066
	(0.014)	(0.023)	(0.032)	(0.043)
Constant	0.254***	0.390***	0.448***	0.469***
	(0.010)	(0.016)	(0.022)	(0.029)
Observations	3,540	1,770	996	550
R^2	0.267	0.054	0.012	0.004

Notes: This table reports the results of an OLS regression of victory on incumbency status for Left-Right elections in 2008, using different subsamples. MOV stands for margin of victory (difference in vote shares for the Left and the Right).
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

no evidence of discontinuity at the threshold. These tests do not the validity of the RD design in this context.

Probability of winning (close) elections by incumbency status Table 5 presents the results of an OLS regression of victory on incumbency status, to check whether incumbent parties are more likely to win (close) elections. If incumbent parties are as likely to win close elections as other political parties, this suggests that the assumption of independence as the threshold is likely to be met: whether the incumbent wins or not would be as-good-as-randomly determined. In this case, a RD design would be able to capture the causal effect of incumbency on vote shares.

The first three columns show that for all elections with a bandwidth of more than 10%, the incumbent party is significantly more likely to win the 2008 election. With a bandwidth of 5%, the incumbency dummy variable is no longer statistically significant at the 5% level. These results suggest that for the RD results to be valid, a bandwidth of less than 10% should be used, or incumbency status needs to be included as a covariate.

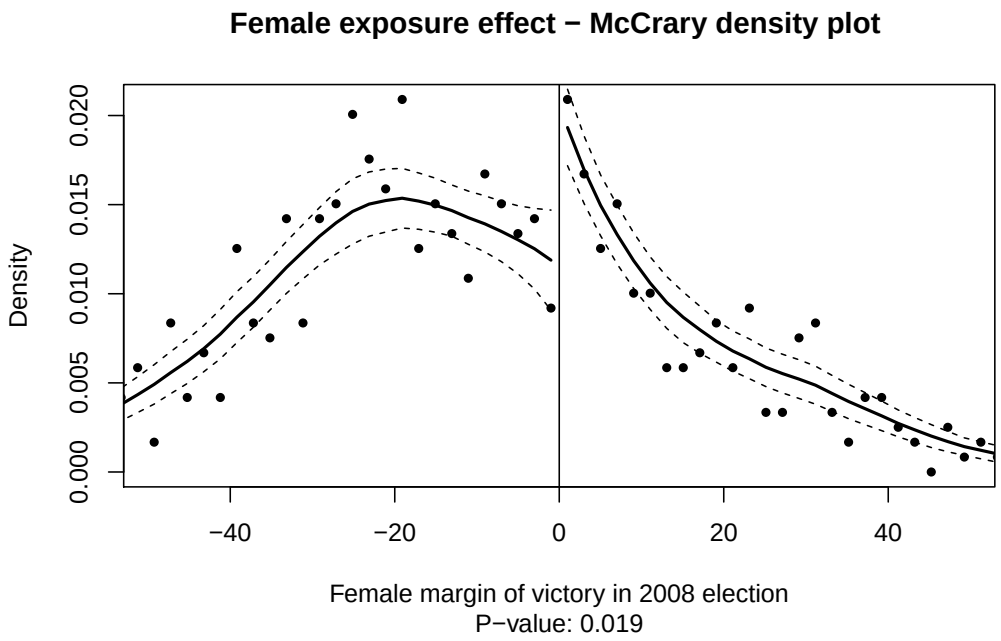
4.4.2 Validity of RD design for female exposure effect

Similarly, I test the validity of the RD design for estimating a female exposure effect.

Difference in pre-treatment characteristics Table A.4 in the appendix reports the results of t-tests comparing various town characteristics for municipalities in which a male mayor was elected in the 2008 election, compared to municipalities with a female mayor.

As for the incumbency advantage, the t-tests are computed for close races, using a bandwidth of 20% of margin of victory. The differences are statistically insignificant at

Figure 2: Female exposure effect - McCrary density plot



Notes: McCrary (2008) density plot for the female margin of victory, for the full sample of mixed-gender elections.

the 5% level for all variables, except for the Gini coefficient. Even then, the difference is not economically significant. Moreover, given the high number of comparisons being performed, it is possible that this difference come random sampling error alone. The family-wise error rate (which is the probability that at least one test will reject the null hypothesis when it is true) is equal to $(1-(1-\alpha))^H$, where α is the significance level used, and H is the number of comparisons performed. With $\alpha = 0.05$ and $H = 25$, the family-wise error rate is 0.73. Thus, it is likely that the difference in the Gini coefficient for towns with male and female mayors is driven by random sampling error.

The results suggest that for this subsample, towns with male and female mayors are comparable, and there is no evidence of the RD assumption of independence being violated using a bandwidth of 20%.

McCrary density test Figure 2 shows the McCrary (2008) density plot for the female margin of victory, for the full sample of mixed-gender elections. The plot shows a statistically significant discontinuity at the threshold, with a jump in the density on the right of the threshold. This would suggest that women are significantly more likely to win very close elections.

To investigate the nature of the density discontinuity, I replicate the density test

Table 6: Female exposure effect - Probability of victory by gender

	Full sample (1)	$\|MOV\| \leq 20\%$ (2)	$\|MOV\| \leq 10\%$ (3)
Female	-0.294^{***}	-0.110^{***}	0.053
	(0.028)	(0.041)	(0.054)
Constant	0.647^{***}	0.555^{***}	0.474^{***}
	(0.020)	(0.029)	(0.038)
Observations	1,190	602	342
R^2	0.087	0.012	0.003

Notes: This table reports the results of an OLS regression of victory on gender, for mixed-gender elections in 2008. MOV stands for margin of victory (the difference in vote share between the top female and top male candidate).
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

by removing observations with a margin of victory between -1% and 1%. The plot is available in figure B.15 in the appendix. It shows that the discontinuity is no longer significant at the 5% level, suggesting it might be driven by a small number of elections close to the threshold.

I check the characteristics of the towns with a female margin of victory between -1% and 1% report them in table A.5 in the appendix. This corresponds to a sample of 20 elections, 14 of which were won by women. Recall that the RD assumption of independence supposes that the winner is determined randomly for tight races, as by a flip of a coin. To test whether this assumption is reasonable, I conduct a binomial test to check whether the probability of victory for these women is statistically different from 0.50. I find a p-value of 0.11, which is consistent with the discontinuity at the threshold being generated by chance. This suggests that the RD design remains valid for the investigation of the female exposure effect. Moreover, results obtained in the main analysis are robust to the exclusion of these twenty towns, as shown in figure B.22 of the appendix.

Probability of winning (close) mixed-gender elections I check whether women have a statistically different probability of winning (close) mixed-gender elections. Table 6 presents the results of an OLS regression of victory on gender for mixed-gender elections in 2008.

The first column uses the full sample of mixed-gender elections, and shows that women are less likely to win municipal elections in general. The second column restricts the sample to elections with a margin of victory between -20% and 20%, which approximately corresponds to the optimal bandwidth for RD regressions. The results show that men

remain more likely to win elections in this subsample.

Finally, the third column restricts the sample to elections with a margin of victory between −10% and 10%. For these close elections, men and women have about the same probability of winning. This suggests that the RD regressions with a bandwidth of 10% or less are most likely to satisfy the assumption of independence, compared to larger bandwidths.

5 Results: Party incumbency advantage

This section shows the results for the party incumbency advantage in French municipal elections. First, I present the baseline results obtained for the Left (competing against the Right) in the first round of the 2014 election. I find a positive and statistically significant party incumbency advantage of around 8 percentage points for my preferred specifications.

I repeat the analysis for other parties and elections, and find no statistically significant effect. This suggests that the existence of an incumbency advantage is highly dependent on the electoral context.

Finally, I show that the party incumbency advantage for the Left in 2014 was almost entirely driven by a personal incumbency advantage, with repeat challengers enjoying a vote share 7 percentage points higher than inexperienced candidates, and repeat incumbents benefiting from a 13 percentage point gain.

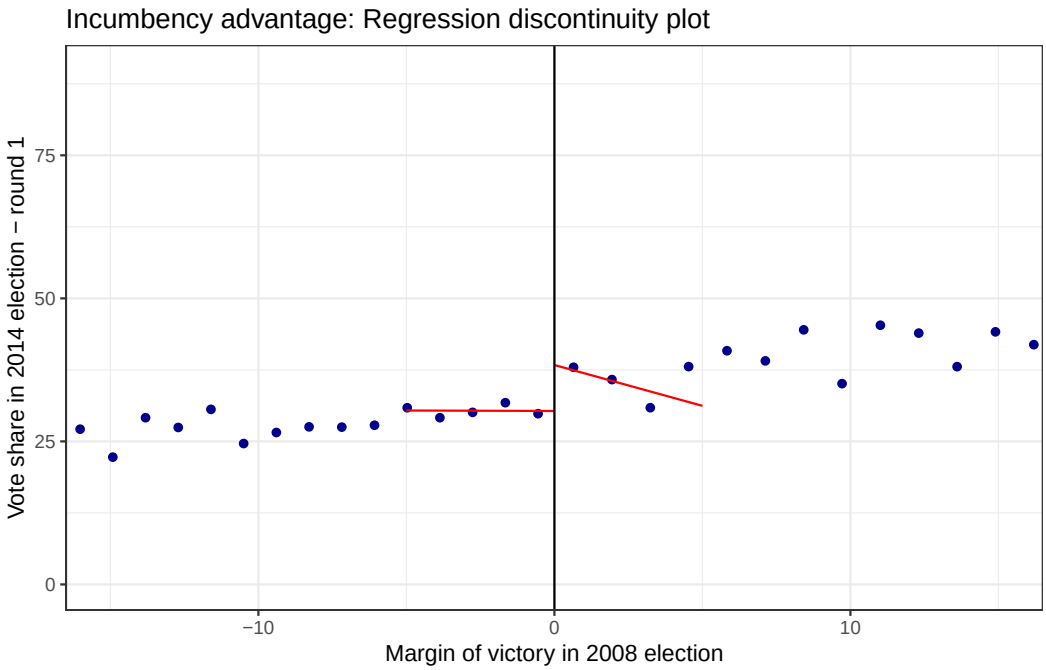
5.1 Baseline results

This subsection presents the baseline results for the Left in the 2014 election. First, I show graphical evidence of a discontinuity in the relationship between the Left's margin of victory in 2008 and the its first-round vote share in 2014. Secondly, I estimate the causal party incumbency advantage using OLS, for elections with a margin of victory between −5% and 5%. I find an effect of about 6 percentage points, but barely significant. Finally, using local polynomial regressions, I find that a statistically significant effect of around 8 percentage points.

5.1.1 Graphical evidence

Figure 3 presents the RD plot for the party incumbency advantage. It shows the relationship between the Left's margin of victory in 2008 and the its first-round vote share in 2014. The regression line is estimated using a linear regression on each side of the threshold, with a bandwidth of 5%. There is a discontinuity at the threshold of around 6 percentage points, which suggests that a party incumbency advantage of 6 percentage points exists for the Left in the 2014 election.

Figure 3: Incumbency advantage - Regression discontinuity plot



Notes: Relationship between margin of victory in the 2008 election and vote share in the first round of the 2014 election for the Left. The regression line is estimated using a linear regression on each side of the threshold, with a bandwidth of 5%.

5.1.2 RD design with OLS estimation

Table 7 presents the results of a regression of 2014 first-round vote share on 2008 margin of victory, the incumbency dummy variable, an interaction term, and other covariates. I focus on Left-Right elections with an absolute margin of victory of less than 5%, as the validity tests from the previous section suggest that the RD assumptions are not violated for such a bandwidth.

The first column reports the baseline results. Incumbent party is positive and significant at the 10% level. The point estimate suggests that being the incumbent party leads to a 5.74 percentage point increase in vote share.

I add party-specific variables in column 2. The coefficient for vote share in 2001 is positive and significant at the 10% level. This can be explained by the persistence of political preferences: final vote share in 2001 is positively associated with vote share in 2014. The point estimate for the coefficient of incumbent party is 5.45, about the same as in the baseline model.

I include town characteristics in addition to party characteristics in column 3. The key coefficients remain similar to the previous specifications. Finally, I add interactions for party-specific variables in column 4. The point estimate for the incumbent party is

Table 7: Incumbency advantage - Baseline results (vote share)

	(1)	(2)	(3)	(4)
Incumbent party	5.74*	5.45*	6.25**	7.85
	(2.96)	(3.07)	(3.11)	(9.60)
Margin of victory (MOV)	0.47	0.33	0.12	0.12
	(0.70)	(0.70)	(0.73)	(0.74)
Victory in 2001		−2.80	−3.41	−2.82
		(2.29)	(2.32)	(2.75)
Vote share in 2001		0.16*	0.17*	0.19**
		(0.10)	(0.09)	(0.09)
Incumbent party × MOV	−0.95	−0.68	−0.65	−0.66
	(1.04)	(1.10)	(1.12)	(1.13)
Incumbent party × Victory in 2001				−0.92
				(4.60)
Incumbent party × Vote share in 2001				−0.03
				(0.20)
Constant	31.12***	25.27***	21.26	19.26
	(2.02)	(4.31)	(33.48)	(33.13)
Town controls	No	No	Yes	Yes
Bandwidth	5.00	5.00	5.00	5.00
Observations	275	275	275	275
R^2	0.04	0.07	0.12	0.12

Notes: The dependent variable is the vote share in the first round of the 2014 election. The Left is the reference party.
Party controls consist of a dummy variable for Left party's victory in 2001, and the Left party's vote share in 2001. Town controls include total population, employment, public sector employment, debt per capita, tax revenue per capita, mean income, Gini coefficient, unemployment benefits/total income, profits/total income, and other income/total income. None of these variables are statistically significant at the 5% level in columns 3 and 4.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

7.85, close to the previous results, but becomes insignificant, as the addition of covariates make the estimation imprecise.

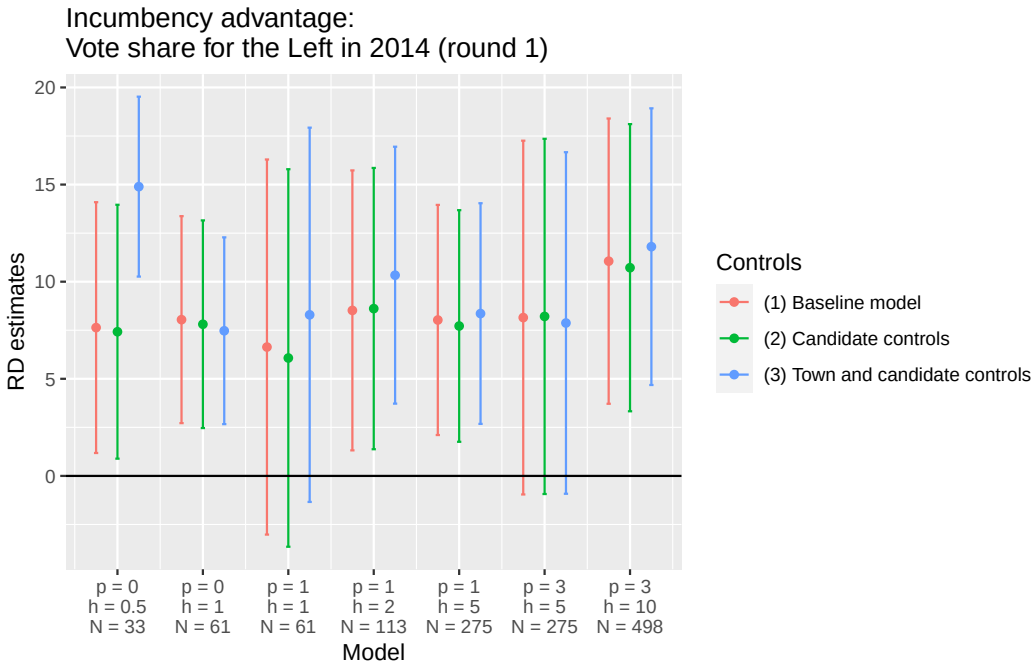
Overall, these results suggest there exists a party incumbency advantage of around 6 percentage points for the Left in 2014. However, when models are estimated using OLS, the statistical significance of the results is sensitive to the specification used.

5.1.3 Local polynomial regressions

I repeat the analysis using local polynomial regressions. I plot the RD coefficients and their 95% confidence intervals for different specifications, varying the bandwidth (from 0.5% to 10%), the degree of the local polynomial (0, 1, or 3), and including different sets of covariates. I use the same set of bandwidths and polynomials as Eggers et al. (2015).

Results are shown in figure 4. The point estimates are all positive, and situated between 6.63 and 16.88 percentage points, with an average of 9 percentage points. Most specifications are statistically significant: the confidence intervals have a minimum lower bound of −3.02 and maximum upper bound of 20.84 percentage points.

Figure 4: Incumbency advantage - Local polynomial regressions (vote share)



Notes: RD coefficients for different specifications, along with their 95% confidence interval, using heteroscedasticity-robust standard errors. The dependent variable is the vote share for the Left in the first round of the 2014 election. The regressions are estimated using local polynomial regressions of degree p and bandwidth h for N observations. The list of party and town controls can be found in the notes of table 7.

My preferred specifications (using a local linear regression and a bandwidth between 2 and 5%) suggest a party incumbency advantage of around 8 percentage points. The point estimates are situated between 7.71 and 10.34 percentage points, and the 95% confidence intervals have a minimum lower bound of 1.32 and a maximum upper bound of 16.95 percentage points.

These specifications are preferred for three reasons. First, Gelman and Imbens (2019)

show that first- and second-order polynomials are more robust, and should be favoured over higher-order polynomials in RD designs. Secondly, Eggers et al. (2015) show that although the naive specification with $p = 0$ is transparent and easily interpreted, it is likely to be biased upwards when estimating the party incumbency advantage. Again, this suggests that the local linear regressions are more reliable in this case. Finally, the local linear regression with a bandwidth of 1% has only 61 observations, which is barely above the sample size threshold of 60 used by Eggers et al. (2015). These factors lead me to conclude that the two sets of regressions with $p = 1$ and $h = 2$ or $h = 5$ are the most reliable.

Overall, these results suggest that the Left has benefited from a party incumbency advantage in first-round vote shares of around 8 percentage points in 2014. Similar results are obtained when using a uniform kernel (see figure B.6 in the appendix).

Finally, results using the optimal bandwidth selection procedure by Calonico, Cattaneo and Titiunik (2014) can be found in table A.1 of the appendix. The optimal bandwidth is higher than 20% for all specifications, which is too large according to the validity tests from section 4, as towns on either side of the threshold are no longer comparable. These results might therefore be biased and must be interpreted with caution. They suggest the existence of a party incumbency advantage of around 4 to 5 percentage points. Results are significant when using a local linear regression, and robust to the inclusion of party and town variables. When using a third-degree local polynomial, the key coefficient becomes statistically insignificant, as standard errors become larger. Overall, these results tend to confirm the existence of a positive party incumbency advantage.

5.2 Robustness checks

In this subsection, I present results for other outcome variables, parties, and elections. I show that the existence of a party incumbency advantage is limited to the Left in 2014. There is no statistical evidence of an incumbency advantage in other contexts. Finally, I present placebo regressions, which do not invalidate the RD approach for studying the party incumbency advantage.

5.2.1 Alternative specifications

Excluding towns with no candidates In the previous section, I treated parties which decided not to run as having a vote share of 0%. In figure B.7 of the appendix, I repeat the analysis treating these as missing values and excluding them. Given that selection is not random, and that the preliminary evidence suggests that incumbent parties tend to do better, excluding parties that choose to not run is likely to underestimate the causal party incumbency advantage. All but two specifications remain statistically significant. Moreover, my preferred specifications point to a positive party incumbency advantage,

with point estimates between 6.64 and 10.38 percentage points. This reinforces the previous finding of a positive party incumbency advantage for the Left in first-round vote shares.

Probability of victory I test for the presence of a party incumbency advantage in first-round probability of victory. Results are available in figure B.8 in the appendix. Although all coefficients remain positive, most of them are statistically insignificant. Thus, I cannot reject the null hypothesis of no incumbency advantage in probability of victory. This can be explained by the two-round multiparty system in French municipal elections: a higher vote share does not automatically translate into a higher probability of victory, as a party needs to pass the 50% threshold to win in the first round.

Results for the Right I repeat the analysis using the Right as the reference party, and show the results in figure B.9 of the appendix, using vote share as the dependent variable. All coefficients are insignificant. Similar results are obtained for probability of victory. These results show no evidence of a party incumbency advantage for the Right in the 2014 election.

This can be explained when taking into account the multiparty electoral system in French municipal elections: as there are more than two parties, the vote shares of the Left and the Right do not have to add up to 100%, such that estimates obtained for the Right do not necessarily mirror the coefficients for the Left.

Final-round outcomes I check the presence of a party incumbency advantage on final-round outcomes. I define final-round outcomes as the combination of first-round outcomes if a list obtained more than 50% of the vote share in the first round, and second-round outcomes if there was a second round in the election. These results need to be interpreted with caution, as lists are allowed to merge between rounds, blurring the political nuance of the parties running in the second round. Moreover, selection means that only towns with strictly more than two lists and relatively close electoral races have a second round. Finally, only a limited number of lists are allowed to continue onto the second round, such that the parameters of electoral competition are not the same as in the first round. Despite these caveats, I decide to report these decisive-round results, as they are arguably the most important for political parties themselves.

Figure B.10 of the appendix shows the results for final-round vote shares. All coefficients are positive, but many are statistically insignificant. The point estimates suggest a party incumbency advantage of 9 percentage points on average, similar to results using first-round vote shares. However, the statistical significance of this finding is sensitive to the specification used.

Figure B.11 of the appendix presents the coefficients obtained for the probability of

victory in the decisive round. All coefficients but one are statistically insignificant. This suggests that even if there is a party incumbency advantage in final-round vote shares, this does not translate into a higher probability of victory.

Incumbency advantage in 2008 I repeat the analysis for the 2008 election, using the margin of victory in 2001 as running variable. Given the unavailability of data for earlier periods, I only conduct the analysis for the baseline model. Results for the Left are shown in figure B.12 of the appendix. Although the point estimates are all positive, most specifications show insignificant results. Similar results are obtained for probability of victory.

When using the Right as the reference party, point estimates are lower than for the Left, and results are insignificant for all three dependent variables. Thus, there is not enough evidence to reject the null hypothesis of no incumbency advantage in the 2001 election.

5.2.2 Placebo regressions

To check the validity of the RD design, I conduct a placebo regression, testing for an "effect" of the Left party's coming first in the first round of the 2014 on the Left party's vote share in 2008, using the margin of victory in 2014 as a running variable. The RD plot is available in figure B.13 of the appendix. Results estimated using OLS are shown in table 8. The specifications used are the same as in the main analysis, with the elections switched.

The first column shows the baseline placebo regression. The coefficients are not statistically or economically significant, which suggests that the RD approach is not invalid. The second column adds party-specific controls. Two variables become statistically significant at the 10% level: Left party's victory and vote share in 2001 are positively associated with vote share in 2008. This is suggests that there is persistence in political preferences over time.

Column 3 adds town-specific controls. The coefficients remain broadly unchanged. Two town controls are statistically significant, which suggests that the Left has experienced a higher vote share in towns with higher populations and lower tax revenue per capita. To further investigate the role of these variables, I interact all significant coefficients with the first rank variable. All interaction terms are insignificant, suggesting that there is no discontinuity in the effect of these controls at the threshold. Moreover, all control variables except from population become insignificant.

Overall, the coefficient for a causal effect of the Left coming first in 2014 is small and insignificant for all four models. Figure B.14 in the appendix presents results using local polynomial regressions. Coefficients are insignificant for all except one regression. Thus,

Table 8: Incumbency advantage - Placebo regressions (vote share)

	(1)	(2)	(3)	(4)
First rank in 2014	1.05	1.07	1.95	−5.08
	(3.99)	(3.63)	(3.69)	(11.48)
Margin of victory (MOV) in 2014	0.14	−0.04	−0.01	0.11
	(0.84)	(0.81)	(0.93)	(0.97)
Victory in 2001		4.20*	5.20**	2.94
		(2.29)	(2.30)	(3.11)
Vote share in 2001		0.18**	0.20**	0.14
		(0.09)	(0.09)	(0.11)
Total population (thousands)			0.09**	0.08**
			(0.04)	(0.04)
Tax revenue per capita (thousands)			−21.45**	−23.31
			(9.56)	(15.43)
First rank in 2014 × MOV in 2014	0.77	0.91	0.95	0.81
	(1.34)	(1.24)	(1.32)	(1.37)
First rank in 2014 × Victory in 2001				4.28
				(4.68)
First rank in 2014 × Vote share in 2001				0.06
				(0.17)
First rank in 2014 × Total population				−0.00
				(0.05)
First rank in 2014 × Tax revenue per capita				4.30
				(17.27)
Constant	50.05***	39.32***	93.38*	103.91**
	(2.63)	(4.58)	(49.14)	(50.97)
Town controls	No	No	Yes	Yes
Bandwidth	5.00	5.00	5.00	5.00
Observations	208	208	208	208
R^2	0.02	0.14	0.21	0.22

Notes: "Effect" of the Left coming first in the first round of the 2014 election on the vote share in the 2008 election. The Left is the reference party. The list of town controls can be found in the notes of table 7. All town controls except from total population and tax revenue per capita (which are included in the table) are statistically insignificant in columns 3 and 4.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

these placebo regressions do not refute the validity of the RD design for estimating the party incumbency advantage in French municipal elections.

5.3 Mechanism: Personal incumbency advantage

In this subsection, I explore a possible mechanism through which the party incumbency advantage for the Left in the 2014 election could operate: the personal incumbency advantage. Recall that the party incumbency advantage is defined as "the overall causal impact of being the current incumbent party in a district on the votes obtained in the district's election" (Lee, 2008), and can include a personal incumbency advantage if incumbent mayors choose to run for reelection. To understand the role of personal incumbency in driving the party incumbency advantage, I create a binary variable equal to one when the same lead candidate runs in both elections for the Left party, and zero otherwise. I test for the significance of this variable using different specifications, progressively including party and town covariates.

Table 9: Incumbency advantage - Personal incumbency advantage (vote share)

	(1)	(2)	(3)	(4)
Incumbent party	5.74*	1.02	−0.08	0.12
	(2.96)	(3.39)	(3.37)	(3.47)
Margin of victory (MOV)	0.47	0.19	0.04	−0.11
	(0.70)	(0.68)	(0.70)	(0.70)
Repeat candidate		7.13***	7.57***	7.75***
		(2.04)	(2.03)	(2.00)
Victory in 2001			0.01	−0.43
			(2.20)	(2.21)
Vote share in 2001			0.16*	0.18**
			(0.09)	(0.08)
Incumbent party × MOV	−0.95	−0.53	−0.23	−0.21
	(1.04)	(0.99)	(1.05)	(1.07)
Incumbent party × Repeat candidate		4.98	5.59*	6.12*
		(3.18)	(3.11)	(3.27)
Constant	31.12***	28.14***	21.29***	22.85
	(2.02)	(2.17)	(4.21)	(31.56)
Town controls	No	No	No	Yes
Bandwidth	5.00	5.00	5.00	5.00
Observations	275	275	275	275
R^2	0.04	0.17	0.20	0.26

Notes: The dependent variable is the vote share in the first round of the 2014 election. The Left is the reference party. The list of town controls can be found in the notes of table 7. All town controls are statistically insignificant at the 5% level.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table 9 shows results for the vote share of the Left party in the first round of the 2014 election. The first column reports the baseline results, which shows a party incumbency advantage of 5.74 percentage points in terms of vote share.

In the second column, I include a binary variable for repeat candidates and an interaction term. I add party characteristics in column 3, and town characteristics in column 4. The key coefficients of interest are stable across columns 2 to 4.

The repeat candidate variable is positive and statistically significant at the 1% level: having a candidate run again for election is associated with a 7 to 8 percentage point increase in vote share. The party incumbency variable becomes insignificant and close to zero, implying that the persistence in the candidates themselves might be driving the party incumbency advantage.

The interaction between party incumbency and the repeat candidate variable is positive. This suggests that the effect of running again might be higher for incumbent than for challenger candidates by around 6 percentage points, although the variables are significant only at the 10% level in the last two columns. This implies a personal advantage of about 13 percentage points for an incumbent who runs again, and 7 percentage points for a challenger who runs again. These results confirm the importance of the candidates themselves in driving the party incumbency advantage.

Note that self-selection issues prevent us from interpreting this effect as a causal personal incumbency advantage. It is possible that only the most skilled candidates (either challengers or incumbents) choose to run for reelection, which would bias the estimates of the personal incumbency upwards.

5.4 Discussion

This section has shown the results for the party incumbency advantage. I find a positive effect of around 8 percentage points for the Left in the first round of 2014. This is close to results based on the congressional elections in United States (8 percentage points; see Lee, 2008), and higher than in French legislative elections (5 percentage points; see Ferlenga and Galasso, 2019).

I find no evidence of an effect for the Right or the 2008 election, suggesting that the presence of an incumbency advantage is highly dependent on the electoral context. This also confirms Eggers and Spirling's (2017) finding that the incumbency advantage interacts with partisan preferences, and differs across parties.

Note that these effects are much lower than the observed differences in means (see table 3 for summary statistics). A naive OLS regression would suggest a party incumbency advantage of 20 percentage points, for both the Left and the Right. The present analysis shows that it is important to account for unobservable characteristics to get unbiased estimates of the causal party incumbency advantage.

Finally, I have shown that the party incumbency advantage (when it exists) disappears when controlling for repeat candidates. This is in line with previous evidence based on Canadian parliamentary elections that a personal incumbency advantage drives the party incumbency advantage (Kendall and Rekkas, 2012).

6 Results: Female exposure effect

This section presents the results for the female exposure effect. First, I show the baseline results using different sets of controls, bandwidths, and polynomials. I find a positive female exposure effect of around 22 percentage points for my preferred specification. The results are statistically significant, with 95% confidence intervals ranging from a minimum lower bound of 7 to a maximum upper bound of 38 percentage points.

Secondly, I repeat the analysis with different outcome variables, and present placebo regressions which do not invalidate the RD design. Using final-round results, I show that the presence of a female incumbent increases the vote share of the top female candidate and her probability of victory. Next, I focus on the gender of lead candidates, and find that a female victory increases the number and proportion of female candidates. Results are significant for the proportion of female candidates, and imply an increase in the proportion of female candidates by 24 percentage points.

In the last subsection, I present a mechanism which could drive the female exposure effect: the personal incumbency advantage. When controlling for repeat candidates, I cannot reject the null hypothesis of no net female exposure effect. However, the point estimate for a net female exposure effect remains large and economically significant, although statistically insignificant. More research is needed to determine whether there exists a pure gender effect, beyond the personal advantage.

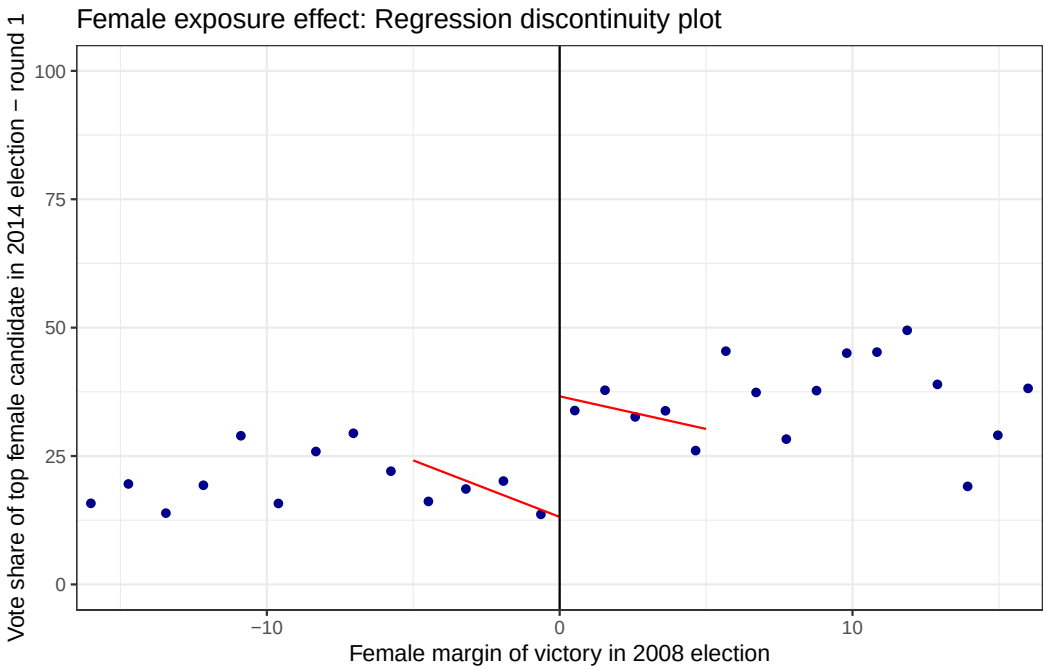
6.1 Baseline results

This subsection presents the baseline results for the female exposure effect. First, I show graphical evidence of a discontinuity in vote shares. Secondly, I estimate the baseline model using OLS, and find a female exposure effect of around 20 percentage points. Finally, I show that these results are robust to alternative specifications.

6.1.1 Graphical evidence

Figure 5 shows the key RD plot. It presents the relationship between female margin of victory in the 2008 election and female vote share in the first round of the 2014 election. The regression line is estimated using a linear regression on each side of the threshold, and a bandwidth of 5%. The figure shows that there is a discontinuity at the threshold, suggesting the existence of a female exposure effect of around 20 percentage points.

Figure 5: Female exposure effect - RD plot



Notes: Relationship between female margin of victory in the 2008 election and female vote share in the first round of the 2014 election. The regression line is estimated using a linear regression on each side of the threshold, with a bandwidth of 5%.

6.1.2 RD design with OLS estimation

I first estimate the RD design using OLS, by including margin of victory (as a running variable), a female incumbent dummy, and an interaction term. The female incumbent variable captures the causal female exposure effect. Results are shown in table 10.

The first column shows the baseline results, using a margin of victory of 5% as bandwidth. The female incumbent variable is positive and statistically significant. It suggests that if a woman is (barely) elected in the 2008 election, this increases the vote share of the top female candidate by 20.58 percentage points in the first round of the 2014 election.

The second column adds party-specific controls, which leaves the main coefficient of interest unchanged. The political nuance variable is statistically and economically significant for the "Other party" variable. However, note that in this subsample, only 2 candidates out of 89 do not belong to either the Left or the Right, which suggests that this effect might be driven by outliers.

Column 3 adds town controls, which are all statistically insignificant. Finally, to explore the effect of the political nuance variables, column 4 interacts them with the female incumbent dummy, and finds no statistically significant interaction effect. The female exposure effect is 21.70 and 19.19 percentage points respectively, in line with the

Table 10: Female exposure effect - Baseline results (vote share)

	(1)	(2)	(3)	(4)
Female incumbent	20.58***	19.67**	21.70**	19.19**
	(7.92)	(8.17)	(9.61)	(9.36)
Margin of victory (MOV)	−0.41	0.69	−0.31	−0.98
	(2.05)	(2.18)	(2.37)	(2.33)
Female's party victory in 2001		−6.47	−8.49	−8.26
		(6.78)	(8.97)	(7.86)
Female's party vote share in 2001		0.05	0.10	0.11
		(0.15)	(0.21)	(0.18)
Female's party in 2008: Right		6.15	9.55*	5.19
		(5.24)	(5.60)	(6.85)
Female's party in 2008: Other party		−23.29**	−26.83*	−20.26
		(11.64)	(14.20)	(13.82)
Female incumbent × MOV	−1.01	−2.12	−1.20	−0.19
	(2.79)	(2.95)	(3.38)	(3.17)
Female incumbent × Right				8.38
				(9.02)
Female incumbent × Other party				−12.31
				(13.23)
Constant	16.28***	16.96*	−8.81	−2.00
	(5.98)	(9.06)	(112.63)	(107.35)
Town controls	No	No	Yes	Yes
Bandwidth	5.00	5.00	5.00	5.00
Observations	89	89	89	89
R^2	0.15	0.21	0.30	0.31

Notes: The dependent variable is the female vote share in the first round of the 2014 election. The Left is the baseline party in columns 2, 3, and 4.
Town controls include: total population, employment, public sector employment, debt per capita, tax revenue per capita, mean income, Gini coefficient, unemployment benefits/total income, profits/total income, other income/total income. None of these variables are statistically significant at the 5% level in columns 4 and 5.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

previous results.

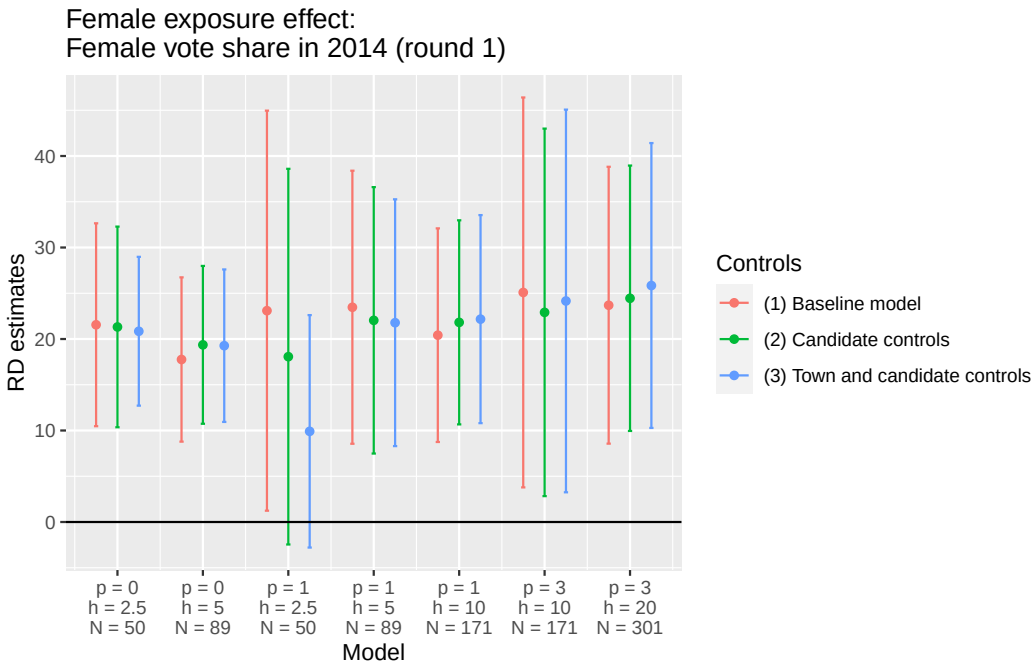
These results suggest that there is a female exposure effect of around 20 percentage points, which is robust to the inclusion of political party variables, town controls, and interaction terms. Given that the mean first-round vote share for female candidates in my sample is 37% (see table 4 for summary statistics), this effect amounts to a 54% increase in the female vote share, and is therefore highly economically significant. However, the results are not precisely estimated: the 95% confidence intervals range from a minimum

lower bound of 0.51 percentage points to a maximum upper bound of 40.86 percentage points.

6.1.3 Local polynomial regressions

Next, I use local polynomial regressions to estimate the female exposure effect. I use different polynomials, bandwidths, and controls, and plot the coefficients with their 95% confidence intervals in figure 6. Coefficients are positive for all specifications, with point estimates for the female exposure effect ranging from 9.91 to 25.85 percentage points. Results are also statistically significant for all except two specifications.

Figure 6: Female exposure effect - Local polynomial regressions (vote share)



Notes: RD coefficients for different specifications, along with their 95% confidence interval, using heteroscedasticity-robust standard errors. The dependent variable is the vote share for the top female candidate in the first round of the 2014 election. Regressions are estimated using local polynomial regressions of degree p and bandwidth h for N observations. The list of party and town controls can be found in the notes of table 10.

My preferred specifications are the local linear regressions with a bandwidth of 5%. Gelman and Imbens (2019) and Eggers et al. (2015) argue that local linear and quadratic regressions are more reliable than the Nadaraya-Watson estimator (with $p = 0$) and higher-order polynomials (with $p \geq 3$). Moreover, a bandwidth of 5% is large enough to allow for a reasonable sample size (89 observations), but small enough for towns on each side of the threshold to be comparable. These results suggest a female exposure effect of

around 22 percentage points. The point estimates are located between 21.78 and 23.47 percentage points, and the 95% confidence intervals range from 7.48 to 38.39 percentage points.

Finally, table A.3 in the appendix reports the results using the optimal bandwidth, for different sets of controls and polynomials. The point estimates are between 14.74 and 25.52 percentage points, and statistically significant at the 1% level.

These results reinforce the baseline finding of a positive and significant female exposure effect of around 20 percentage points.

6.2 Robustness checks

I check the robustness of these results to the use of alternative outcome variables, and use placebo regressions to test the validity of the RD design.

6.2.1 Alternative specifications

Excluding towns with no female candidates In the previous section, I treated towns with no female candidates as having a female vote share of 0%. In figure B.16 of the appendix, I repeat the analysis treating these as missing values and excluding them. Given that selection is not random, and that the preliminary evidence suggests that female candidates tend to do better in towns with a female incumbent, excluding municipalities with no female candidates is likely to lead to results that are biased downwards.

Although the point estimates are positive for all specifications but one, most estimates are statistically insignificant. The point estimates for my preferred specification (with $p = 1$ and $h = 5$) are situated between 5.58 and 15.12 percentage points. The coefficient is significant for the baseline model, but insignificant for the models with controls. The 95% confidence intervals range from a minimum lower bound of -5.82% to a maximum upper bound of 29.28%. This suggests that even in the absence of strategic exit, there would be a positive female exposure effect, although the statistical significance of the results is not robust across specifications.

Probability of victory Figure B.17 in the appendix shows the results for the probability that a woman is elected in the first round of the 2014 election. All coefficients except two are positive, although most are not statistically significant at the 5% level. Thus, we cannot reject the null hypothesis that having a female incumbent (as opposed to male) has no effect on the probability of victory of the top female candidate in the first round of municipal elections.

Final-round outcomes Figures B.18 and B.19 of the appendix show the female exposure effect for final-round vote share and probability of victory. Coefficients for all

specifications are positive, suggesting the existence of a positive female exposure effect. The effect is statistically significant for all except two specifications for the female vote share, with point estimates of 24 percentage points for my preferred specifications.

For the probability of election, the results are statistically significant for all except six specifications. The point estimates suggest that having a female incumbent increases the probability of victory of a female candidate by 23 to 42 percentage points, with an effect of 32 percentage points for my preferred specification.

Overall, the evidence is suggestive of a large and positive female exposure effect on final-round vote shares and probability of victory.

Number of female candidates Next, I look at the impact of having a female incumbent on the number of female candidates in the first round of the 2014 elections. Results are shown in figure B.20 in the appendix. All point estimates are positive, and most coefficients are statistically significant. The point estimates for my preferred specifications (with $p = 1$ and $h = 5$) range from 0.65 to 0.88. Coefficients are significant when including controls, but insignificant for the baseline model. These results suggest that having a female mayor increases the number of female candidates by around 0.8 women on average, although the statistical significance of these results is not robust.

Proportion of female candidates Finally, I look at the impact of a female victory on the proportion of female candidates in the first round of the 2014 elections. Figure B.21 in the appendix shows the results. All point estimates are positive, and most specifications are statistically significant. The point estimates for my preferred specifications range from 0.23 to 0.25, and are statistically significant. The 95% confidence intervals suggest that a female victory increases the proportion of female candidates by 6 to 41 percentage points.

6.2.2 Placebo regressions

To check the validity of the RD approach, I test for an "effect" of having a female top candidate in 2014 on the 2008 female vote share. I use the margin of victory in the first round of 2014 as a running variable, and replicate the same approach as in the main analysis, but inverting the election years. Table 11 present the results for these placebo regressions. The coefficient for the "effect" of having a female top candidate in 2014 is statistically insignificant in all specifications used. This finding is robust to the inclusion of party and town controls. All control variables except from population are statistically insignificant.

Figure B.23 in the appendix shows the RD plot, which shows no jump in the outcome variable at the threshold. Finally, figure B.24 in the appendix repeats the analysis for different bandwidths and polynomials. All coefficients are statistically insignificant. These

Table 11: Female exposure effect - Placebo regressions (vote share)

	(1)	(2)	(3)
First rank in 2014	0.14	3.14	7.17
	(9.07)	(9.27)	(9.62)
Margin of victory in 2014 (MOV)	−1.81	−1.77	−3.68
	(2.51)	(2.65)	(2.80)
First rank in 2014 × MOV in 2014	0.93	0.32	3.54
	(3.48)	(3.56)	(4.05)
Total population (thousands)			0.15**
			(0.07)
Constant	21.04***	26.44***	131.93
	(6.79)	(8.06)	(91.10)
Party controls	No	Yes	Yes
Town controls	No	No	Yes
Bandwidth	5.00	5.00	5.00
Observations	117	117	117
R^2	0.03	0.08	0.25

Notes: "Effect" of having a female top candidate in the first round of the 2014 election on female vote share in the 2008 election. The list of control variables can be found in table 10. All controls except from population (which is included in the table) are statistically insignificant.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

results therefore do not reject the validity of the RD design for studying the female exposure effect.

6.3 Mechanism: Personal incumbency advantage

In this subsection, I explore the role of a personal incumbency advantage in driving the female exposure effect. I conduct the analysis for first-round vote shares and the proportion of female candidates.

6.3.1 Personal incumbency advantage in first-round vote shares

Table 12 presents the results of a regression of vote share in 2014 on a repeat candidate dummy variable and other covariates. Note that these results cannot be interpreted causally, as candidates select themselves into running for reelection based on unobservable characteristics.

The first column presents the baseline RD result, and the second column adds a repeat candidate variable and an interaction term. The repeat candidate dummy is positive and

Table 12: Female exposure effect - Personal incumbency advantage (vote share)

	(1)	(2)	(3)	(4)
Female incumbent	20.58***	18.14**	14.09	15.28
	(7.92)	(8.79)	(9.81)	(11.21)
Margin of victory (MOV)	−0.41	−0.89	−0.38	−0.59
	(2.05)	(1.51)	(1.71)	(2.04)
Repeat candidate		31.74***	31.12***	30.75***
		(3.37)	(3.61)	(4.83)
Female incumbent × MOV	−1.01	0.18	0.13	−0.09
	(2.79)	(2.41)	(2.53)	(3.15)
Female incumbent × Repeat candidate		−11.02	−10.11	−11.13
		(6.80)	(7.09)	(8.66)
Constant	16.28***	4.97	3.55	−5.73
	(5.98)	(4.76)	(9.09)	(84.15)
Party controls	No	No	Yes	Yes
Town controls	No	No	No	Yes
Bandwidth	5.00	5.00	5.00	5.00
Observations	89	89	89	89
R^2	0.15	0.49	0.51	0.54

Notes: The dependent variable is the female vote share in the first round of the 2014 election. The list of party and town controls can be found in table 10. All controls are statistically insignificant.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

statistically significant: if the female candidate in 2014 is the same as in 2008, her vote share is 31.74 percentage points higher, all other things being equal. Moreover, the female incumbent dummy is no longer significant at the 5% level, suggesting that the female exposure effect might be driven by female candidates running again.

The interaction between the female incumbent and the repeat candidate variables is negative (although insignificant), which seems surprising at first. One could expect that female incumbents who run for reelection would be more likely to be elected than female challengers who run again, as in the case for the party incumbency advantage. However, the negative sign suggests that the opposite phenomenon is happening. This could be explained by self-selection. Female challengers are unlikely to run again after losing an election: those who do run are therefore likely to differ in their unobservable characteristics. Thus, the negative sign for female incumbents that are repeat candidates can be explained by the self-selection of skilled challengers, and cannot interpreted causally.

Column 3 adds party controls, and the column 4 town controls. The coefficients of interest remain broadly unchanged. The repeat candidate dummy stays around 31 per-

centage points, and significant at the 1% level. Although the female incumbency variable is insignificant, the point estimates remain large even when controlling for repeat candidates, ranging from 14 to 15 percentage points in the last two columns. Thus, although I cannot reject the null hypothesis of no net female exposure effect when controlling for repeat candidates, more research is needed to confirm whether the female exposure effect is driven solely by a personal incumbency advantage.

6.3.2 Personal incumbency advantage and proportion of female candidates

Next, I repeat the analysis using the proportion of female head candidates in the first round of the 2014 election as the outcome variable. Table A.6 in the appendix presents the results.

The baseline model controls for the gender of the incumbent, the female margin of victory, and an interaction term. The coefficient on the female incumbent variable is positive and statistically significant at the 5% level, indicating that a female victory in 2008 leads to a 18 percentage point increase in the proportion of female candidates in 2014.

Column 2 adds the proportion of female candidates in 2008 as a control. The coefficient on this variable is small (0.01) and insignificant. Moreover, although the point estimate for the female incumbent variable does not change, it is now only significant at the 10% level.

Next, I include a repeat candidate variable, and different party and town controls. The coefficient on the repeat candidate variable is 0.29 or 0.30, and statistically significant at the 1% level. This suggests that repeat candidates increase the proportion of female candidates by 30 percentage points, although this effect cannot be causally interpreted.

Controlling for repeat candidates makes the coefficient on the female incumbent variable statistically insignificant. Thus, I cannot reject the hypothesis that a personal incumbency advantage drives the female exposure effect in the proportion of female candidates. However, the point estimates remain positive, suggesting that there could still be a net gender effect beyond the personal incumbency advantage. Further research is needed to confirm the presence of a net causal female exposure effect.

6.4 Discussion

This section has presented evidence of a positive female exposure effect on first-round vote shares: a female victory increases the vote share of the top female candidate by around 22 percentage points in the first round of the subsequent election, and the result is statistically significant. This is comparable to the naive OLS estimates: a simple comparison in means shows that having a female incumbent is associated with a 18 percentage point gain in female vote shares, on average. This suggests that, contrary to the evidence on the party

incumbency advantage, unobservable characteristics do not seem to be driving the benefit for candidates of the same gender as the incumbent.

The economic significance of an impact of 22 percentage points is substantial, as this represents a 54% increase in vote share for female candidates. Although large, I believe that this estimate is credible when considering the role of strategic exit. Female candidates are less likely to run in towns where a woman lost in 2008, compared to towns where a woman won: 12% of towns with a female incumbent have no female candidate in 2014, compared to 46% for towns with a female challenger. This means that, by construction, 46% of towns with a female challenger have a female vote share of 0% in 2014, driving down the average female vote share for these municipalities. Thus, strategic exit of female candidates in municipalities where a woman lost in 2008 can partially explain the large magnitude of the female exposure effect found on vote shares.

Looking at the gender of candidates, a female victory in 2008 increases both the number and proportion of female candidates in 2014. Results are statistically significant for the proportion of women, and imply an effect of 24 percentage points on average.

Moreover, I cannot reject the hypothesis that a large personal incumbency advantage drives the female exposure effect. Female repeat candidates enjoy a 31 percentage point gain for challengers, and a 20 percentage point gain for incumbents. When controlling for repeat candidates, the female incumbency variable remains positive and large (although statistically insignificant). Qualitatively similar results hold for the proportion of female candidates: contrary to Bhalotra, Clots-Figueras and Iyer (2017), I find no evidence that the election of a woman leads to a decrease in the entry of new female candidates. Further research is needed to confirm the presence of a net causal female exposure effect.

One possible way to disentangle the personal incumbency advantage from a pure gender effect could be to use countries with term limits as a natural experiment. In municipalities where the incumbent is allowed to run again, the coefficient on the female incumbent variable would capture both the personal incumbency advantage and the pure female exposure effect, as in the present analysis. However, for towns in which the incumbent candidate has reached the term limit, the coefficient would capture only a pure female exposure effect. The difference between these two coefficients could give an estimate of the personal incumbency advantage.

My results can be reconciled with Lippmann's (2019) finding that female candidates are less likely to be elected after a female incumbent. Lippmann (2019) focuses on female incumbent mayors who were not reelected as councillors in small municipalities (and therefore could not run for office again). In small towns, voters can choose individual candidates rather than full lists. Thus, an incumbent has to lose to many other individual candidates to fail to be reelected as a councillor, which suggests that these female mayors were relatively unskilled or unpopular. In contrast, my design focuses on the top two lists in large municipalities. Barely losing to a male candidate and coming in second place is

already quite an achievement, which signals that these female candidates are relatively skilled. Thus, it is possible that there is a negative female exposure effect following an unsuccessful female mayor, but a positive exposure effect following a relatively successful one.

Previous studies tend to suggest that the negative female exposure effect experienced by women in Lippmann's (2019) study is driven by a lack of female candidates. It is possible that an unsuccessful mayor decreases the number of female candidates, whereas a successful one might lead to an increase. My analysis shows that a female victory significantly increases the proportion of female candidates, and the coefficient remains positive when controlling for repeat candidates (even though it becomes insignificant). Similarly, Ladam, Harden and Windett (2018) have found that high-profile women exert substantively large positive effects on the number of female candidates. Beaman et al. (2009) also show that prior exposure to a female leader is associated with higher electoral success for women. Overall, these results go against evidence from mayoral elections in the United States (Ferreira and Gyourko, 2014) and Brazil (Brollo and Troiano, 2016), which find no female exposure effect, or even a negative effect.

An unsuccessful mayor might discourage women from running for office, by reminding potential candidates that politics is male-dominated. Fox and Lawless (2011) show that despite comparable credentials, backgrounds, and experiences, women are significantly less likely to perceive themselves as qualified to seek office. This differential in perceptions is strengthened when reminding women of the negative stereotype against them. Indeed, Pruysers and Blais (2017) find that female students who are exposed to negative stereotypes about women in politics express a significantly lower level of political ambition than those in a non-threat condition. Thus, it seems possible that unsuccessful female politicians discourage other women from becoming candidates, whereas successful role models might inspire more women to run.

7 Conclusion

This thesis has analysed the party incumbency advantage and female exposure effect in recent French municipal elections. First, I find some evidence of a party incumbency advantage in vote shares for the Left, in the first round of the 2014 election. This effect amounts to an 8 percentage point increase in vote shares, and is statistically significant. I do not find evidence of an effect for other elections, political parties, and outcome variables. This suggests that the electoral context is a key determinant in the relationship between party incumbency status and electoral outcomes.

Secondly, I find a positive and large female exposure effect: a female victory increases the vote share of the top female candidate in the next election by about 22 percentage points. There is also a positive effect on probability of victory, final-round outcomes,

proportion and number of female candidates, with statistically significant results for final-round outcomes and the proportion of female candidates.

Finally, I show that the female exposure effect and the party incumbency advantage (when it exists) seem to be driven by a personal incumbency advantage. When controlling for repeat candidates, the party incumbency advantage disappears, and the female exposure effect becomes statistically insignificant. The point estimate for the female exposure effect remains economically important, suggesting that a female mayor increases the vote share of other female candidates by about 15 percentage points. Qualitatively similar results hold for the proportion of female candidates. Thus, further research is needed to confirm the presence of a pure gender effect beyond the personal incumbency advantage.

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Appendix

A Appendix tables

A.1 Incumbency advantage

Table A.1: Incumbency advantage - Results using optimal bandwidth (vote share)

	(1)	(2)	(3)	(4)
Incumbent party	5.03***	4.89***	4.90***	3.91
	(1.75)	(1.73)	(1.70)	(2.57)
Party controls	No	Yes	Yes	Yes
Town controls	No	No	Yes	Yes
Degree of local polynomial	1	1	1	3
Bandwidth size	23.48	23.49	22.84	31.14
Observations	1024	1024	995	1286

Notes: The dependent variable is the vote share of the Left in the first round of the 2014 election. The running variable is the margin of victory in 2008 (defined as the difference in the vote share of the Left and the vote share of the Right). Results are estimated using local polynomial regressions. The optimal bandwidth is computed according to the selection procedure by Calonico, Cattaneo and Titiunik (2014). The party and town controls are the same as in table 7.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table A.2: Difference in municipality characteristics based on party (MOV $\leq 5\%$)

	Mayor: Left	Mayor: Right	Difference	Standard error	P-value	Bandwidth	N
Female candidate	0.16	0.17	0.01	0.05	0.892	5.00	275
Electoral roll	12,009.22	10,826.27	-1,182.95	2,208.45	0.593	5.00	275
Total population	19,811.36	17,317.43	-2,493.93	4,022.01	0.536	5.00	275
Number of employed	7,865.34	6,693.14	-1,172.20	1,640.95	0.476	5.00	275
Number of women employed	3,736.89	3,189.37	-547.52	780.54	0.484	5.00	275
Public sector employment	2,976.33	2,510.03	-466.30	602.23	0.440	5.00	275
Number of women in public sector	2,884.29	2,450.12	-434.16	583.84	0.458	5.00	275
Number of men in public sector	3,068.38	2,569.95	-498.43	621.33	0.423	5.00	275
Number of wage earners	7,147.67	6,027.01	-1,120.66	1,486.46	0.452	5.00	275
Debt per capita	969.63	1,131.77	162.14*	90.29	0.074	5.00	275
Tax revenue per capita	423.90	437.65	13.75	24.89	0.581	5.00	275
Number of fiscal households	8,103.08	7,232.67	-870.42	1,713.31	0.612	5.00	275
First-quartile income	17,065.49	17,030.32	-35.17	500.72	0.944	5.00	275
Median income	27,326.01	27,398.59	72.59	821.62	0.930	5.00	275
Third-quartile income	41,451.17	41,864.87	413.70	1,118.98	0.712	5.00	275
Interquartile range for income	24,385.69	24,834.56	448.87	675.82	0.507	5.00	275
Mean income	32,914.33	33,284.89	370.56	918.07	0.687	5.00	275
Gini coefficient	0.38	0.38	0.00	0.00	0.329	5.00	275
Taxed households (perc)	61.55	62.27	0.72	1.17	0.541	5.00	275
Wages/total income (perc)	62.96	62.46	-0.50	1.00	0.621	5.00	275
Unemployment benefits/total income (perc)	2.96	2.86	-0.10	0.09	0.279	5.00	275
Pensions/total income (perc)	25.80	26.04	0.23	0.77	0.764	5.00	275
Profits/total income (perc)	5.95	6.01	0.06	0.26	0.832	5.00	275
Other income/total income (perc)	5.28	5.49	0.21	0.26	0.426	5.00	275

Notes: Results of t-tests looking at the difference in pre-treatment town characteristics for municipalities in which the Left party won against the Right party (and vice versa) by a margin of victory between -5% and 5%.
*** p<0.01, ** p<0.05, * p<0.10.

A.2 Female exposure effect

Table A.3: Female exposure effect - Results using optimal bandwidth (vote share)

	(1)	(2)	(3)	(4)
Female incumbent	14.74***	17.50***	17.49***	25.52***
	(4.58)	(4.54)	(4.59)	(7.16)
Party controls	No	Yes	Yes	Yes
Town controls	No	No	Yes	Yes
Degree of local polynomial	1	1	1	3
Bandwidth size	21.48	20.44	20.45	26.83
Observations	323	305	305	396

Notes: The dependent variable is the vote share of the top female candidate in the first round of the 2014 election. The running variable is the margin of victory in 2008 (defined as the difference in the vote share of the top female candidate and the vote share of the top male candidate). Results are estimated using local polynomial regressions. The optimal bandwidth is computed according to the selection procedure by Calonico, Cattaneo and Titiunik (2014). The party and town controls are the same as in table 10.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table A.4: Difference in municipality characteristics for female and male mayors (MOV $\leq$ 20%)

	Mayor: F	Mayor: M	Difference	Standard error	P-value	Bandwidth	N
Left candidate	0.56	0.49	-0.07	0.06	0.237	20.00	301
Right candidate	0.41	0.47	0.06	0.06	0.278	20.00	301
Electoral roll	8,355.96	9,958.26	1,602.29	1,524.75	0.294	20.00	301
Total population	13,245.00	15,832.41	2,587.41	2,779.94	0.353	20.00	301
Number of employed	5,315.62	6,250.61	934.99	1,092.19	0.393	20.00	301
Number of women employed	2,516.10	2,999.53	483.44	531.85	0.364	20.00	301
Public sector employment	2,030.06	2,376.81	346.75	402.93	0.390	20.00	301
Number of women in public sector	1,960.49	2,324.45	363.96	402.10	0.366	20.00	301
Number of men in public sector	2,099.63	2,429.17	329.54	404.32	0.416	20.00	301
Number of wage earners	4,808.03	5,655.19	847.16	989.15	0.392	20.00	301
Debt per capita	901.00	953.85	52.86	69.23	0.446	20.00	301
Tax revenue per capita	445.36	438.22	-7.14	26.67	0.789	20.00	301
Number of fiscal households	5,405.34	6,485.38	1,080.03	1,157.56	0.352	20.00	301
First-quartile income	18,259.32	17,798.55	-460.78	588.65	0.434	20.00	301
Median income	29,355.69	28,797.61	-558.08	978.61	0.569	20.00	301
Third-quartile income	44,105.84	43,816.82	-289.02	1,422.87	0.839	20.00	301
Interquartile range for income	25,846.51	26,018.27	171.76	897.59	0.848	20.00	301
Mean income	34,989.67	34,756.13	-233.54	1,192.32	0.845	20.00	301
Gini coefficient	0.37	0.38	0.01**	0.00	0.024	20.00	301
Taxed households (perc)	63.68	62.81	-0.86	1.25	0.490	20.00	301
Wages/total income (perc)	64.31	63.78	-0.54	0.98	0.587	20.00	301
Unemployment benefits/total income (perc)	2.97	2.81	-0.16*	0.09	0.061	20.00	301
Pensions/total income (perc)	24.80	25.11	0.31	0.75	0.682	20.00	301
Profits/total income (perc)	5.58	5.90	0.32	0.26	0.214	20.00	301
Other income/total income (perc)	5.31	5.21	-0.10	0.27	0.719	20.00	301

Notes: Results of t-tests looking at the difference in pre-treatment town characteristics for male and female mayors. The tests are computed for the subsample of (close) mixed-gender races, with a female margin of victory between -20% and 20%.
*** p<0.01, ** p<0.05, * p<0.10.

Table A.5: Female exposure effect - Towns with female margin of victory between −1% and +1%

Département	Town name	Female winner	MOV	Female party	Female vote share	Male party	Winning party in 2001	Winner's vote share in 2001
64	Pau	1	0.95	Left	39.76	Centre	Left	56.67
69	Vernaison	1	0.94	Right	50.47	Left	Right	52.29
34	Marsillargues	1	0.80	Left	50.40	Left	Other	60.68
82	Montauban	1	0.62	Right	50.31	Left	Right	51.41
64	Urrugne	1	0.60	Right	50.30	Left	Right	68.58
91	Longjumeau	1	0.48	Right	47.27	Left	Right	50.45
90	Offemont	1	0.42	Left	50.21	Right	Left	58.85
77	Dammartin-en-Goële	1	0.38	Left	50.19	Right	Left	53.87
76	Eu	1	0.34	Left	45.82	Right	Right	53.31
44	Saint-Lyphard	1	0.29	Right	36.16	Left		
83	Rians	1	0.21	Right	45.10	Right	Right	52.86
58	Clamecy	1	0.18	Left	37.62	Left	Left	100.00
13	Cassis	1	0.12	Right	45.47	Right	Right	100.00
44	Saint-Philbert-de-Grand-Lieu	1	0.06	Left	50.03	Right	Right	69.84
11	Trèbes	0	-0.06	Left	49.97	Right	Right	55.41
24	Trélissac	0	-0.14	Other	49.93	Left	Left	52.93
55	Saint-Mihiel	0	-0.30	Left	49.85	Right	Right	45.50
26	Romans-sur-Isère	0	-0.49	Right	41.58	Left	Left	44.54
78	Villepreux	0	-0.66	Left	49.67	Right	Left	57.77
34	Saint-Jean-de-Védas	0	-0.68	Right	49.66	Left	Left	39.65

Notes: Characteristics of towns with a female margin of victory (MOV) between −1% and +1%.

Table A.6: Female exposure effect - Personal incumbency advantage (proportion of female candidates)

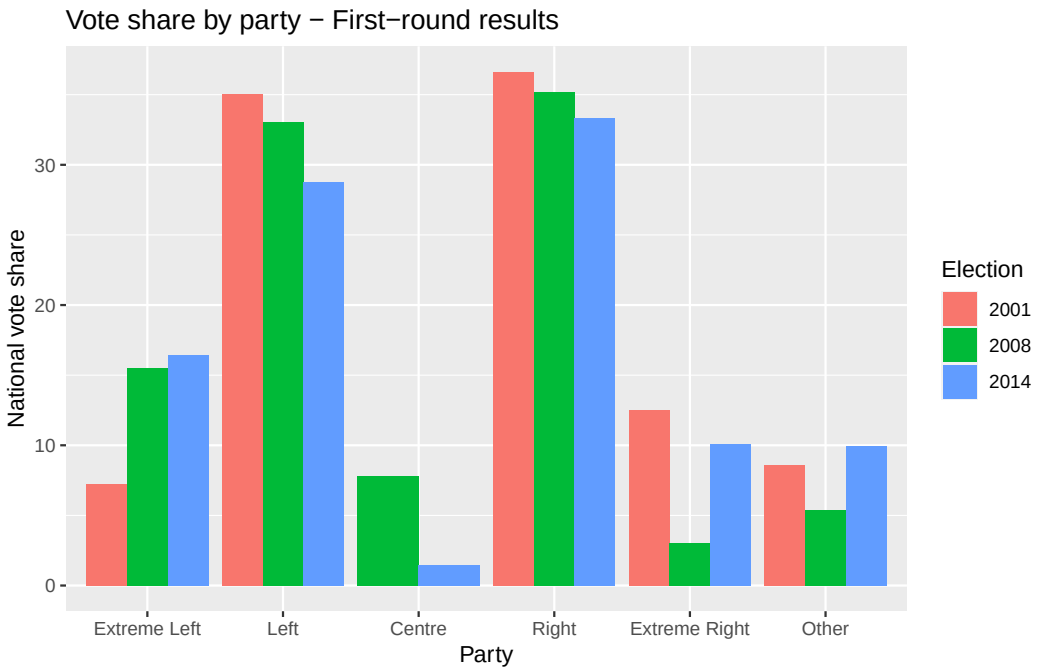
	(1)	(2)	(3)	(4)	(5)
Female incumbent	0.18**	0.18*	0.14	0.15	0.15
	(0.09)	(0.09)	(0.09)	(0.11)	(0.13)
Margin of victory (MOV)	−0.00	−0.00	−0.01	−0.01	−0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)
Proportion of female candidates in 2008		0.01	0.15	0.12	0.18
		(0.25)	(0.20)	(0.21)	(0.27)
Repeat candidate			0.30***	0.30***	0.29***
			(0.06)	(0.06)	(0.07)
Female's party victory in 2001				−0.00	−0.06
				(0.07)	(0.08)
Female's party vote share in 2001				0.00	0.00
				(0.00)	(0.00)
Female's party in 2008: Right				−0.07	−0.02
				(0.05)	(0.05)
Female's party in 2008: Other party				−0.20	−0.16
				(0.13)	(0.18)
Female incumbent × MOV	−0.01	−0.01	0.00	−0.00	0.01
	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)
Female incumbent × Repeat candidate			−0.07	−0.08	−0.07
			(0.08)	(0.09)	(0.09)
Constant	0.20***	0.20	0.02	0.07	0.03
	(0.07)	(0.14)	(0.12)	(0.14)	(1.01)
Party controls	No	No	No	Yes	Yes
Town controls	No	No	No	No	Yes
Bandwidth	5.00	5.00	5.00	5.00	5.00
Observations	89	89	89	89	89
R^2	0.11	0.11	0.40	0.43	0.49

Notes: The dependent variable is the proportion of female candidates in the first round of the 2014 election, for mixed-gender elections in 2008. The list of party and town controls can be found in table 10. All controls are statistically insignificant at the 5% level. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

B Appendix figures

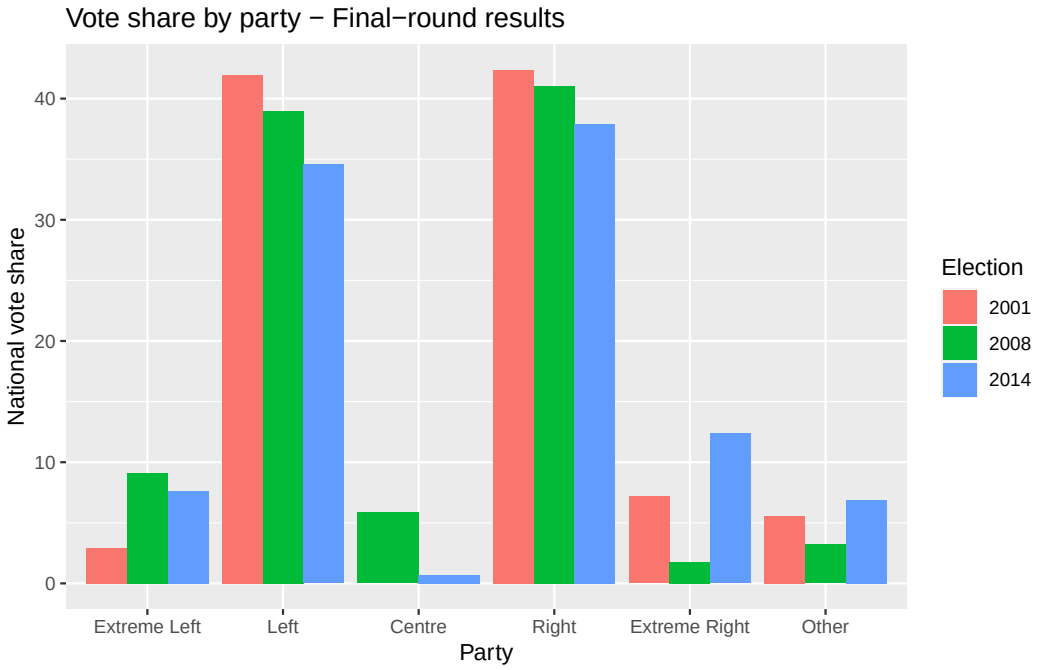
B.1 Descriptive statistics

Figure B.1: Vote share by party - First-round results



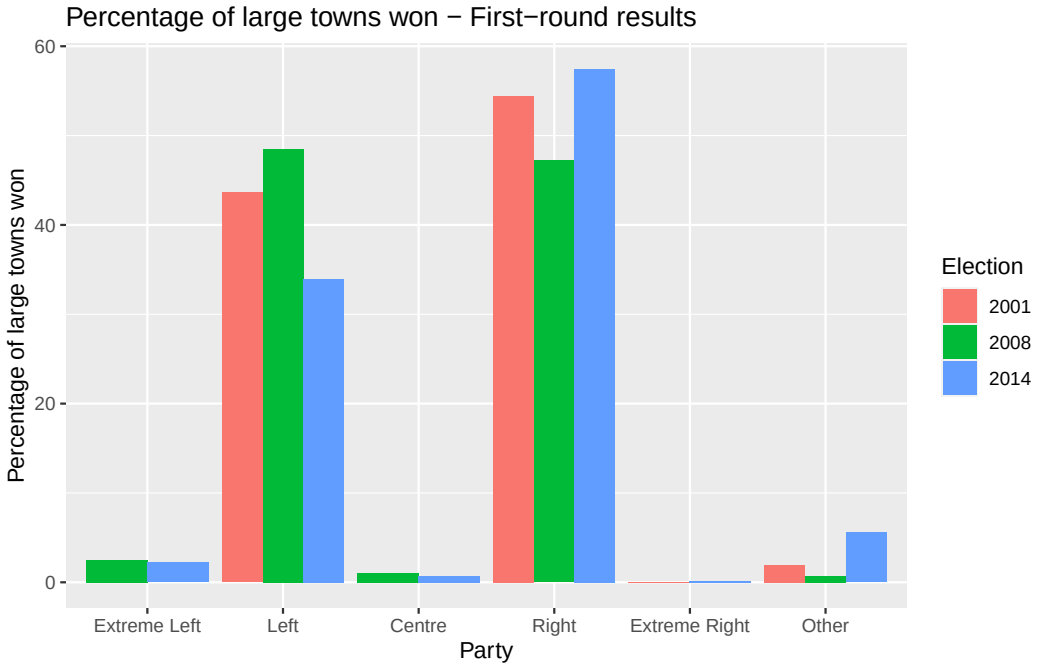
Notes: National vote shares by party for the first round of the 2001, 2008, and 2014 municipal elections. Note that the vote share for the Centre is zero in 2001, as a political nuance for *divers* did not exist.

Figure B.2: Vote share by party - Final-round results



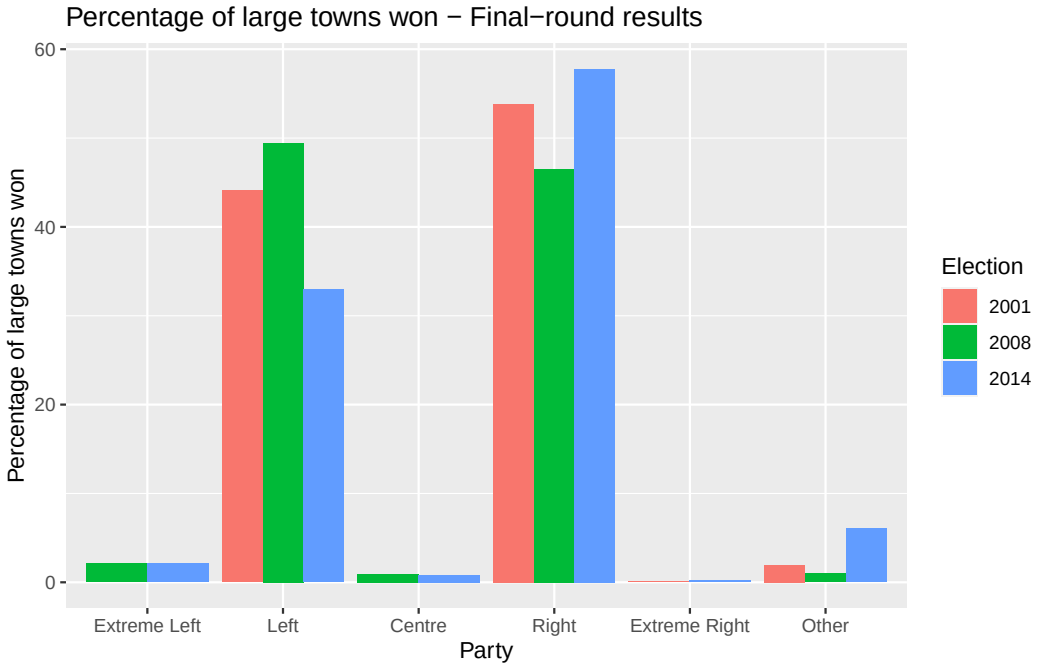
Notes: National vote shares by party for the final round of the 2001, 2008, and 2014 municipal elections. Note that the vote share for the Centre is zero in 2001, as a political nuance for *divers* did not exist.

Figure B.3: Percentage of large towns won - First-round results



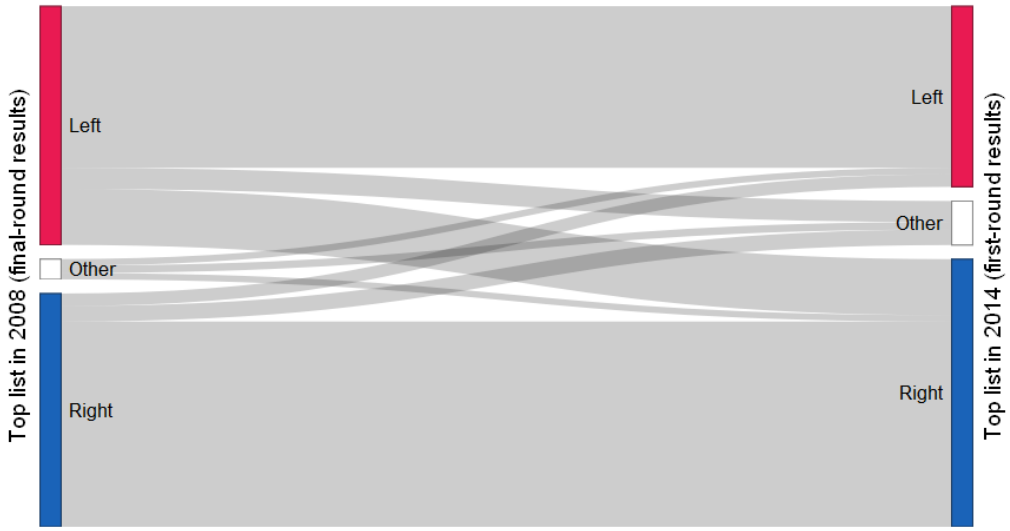
Notes: Percentage of large towns in which each party won in the first round the 2001, 2008, and 2014 municipal elections. Note that the vote share for the Centre is zero in 2001, as a political nuance for *divers* did not exist.

Figure B.4: Percentage of large towns won - Final-round results



Notes: Percentage of large towns in which each party won in the final round the 2001, 2008, and 2014 municipal elections. Note that the vote share for the Centre is zero in 2001, as a political nuance for *divers* did not exist.

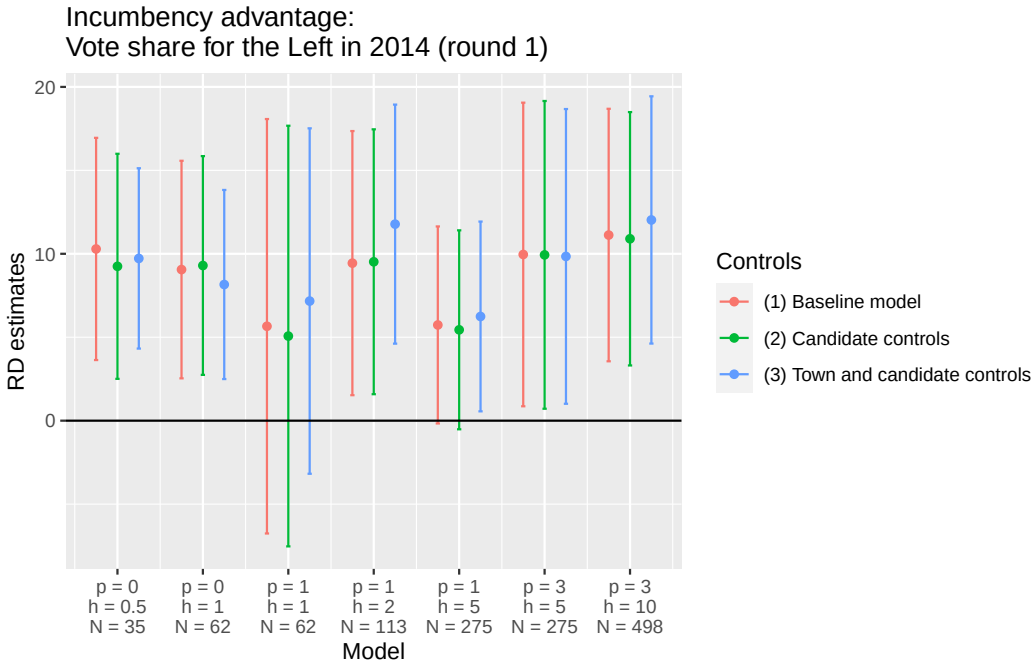
Figure B.5: Top lists in the 2008 and 2014 elections



Notes: Top lists in the final round of the 2008 election and the first round of the 2014 election. The width of the links is proportional to the the number of municipalities in which each list came first. Lists are divided into three groups based on their political nuance: Left, Right, or Other.

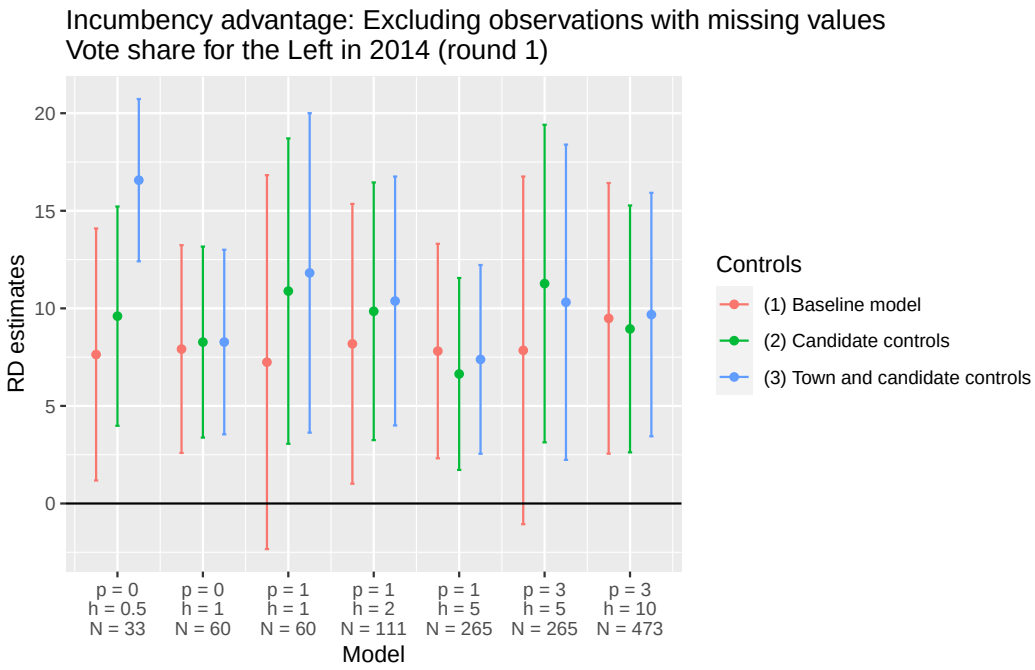
B.2 Incumbency advantage

Figure B.6: Incumbency advantage - Results using a uniform kernel (vote share)



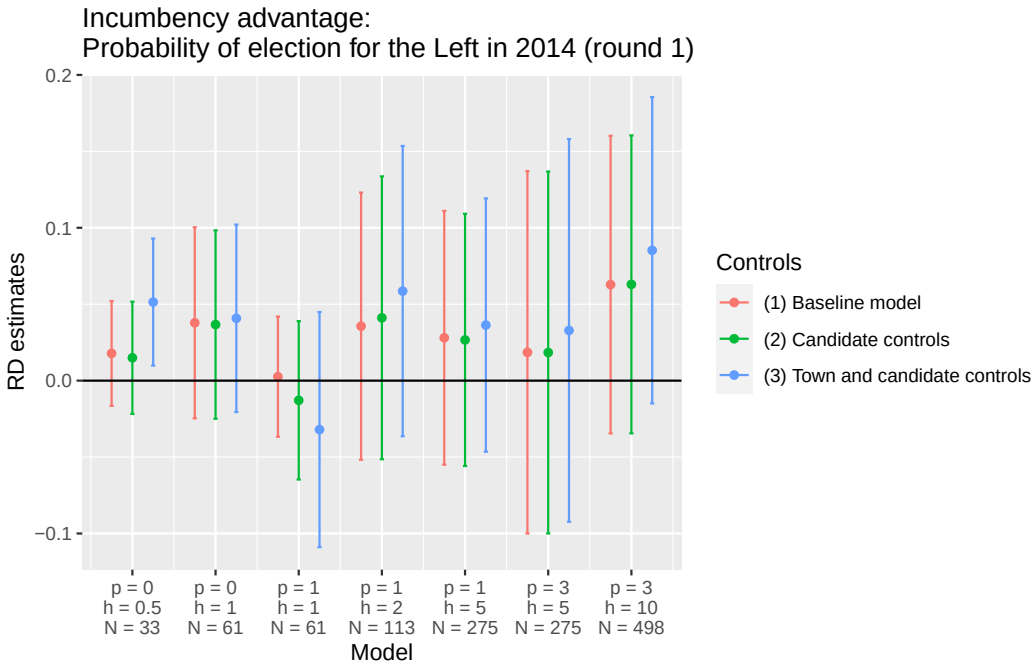
Notes: RD coefficients for different specifications, along with their 95% confidence interval, using heteroscedasticity-robust standard errors. The dependent variable is the vote share for the Left in the first round of the 2014 election. The regressions are estimated using local polynomial regressions of degree p and bandwidth h for N observations. The list of party and town controls can be found in the notes of table 7. The local polynomial regressions are estimated using a uniform kernel.

Figure B.7: Incumbency advantage - Results excluding towns with no candidates



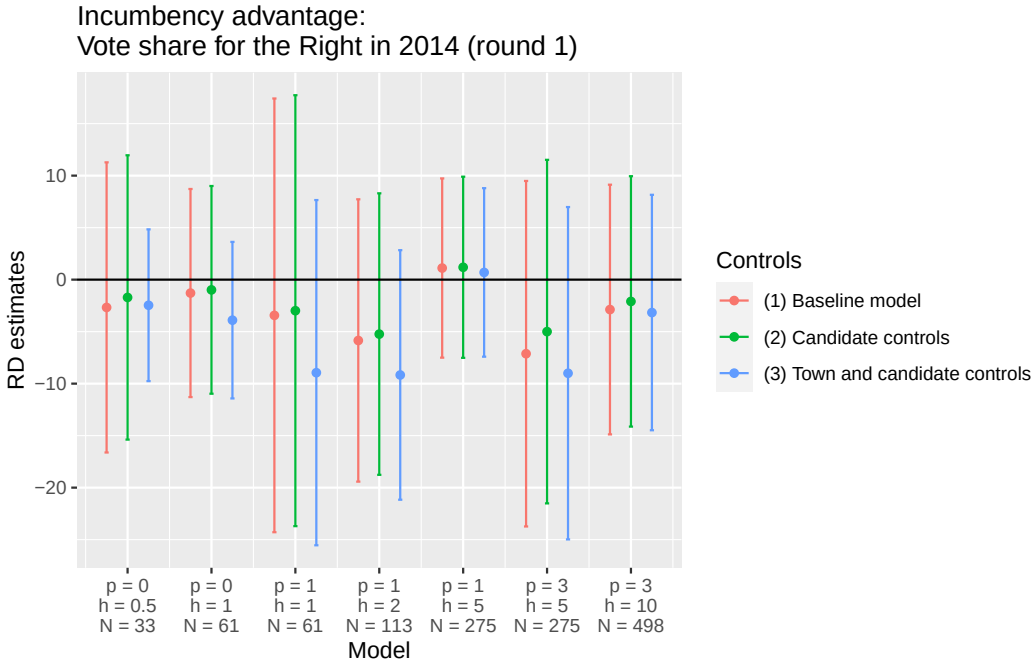
Notes: RD coefficients for different specifications, along with their 95% confidence interval, using heteroscedasticity-robust standard errors. The dependent variable is the vote share for the Left in the first round of the 2014 election. The regressions are estimated using local polynomial regressions of degree p and bandwidth h for N observations. The list of party and town controls can be found in the notes of table 7. Towns with no Left candidates in 2014 are excluded from the analysis.

Figure B.8: Incumbency advantage - Probability of election for the Left in 2014



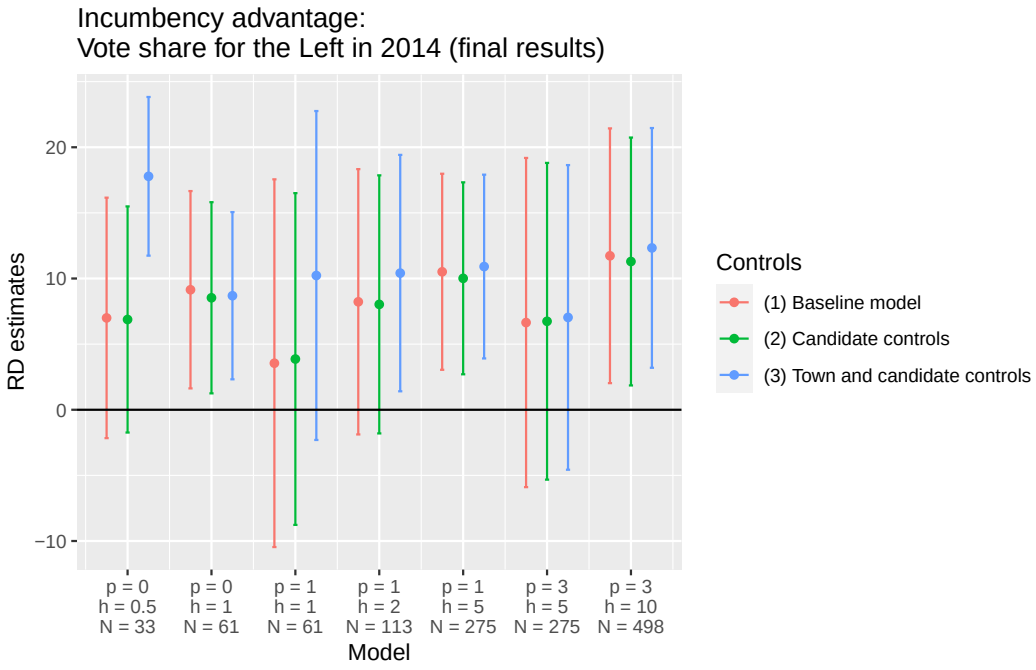
Notes: RD coefficients for different specifications, along with their 95% confidence interval, using heteroscedasticity-robust standard errors. The dependent variable is a dummy variable which equals one if the Left is elected in the first round of the 2014 election, and zero otherwise. The regressions are estimated using local polynomial regressions of degree p and bandwidth h for N observations. The list of party and town controls can be found in the notes of table 7.

Figure B.9: Incumbency advantage - Vote share for the Right in 2014



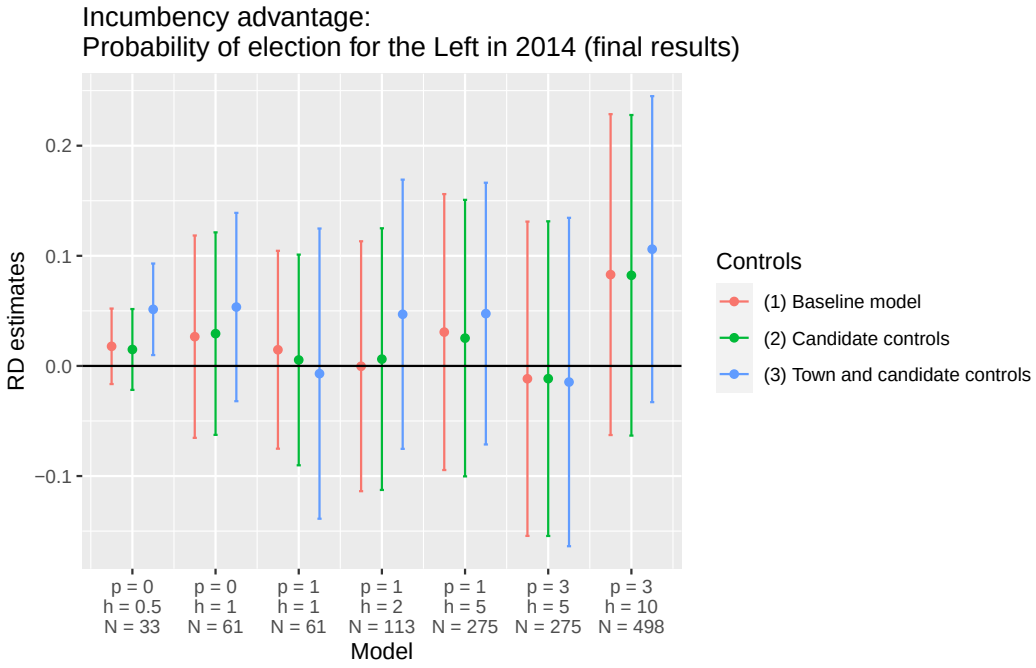
Notes: RD coefficients for different specifications, along with their 95% confidence interval, using heteroscedasticity-robust standard errors. The dependent variable is the vote share for the Right in the first round of the 2014 election. The regressions are estimated using local polynomial regressions of degree p and bandwidth h for N observations. The list of party and town controls can be found in the notes of table 7.

Figure B.10: Incumbency advantage - Final-round results for the Left in 2014 (vote share)



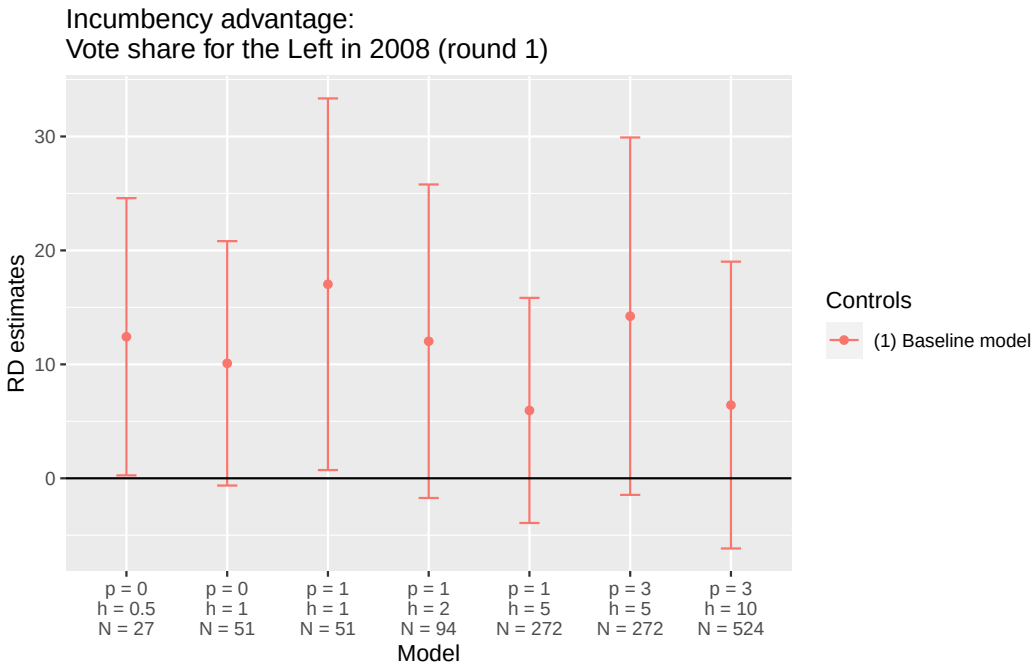
Notes: RD coefficients for different specifications, along with their 95% confidence interval, using heteroscedasticity-robust standard errors. The dependent variable is the vote share for the Left in the final round of the 2014 election. The regressions are estimated using local polynomial regressions of degree p and bandwidth h for N observations. The list of party and town controls can be found in the notes of table 7.

Figure B.11: Incumbency advantage - Final-round results for the Left in 2014 (probability of election)



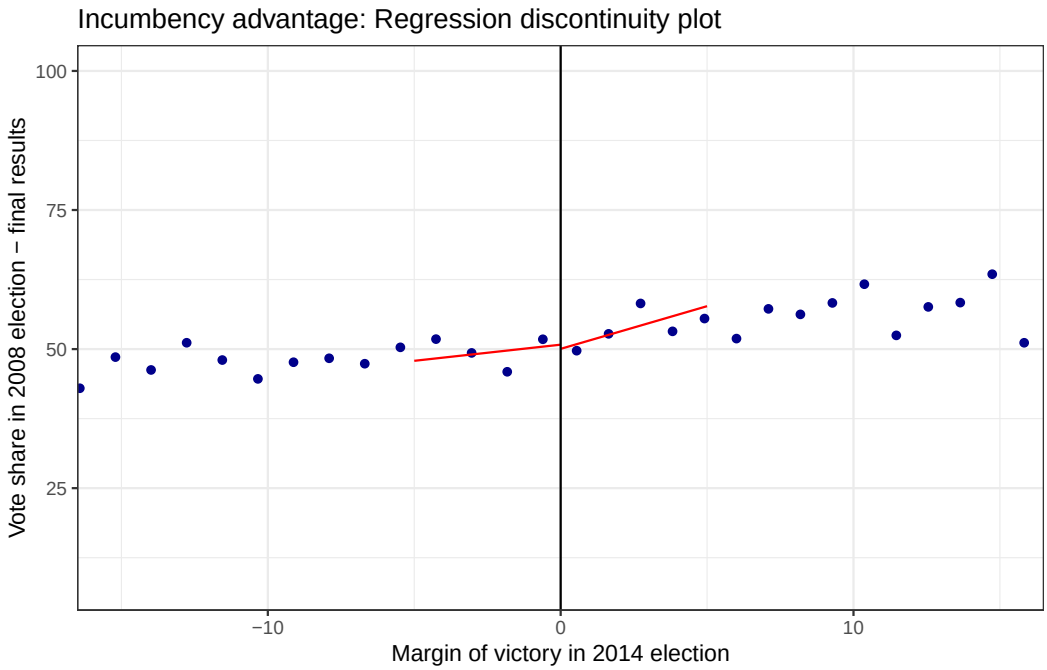
Notes: RD coefficients for different specifications, along with their 95% confidence interval, using heteroscedasticity-robust standard errors. The dependent variable is a dummy variable which equals one if the Left is elected in the 2014 election, and zero otherwise. The regressions are estimated using local polynomial regressions of degree p and bandwidth h for N observations. The list of party and town controls can be found in the notes of table 7.

Figure B.12: Incumbency advantage - Vote share for the Left in 2008



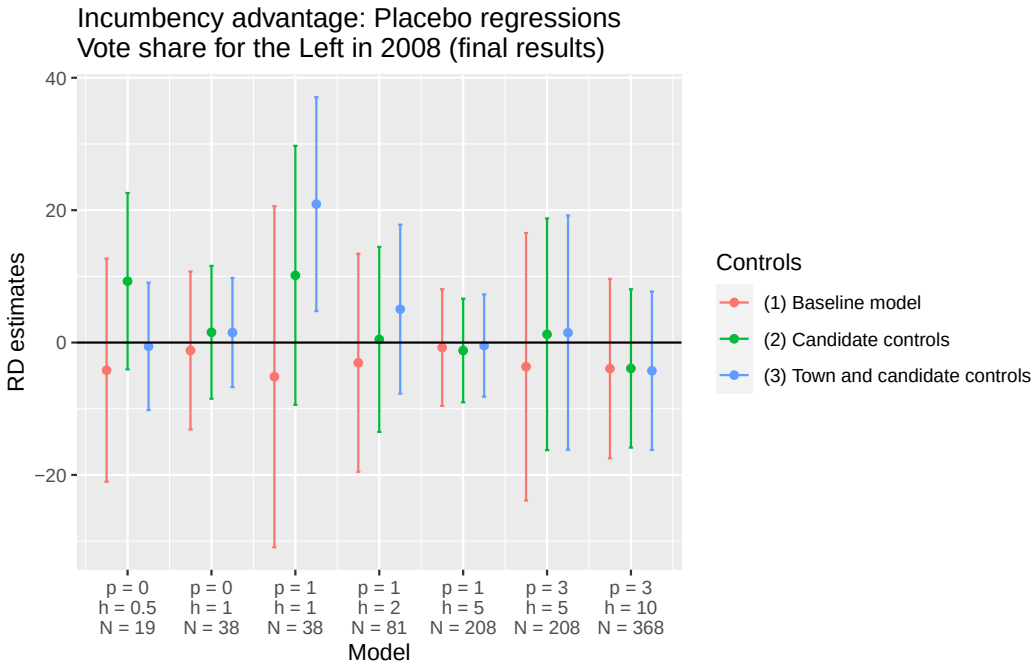
Notes: RD coefficients for different specifications, along with their 95% confidence interval, using heteroscedasticity-robust standard errors. The dependent variable is the vote share for the Left in the first round of the 2008 election. The regressions are estimated using local polynomial regressions of degree p and bandwidth h for N observations.

Figure B.13: Incumbency advantage - Placebo regression: RD plot



Notes: Relationship between margin of victory in the first round of the 2014 election and vote share in 2008 for the Left. The regression line is estimated using a linear regression on each side of the threshold and a bandwidth of 5%.

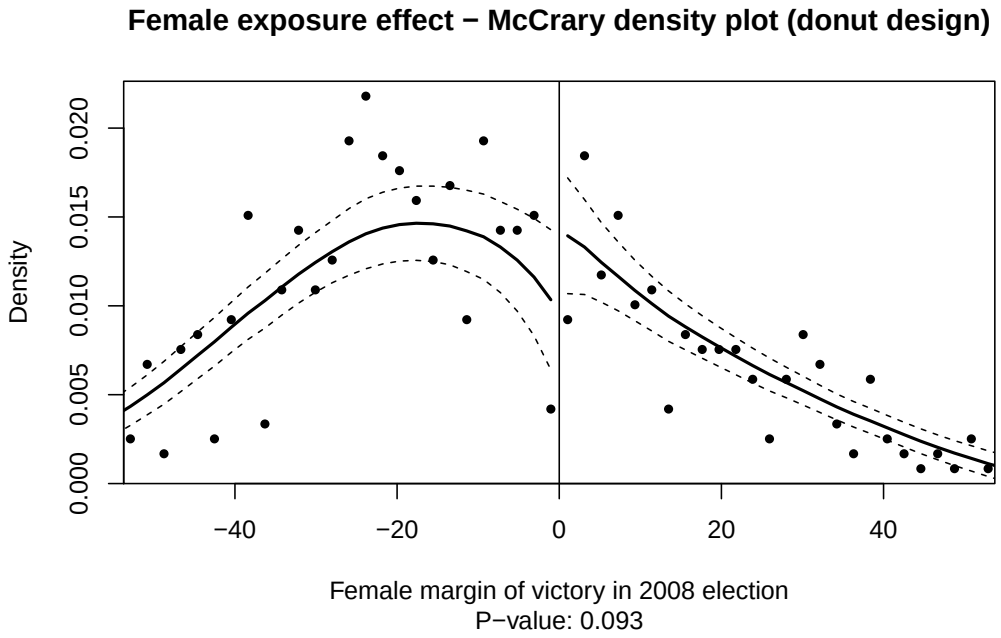
Figure B.14: Incumbency advantage - Placebo regressions (vote share)



Notes: "Effect" of the Left ranking first in the first round of the 2014 election on the vote share in the 2008 election. The regressions are estimated using local polynomial regressions of degree p and bandwidth h for N observations. The list of party and town controls can be found in the notes of table 7.

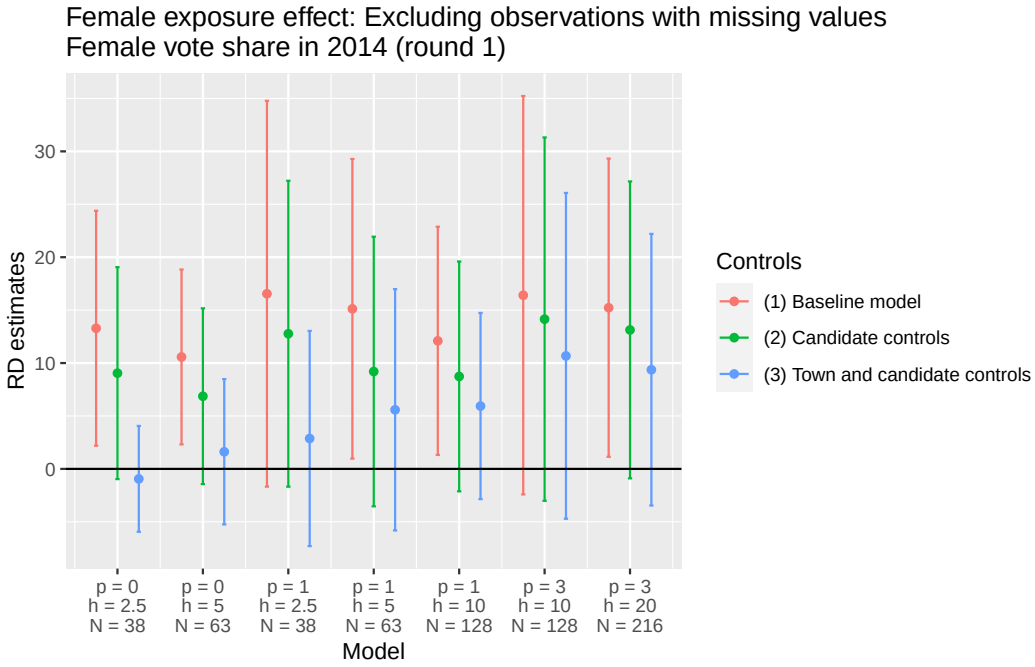
B.3 Female exposure effect

Figure B.15: Female exposure effect - McCrary density plot (donut design)



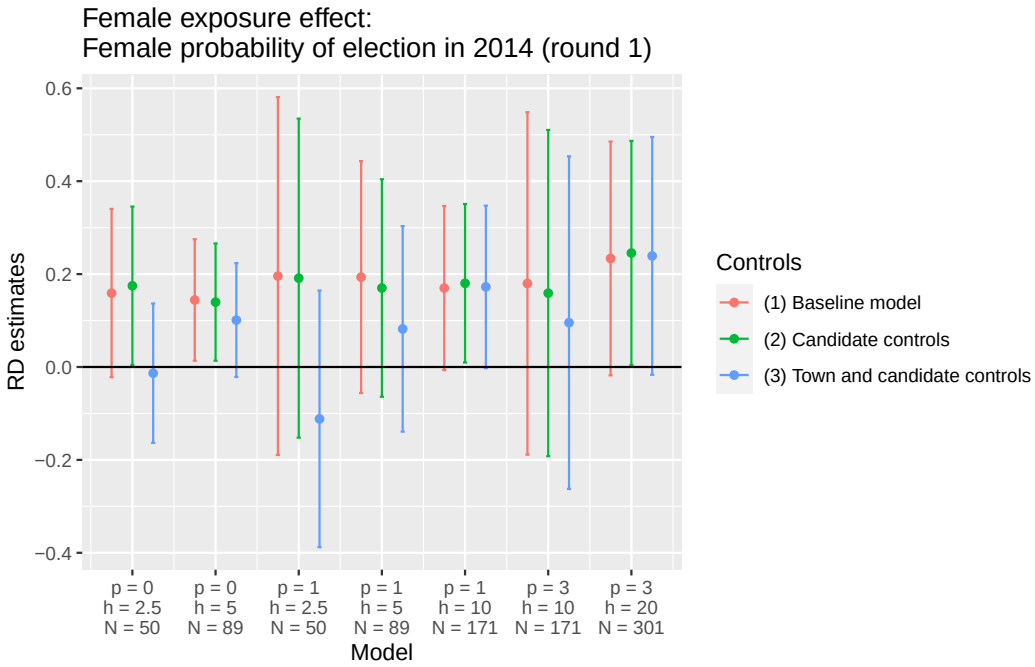
Notes: McCrary (2008) density plot for the female margin of victory, for the sample of mixed-gender elections, excluding elections with a margin of victory between -1% and 1%.

Figure B.16: Female exposure effect - Results excluding towns with no candidates



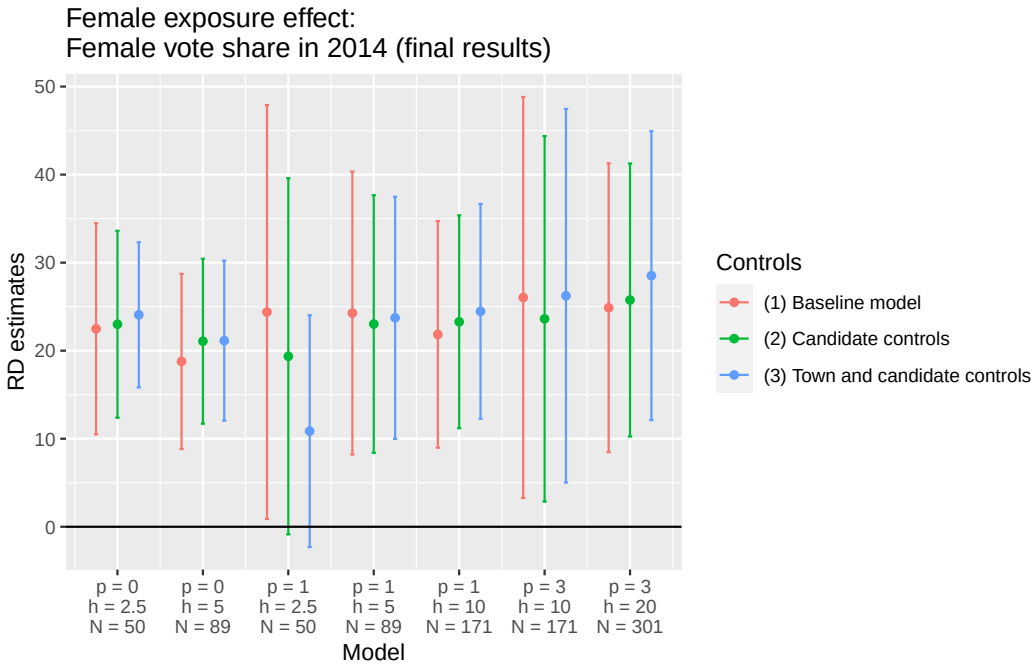
Notes: RD coefficients for different specifications, along with their 95% confidence interval, using heteroscedasticity-robust standard errors. The dependent variable is the vote share for the top female candidate in the first round of the 2014 election. The regressions are estimated using local polynomial regressions of degree p and bandwidth h for N observations. The list of party and town controls can be found in the notes of table 10. Towns with no female candidates in 2014 are excluded from the analysis.

Figure B.17: Female exposure effect - Probability of election



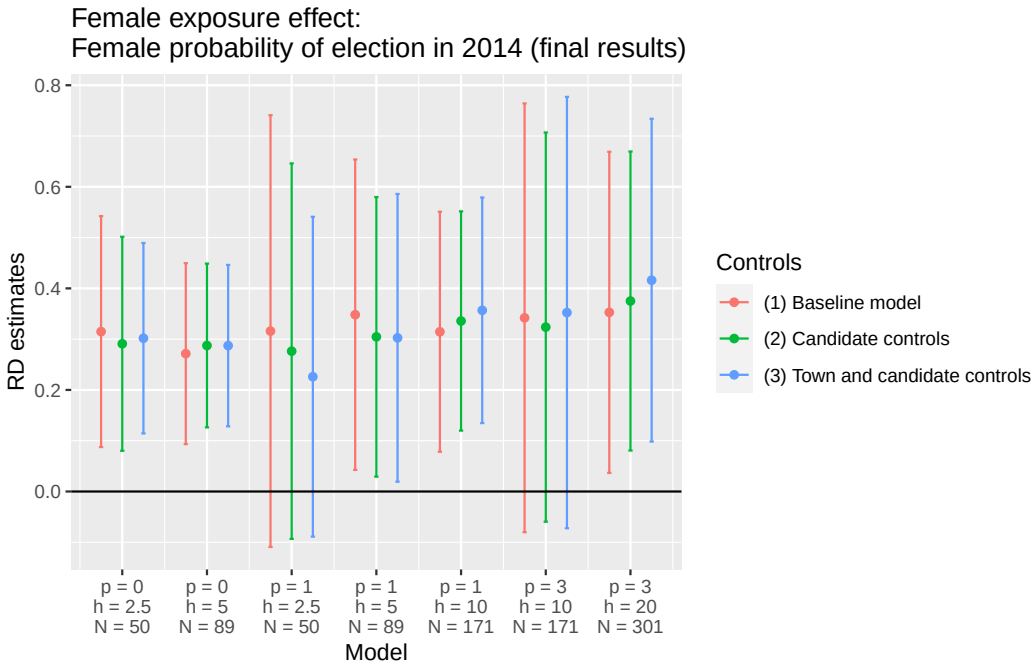
Notes: RD coefficients for different specifications, along with their 95% confidence interval, using heteroscedasticity-robust standard errors. The dependent variable is a dummy variable which equals one if the top female candidate is elected in the first round of the 2014 election, and zero otherwise. The regressions are estimated using local polynomial regressions of degree p and bandwidth h for N observations. The list of party and town controls can be found in the notes of table 10.

Figure B.18: Female exposure effect - Final-round results (vote share)



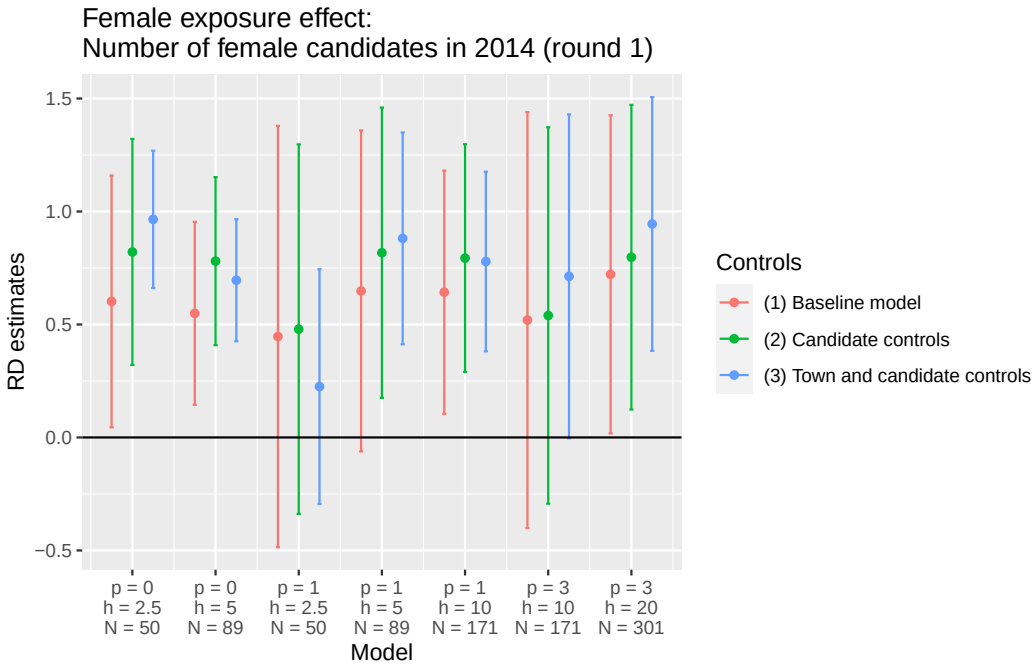
Notes: RD coefficients for different specifications, along with their 95% confidence interval, using heteroscedasticity-robust standard errors. The dependent variable is the vote share for the top female candidate in the final round of the 2014 election. The regressions are estimated using local polynomial regressions of degree p and bandwidth h for N observations. The list of party and town controls can be found in the notes of table 10.

Figure B.19: Female exposure effect - Final-round results (probability of victory)



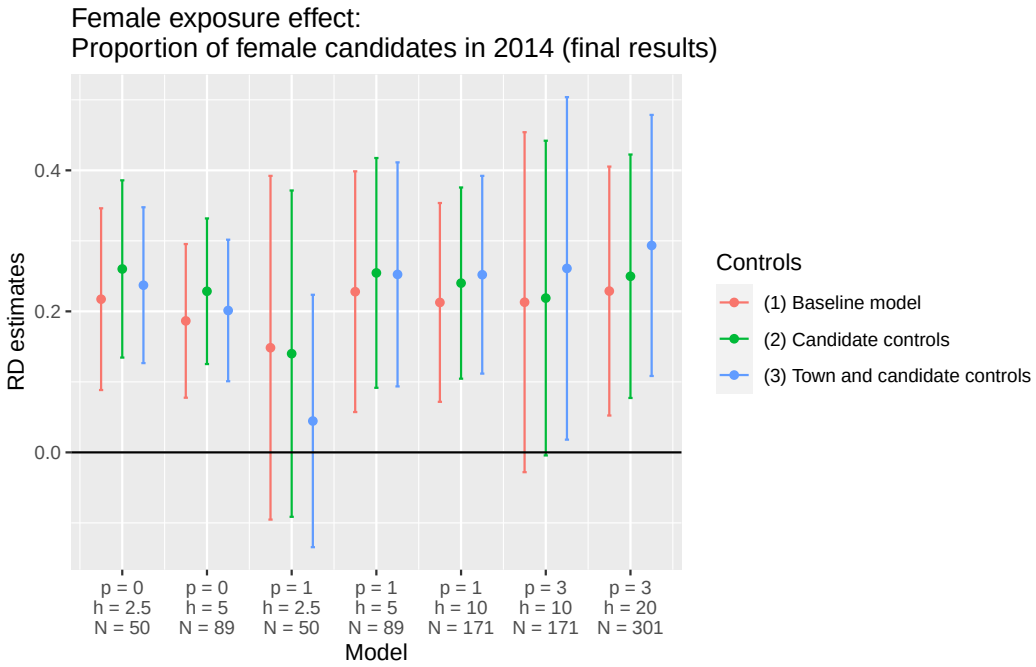
Notes: RD coefficients for different specifications, along with their 95% confidence interval, using heteroscedasticity-robust standard errors. The dependent variable is a dummy variable which equals one if a woman is elected in the 2014 election, and zero otherwise. The regressions are estimated using local polynomial regressions of degree p and bandwidth h for N observations. The list of party and town controls can be found in the notes of table 10.

Figure B.20: Female exposure effect - Number of female candidates in 2014



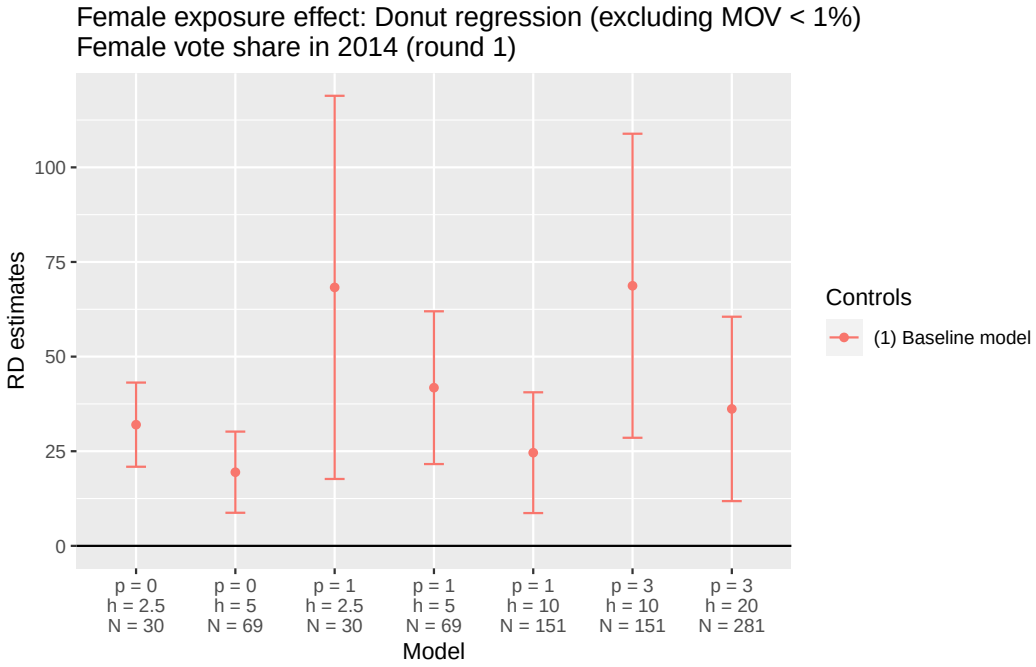
Notes: RD coefficients for different specifications, along with their 95% confidence interval, using heteroscedasticity-robust standard errors. The dependent variable is the number of lists with a female lead candidate in the first round of the 2014 election. The regressions are estimated using local polynomial regressions of degree p and bandwidth h for N observations. The list of party and town controls can be found in the notes of table 10.

Figure B.21: Female exposure effect - Proportion of female candidates in 2014



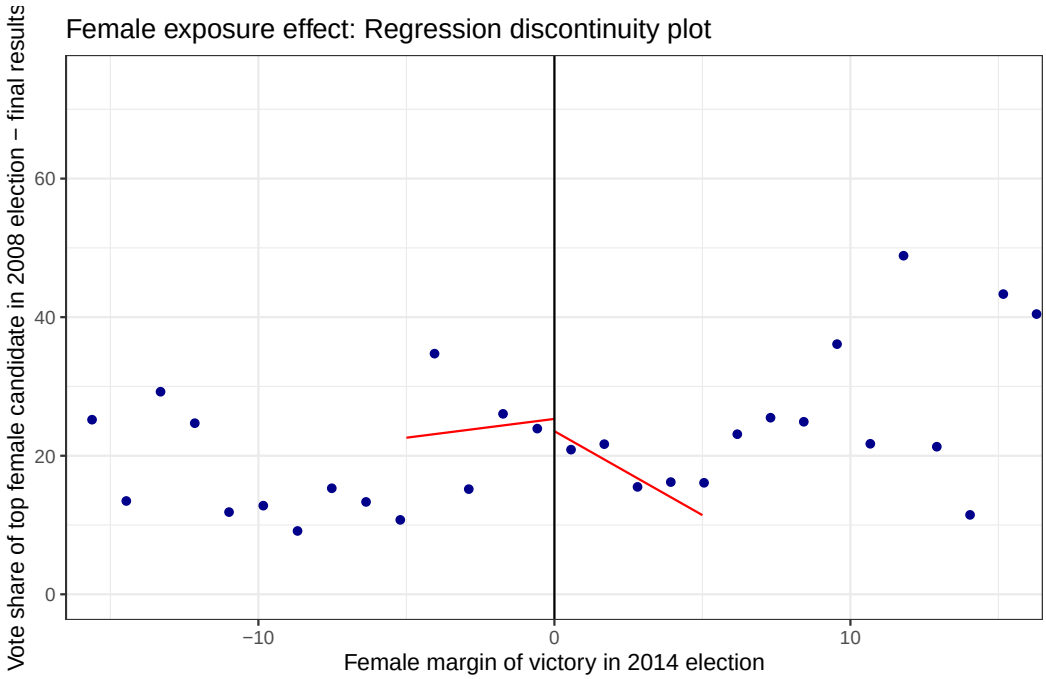
Notes: RD coefficients for different specifications, along with their 95% confidence interval, using heteroscedasticity-robust standard errors. The dependent variable is the proportion of lists with a female lead candidate in the first round of the 2014 election. The regressions are estimated using local polynomial regressions of degree p and bandwidth h for N observations. The list of party and town controls can be found in the notes of table 10.

Figure B.22: Female exposure effect - Donut RD design (vote share)



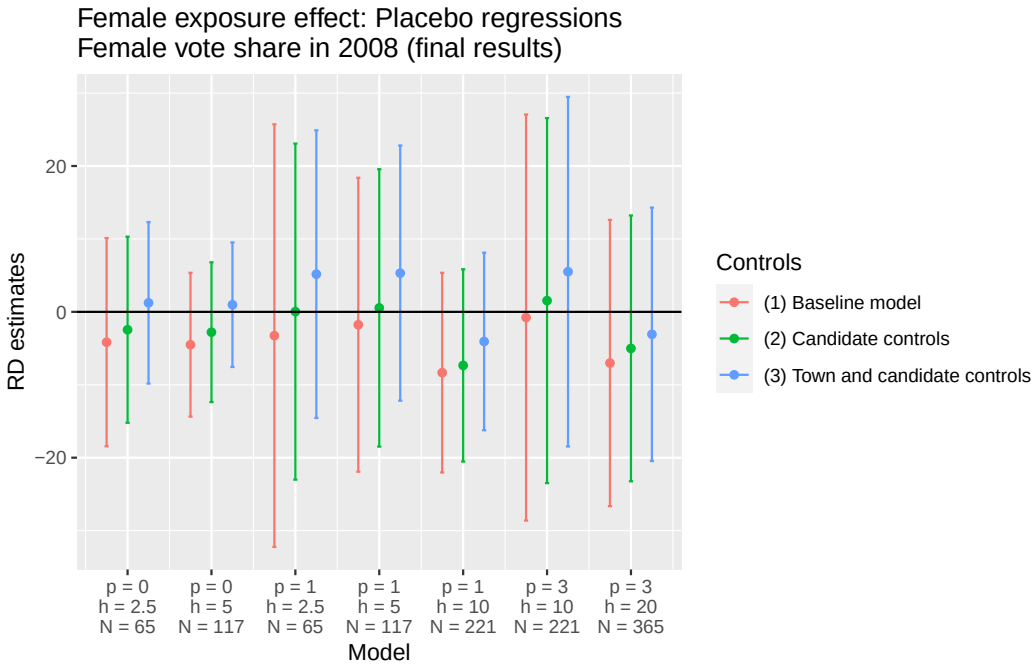
Notes: RD coefficients for different specifications, along with their 95% confidence interval, using heteroscedasticity-robust standard errors. The dependent variable is the vote share for the top female candidate in the first round of the 2014 election. Regressions are estimated using local polynomial regressions of degree p and bandwidth h for N observations. Observations with a margin of victory between -1% and 1% are excluded from the sample.

Figure B.23: Female exposure effect - Placebo regression: RD plot



Notes: Relationship between female margin of victory in the first round of the 2014 election and female vote share in 2008. The regression line is estimated using a linear regression on each side of the threshold and a bandwidth of 5%.

Figure B.24: Female exposure effect - Placebo regressions (vote share)



Notes: RD coefficients for different specifications, along with their 95% confidence interval, using heteroscedasticity-robust standard errors. "Effect" of a woman ranking first in the first round of the 2014 election on the top female's vote share in the 2008 election. The regressions are estimated using local polynomial regressions of degree p and bandwidth h for N observations. The list of party and town controls can be found in the notes of table 10.