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ORIGINAL ARTICLE

Primary elections and electoral outcomes: evidence from the Spanish Socialist Party

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Abstract

Using a regression discontinuity design and primary elections to select Spanish Socialist Party (PSOE) mayoral candidates as a case study, this paper investigates the causal link between primary elections and electoral outcomes. The results suggest that selecting the PSOE's mayoral candidate through primary elections has no effect on the percentage of votes and total votes received by the PSOE's candidate in local elections, the probability of gaining the mayorship and the local government's stability. On the other hand, the results suggest that PSOE's primary elections result in increased votes for competing political parties to the right of the PSOE and in reduced votes for competing parties to the left of the PSOE.

JEL Classification D7 · D72

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1 Introduction

In recent decades, the use of primary elections that are open to militants within political parties to select candidates for office has become increasingly popular across the Western world. However, little is known about the effect of these elections: Do they improve the electoral outcomes for the political parties that select their candidates in that manner? Do they affect the electoral outcomes of competing political parties?

The effect of selecting a party's candidate through primary elections that are open to party militants is theoretically ambiguous. On the one hand, a political party's potential voters might consider primaries a more transparent and direct mechanism to select the candidates running for office and become more engaged with the political process (Detterbeck 2013). Additionally, primaries might reveal more reliable estimates of the ability to win of the candidate (Serra 2011; Adams and Merrill III 2008). On the other hand, in contexts where candidates are chosen only by party militants and the militants have different political preferences than those of potential voters, the candidates who emerge from primary elections might not maximize the number of votes that the political party would have received in the absence of a primary election. Furthermore, more polarized candidates may also increase the votes of political parties which are at the opposite front of the political spectrum (Aranson and Ordeshook 1972; Coleman 1972; Owen and Grofman 2006). Therefore, the total effect of primaries on electoral outcomes boils down to an empirical question about whether one of the two effects dominates the other.

This study investigates the causal link between holding primary elections and electoral outcomes by leveraging a natural experiment in Spain. The Spanish Socialist Party (PSOE) introduced primary elections in the late 1990s for the selection of candidates for office at the local, regional and national levels. Since 2014, PSOE candidates for mayor in local elections have been selected through primary elections only in municipalities that had more than 20,000 inhabitants and more than one internal candidate and where the previous mayor was not a PSOE mayor running for reelection. In the remaining municipalities, PSOE candidates have been selected through the local PSOE committee. In practical terms, the probability of selecting PSOE candidates through primary elections was increased for municipalities just above 20,000 inhabitants relative to municipalities just below that threshold. We exploit this fact using a regression discontinuity design (RDD) to assess the causal relationship between primary elections and electoral outcomes. The organizations of primaries in the rest of the political parties analyzed do not follow this population threshold rule.

Our results reveal that the PSOE electoral outcomes that were examined—the share of votes received by the PSOE in the local elections, the total number of votes received by PSOE, the probability that a candidate wins the mayorship, and the probability that the term ends prematurely—are unaffected by primary elections. On the other hand, we find evidence suggesting that PSOE primary elections increase the vote counts for parties to the right of the PSOE while decreasing the vote counts for parties to the left of the PSOE. The latter result is consistent with the hypothesis that primary elections could have increased the vote counts for the PSOE among potential voters who leaned left politically while decreasing the number of PSOE votes among potential voters who leaned toward the centre right, with a net effect on votes equal to 0. These results

should nonetheless be extrapolated with caution since they are local average treatment effects and there might be an effect of primaries in national elections or in larger municipalities.

Our results speak to the theoretical and empirical literature that examine the link between primary elections, the polarization of candidates and electoral outcomes. Theoretical studies have modelled the interaction between party leaders, candidates, and voters to predict the circumstances under which parties would run primaries (Serra 2011) and the results from holding them (Adams and Merrill III 2008). Serra (2011) assumes that voters are interested in the policies and the quality of the candidate, *valence*. Then, he compares the cost-benefit analysis that parties consider when organizing primaries compared to letting party leaders elect them. He considers two benefits for parties to implement primary elections. The first, broadening the pool of candidates to new, fresh contenders that party leaders did not consider. Secondly, by running in the primaries, the candidates will have the opportunity to show their campaigning skills. On the other hand, parties face some costs by having candidates differ from the party leaders' preferences. Thus, the trade-off that parties face is between a high-skill candidate with a less preferred policy platform. He concludes that candidates selected by primaries have higher skills than those selected by party leaders. Similarly, Adams and Merrill III (2008) predict that organizing primary elections will increase the likelihood of the party winning the elections, especially when they are the weaker party.

Furthermore, our results contribute to the existing empirical literature in the topic (Ramiro 2016; Astudillo and Detterbeck 2018; Sandri and Venturino 2016; Rogowski and Langella 2015; Carey and Polga-Hecimovich 2006; Cintolesi 2019; Sides et al. 2018). Most of the studies focus on the USA. One exception is the study by (Carey and Polga-Hecimovich 2006). The latter study uses data from 90 elections in 18 countries in Latin America and finds that primaries tend to produce stronger candidates that receive a higher share of votes in the general presidential elections. Most of the studies in the USA have looked at the effect of primaries on polarization. Using the senator elections from one state, Indiana, Cintolesi (2019) finds that more moderate candidates are elected through primaries. Similarly, a study by Rogowski and Langella (2015), using data from the US Congress and state legislatures for over 30 years, finds no association between primaries and candidate's polarization. Hirano et al. (2010) find the same results using a subsample of states. One possible explanation is that militants are not as extreme ideologically as sometimes assumed. Sides et al. (2018) find that, in the USA, primary voters are demographically and ideologically similar to voters in the elections.

In Europe, primaries are often closed to militants and, thus, different to voters in general elections. However, Mikulska and Scarrow (2010) find that more inclusive candidate selection rules select politicians with similar political views to voters in British elections in the 1990s. Several papers have suggested alternative reasons for parties to celebrate primaries to the ones described by the theoretical papers above. Astudillo and Detterbeck (2018) analyze data from Germany and Spain to explain under which circumstances do parties elect their candidates through primary elections. They notice that these two countries started using primaries over the traditional party-leader selection in the last 25 years, especially at the municipal level. They conclude that the main driver in both countries has been internal disputes and party leaders'

desire to resolve internal disputes. Sandri and Venturino (2016) explore the case of Italy. As in Germany and Spain, primary elections have also become popular in the past years at the local level. The authors find that the most moderates candidates are more likely to win.

Regarding the effect of primaries on electoral outcomes in Europe, the closest study to our paper, by Ramiro (2016), found a positive association between holding primary elections for the PSOE and subsequent electoral outcomes. However, that study differed from ours in two key aspects, and its results are not directly comparable to ours. First, Ramiro (2016) uses data from 1999, 2003, 2007, and 2011, while our results are based on data from 2015 and 2019. While he finds a positive association in 1999, 2003, and 2007 between primary elections and electoral results, the correlation becomes negative in the 2011 electoral cycle, consistent with our OLS results for 2015 and 2019. Second, we address potential endogeneity concerns originating from selection bias in holding primary elections in some municipalities through an RDD approach. Using the PSOE's natural experiment as a case study, we believe this paper contributes to the thin literature investigating the causal link between primary elections and electoral outcomes in Europe.

This article is organized as follows. Section 2 describes the databases used and presents descriptive statistics. Section 3 introduces our empirical framework and identification assumption. Section 4 explores the results, and Sect. 5 concludes.

2 Data

This paper combines multiple datasets. Information on primary elections at the municipality level was gathered using the websites of local and regional newspapers. Specifically, we constructed a database that includes the municipalities in which the PSOE mayoral candidates for the 2015 and 2019 elections were selected through primary elections. We had to exclude from the database and the analysis of the municipalities from the regions of Navarra, Castilla la Mancha, Extremadura, and Baleares for the 2019 electoral cycle, for which systematic information on primary elections was not found.

Additionally, we use data on electoral outcomes from the 2015 and 2019 local elections from the Spanish Ministry of Interior. Information on population at the municipality level was collected from the Padrón continuo de habitantes for the relevant years (2013 and 2017).[1] This variable is used to construct the running variable of the analysis.

Table 1 shows summary statistics of this database for two different samples. Panel A shows statistics for the sample of municipalities where the mayor at the time of the elections was not from PSOE, while Panel B shows summary statistics for the whole sample of municipalities in the database. Since the primary elections were not held in municipalities already governed by the PSOE where the mayor is willing to run for re-election, the probability of holding primary elections of municipalities above the

[1] The primary elections were held in 2014 and 2018, and to determine whether a municipality is above or below the threshold, we use the *Padrón continuo de habitantes* in 2013 and 2017.

Table 1 Summary statistics

	(1) Mean	(2) Std. dev	(3) Min	(4) Max	(5) Median
PANEL A: All villages					
Population	5787.38	46,852.37	1	3,207,247	552
Primary elections	0.0097	0.0981	0	1	0
Percentage vote PSOE in municipality	0.31	0.23	0	1.33	0.3
Prob. PSOE mayor	0.32	0.47	0	1	0
Prob. mayor did not end 4-year mandate	0.09	0.29	0	1	0
PANEL B: Restricted sample					
Population	5992.6	55,749.11	1	3,207,247	466
Primary elections	0.0125	0.1111	0	1	0
Percentage vote PSOE in municipality	0.21	0.17	0	1	0.2
Prob. PSOE mayor	0.14	0.34	0	1	0
Prob. mayor did not end 4-year mandate	0.08	0.27	0	1	0

This table shows descriptive statistics for the main variables of interest. Panel B shows statistics for the whole sample of municipalities, while Panel A shows summary statistics for municipalities in which the mayor at the time the primary elections were held in the country was not from PSOE

threshold is higher in the sample in Panel A. Thus, we use the sample in Panel A as the main analytical sample and the sample in Panel B to test the robustness of the results. As we can observe, municipalities cover a substantial range of population sizes. In fact, the population ranges from 1 person for the village of Illán de Vacas (Toledo) to more than 3 million people for the city of Madrid. Municipalities in the restricted sample appear to be slightly larger on average. As expected, we observe that primaries are more likely to take place in municipalities of the restricted sample. Similarly, primaries are also more likely to occur in municipalities with more than 20,000 inhabitants. Indeed, within this group of municipalities, there have been primaries in 18% of them, while for municipalities with less than 20,000 people, that average is 0.036%.[2]

[2] These two averages are not shown in the table. Despite the provisions in the Ordinance for the Regulation of the Primary Elections in PSOE (Reglamento Federal de Primarias del PSOE) that states that only municipalities with more than 20,000 can hold primary elections, four municipalities with less than 20,000 inhabitants held primary elections in 2014: Huércal–Overa (19,825 inhabitants), Carboneras (8035), Olivenza (12,043) and Santa Eulalia (1118); and one in 2018: Alfarara (405). This is however not

We observe that, on average, the PSOE receives approximately 30% of the votes in the municipalities considered in the whole sample. Likewise, the probability of having a PSOE mayor is approximately 32%. As expected, these two estimates are much lower in the restricted sample of municipalities where the mayors before the elections were not a member of the PSOE. As for the probability that the mayor did not end the 4-year mandate, the estimates are similar across the two samples, displaying a probability of approximately 8%.[3] Table 11 in Appendix shows the descriptive statistics for the municipalities within the optimal bandwidth, which includes those municipalities used in the regression discontinuity analysis.

3 Empirical strategy

In 2014, the PSOE allowed municipalities with over 20,000 inhabitants to run primaries to select their candidates for mayorship in the local elections that were held in May 2015 and in May 2019. Specifically, municipalities with more than 20,000 inhabitants, where there were at least two PSOE candidates for mayorship, could opt to organize primaries if the current mayor was not a PSOE mayor running for reelection (PSOE 2013). This decision created a threshold for the probability of running primaries. Simply put, in municipalities with a population lower than 20,000 inhabitants the PSOE cannot run primaries to select their candidate for mayorship, while the selection of PSOE's candidate for mayorship will be conducted via primary elections in municipalities above the threshold that meet also the other two conditions. We exploit this threshold to assess the causal link between running primaries on an array of electoral outcomes using a regression discontinuity approach.

The identification strategy rests on the assumption that municipalities just below and above this population threshold are on average identical, but that the probability of selecting their PSOE candidate for mayorship via primaries increases at the cut-off.

Namely, we consider the following reduced-form equation:

$$Y_m = \alpha_0 + \alpha_1 \mathbb{1}\{\text{Population}_m > 20k\} + \alpha_2 F(\text{Population}_m > 20k) + \varepsilon_m \quad (3.1)$$

where Y_m is an outcome of interest in municipality m, $\mathbb{1}\{\text{Population}_m > 20k\}$ is an indicator variable taking a value of 1 if the population in municipality m is above the threshold and $F(\text{Population}_m > 20k)$ is a function of the population in municipality m being above the threshold. It is worth noting that the number of observations differs across regressions due to the optimal bandwidth chosen. We calculate the optimal bandwidth as described by Calonico et al. (2014) and then test the robustness of the results to the use of alternative bandwidths equal to 0.75 and 1.5 times the

footnote 2 continued
problematic since the validity of our design relies on a discrete change in the probability of holding primary elections at the cut-off rather than on the complete absence of primary elections for municipalities below the cut-off.

[3] This variable is only available for 2015 because at the time of the study the 4-year mandate is not concluded for the 2019 elected mayors.

optimal bandwidths. Additionally, following Gelman and Imbens (2019), we estimate the results using a first-order and a second-order polynomial for the running variable allowing a different polynomial on both sides of the discontinuity.

One potential concern with the results is that municipalities just below the cut-off could have manipulated their population information to be able to be eligible to select their PSOE candidate via primaries. However, we present the results of the McCrary density test to shed light on this issue (McCrary 2008). Panels A and B of Fig. 1, respectively, present the aforementioned test for the entire sample and only for the restricted sample of municipalities. As we can observe, there are no discontinuities in the density of the forcing variable at the cut-off, which rules out the manipulation hypothesis (Figs. 2, 3, 4, 5, 6, 7).

One final concern with the causal interpretation of the results of our empirical strategy is other factors changing sharply for municipalities larger than 20,000 inhabitants that affect PSOE's electoral outcomes. While funding or services provided do not change for municipalities just above and below this population threshold, some competences are executed by local governments only for municipalities larger than 20,000 inhabitants: civil protection and emergencies, the evaluation of social protection needs and provision of support to people in situation of social vulnerability, the prevention and extinction of fires and the management of sport infrastructure. While these competences are also provided in the municipalities below the threshold they are managed by the province-level administration. In order to confound our estimates of interest, the execution of these competences by the local government should affect PSOE's electoral outcomes.

4 Results

We start this section by studying the naive correlation between PSOE's electoral outcomes and primary elections. For this, we estimate the following regression using OLS:

$$Y_m = \beta_0 + \beta_1 \text{Primaries}_m + \beta_2 Ln(\text{Population}_m) + \theta_m \tag{4.1}$$

Table 2 shows the results of this analysis. They suggest that there is either a negative or a null statistical association between primaries and PSOE's electoral outcomes. Table 2 reports the results for both the whole and the restricted sample, yet, estimated β_1 is negative in the point estimate of all regressions but one and statistically significant for the votes received by the PSOE and the probability of electing a PSOE mayor in the unrestricted sample. These findings suggest that primaries worsen the electoral outcomes of the PSOE. Table 12 presents the results of the same analysis using only those municipalities within the main bandwidth used in the regression discontinuity analysis. While smaller, the coefficients are overall negative but only statistically significant at conventional confidence levels for the sample that includes the unrestricted sample of municipalities (Table 3).

However, there might be the doubt that these results are simply driven by selection into treatment. Since we are considering the whole sample it might be that on aver-

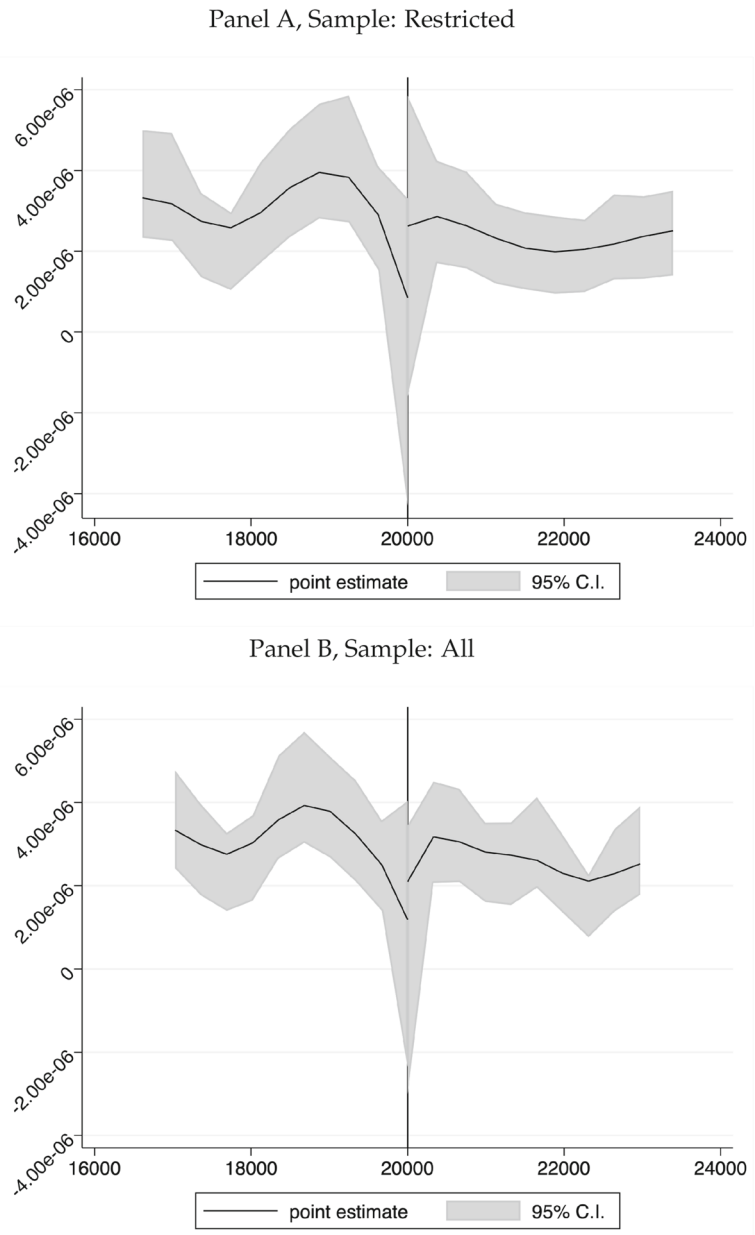

Fig. 1 Density of the forcing variable at the cut-off (all municipalities vs restricted sample of municipalities)

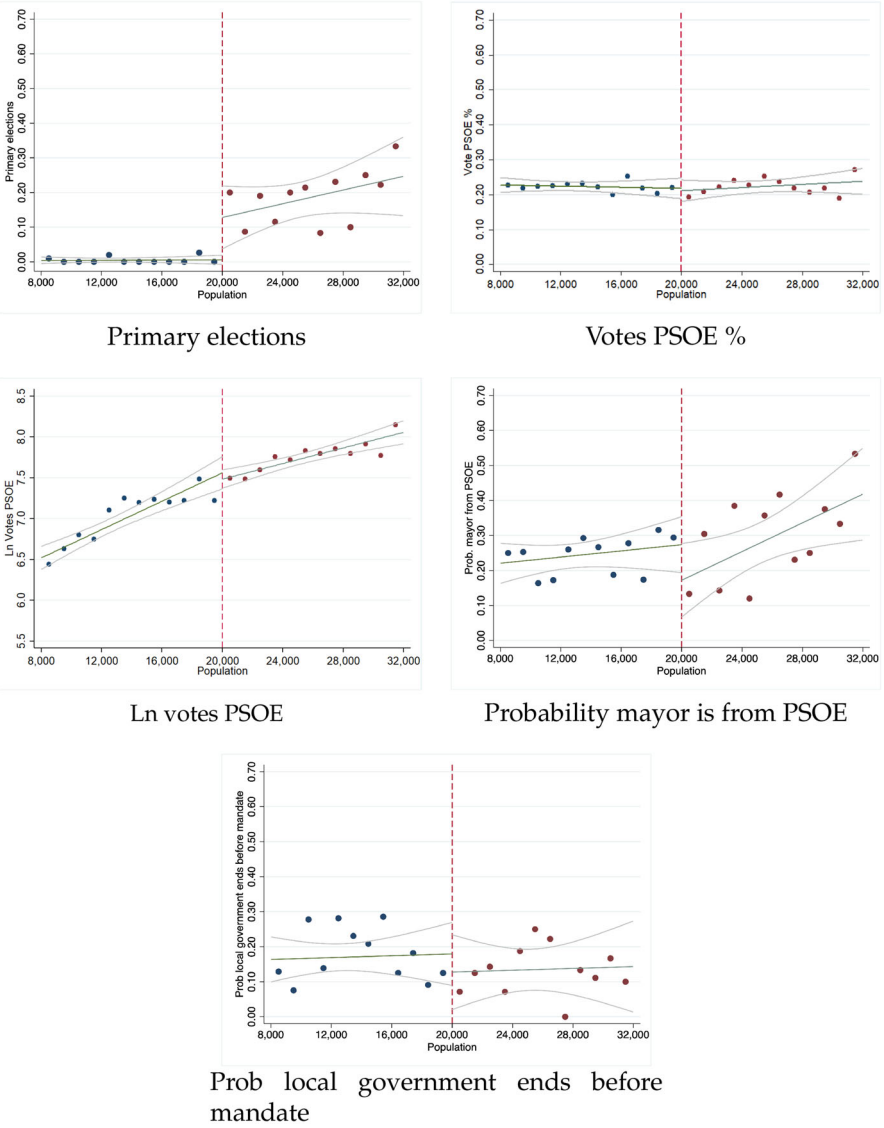

Fig. 2 Restricted sample of municipalities: linear polynomials

age towns that opted to organize primaries experienced more challenging situations towards the PSOE party. To overcome endogeneity concerns, we follow the RDD estimation procedure described in the previous section. Table 9 presents the results of estimating equation (3.1) using the optimal bandwidth, and either a first-order or a second-order polynomial. Panels A and B of Table 9, respectively, show such results for our preferred sample that includes only municipalities where the mayor when the

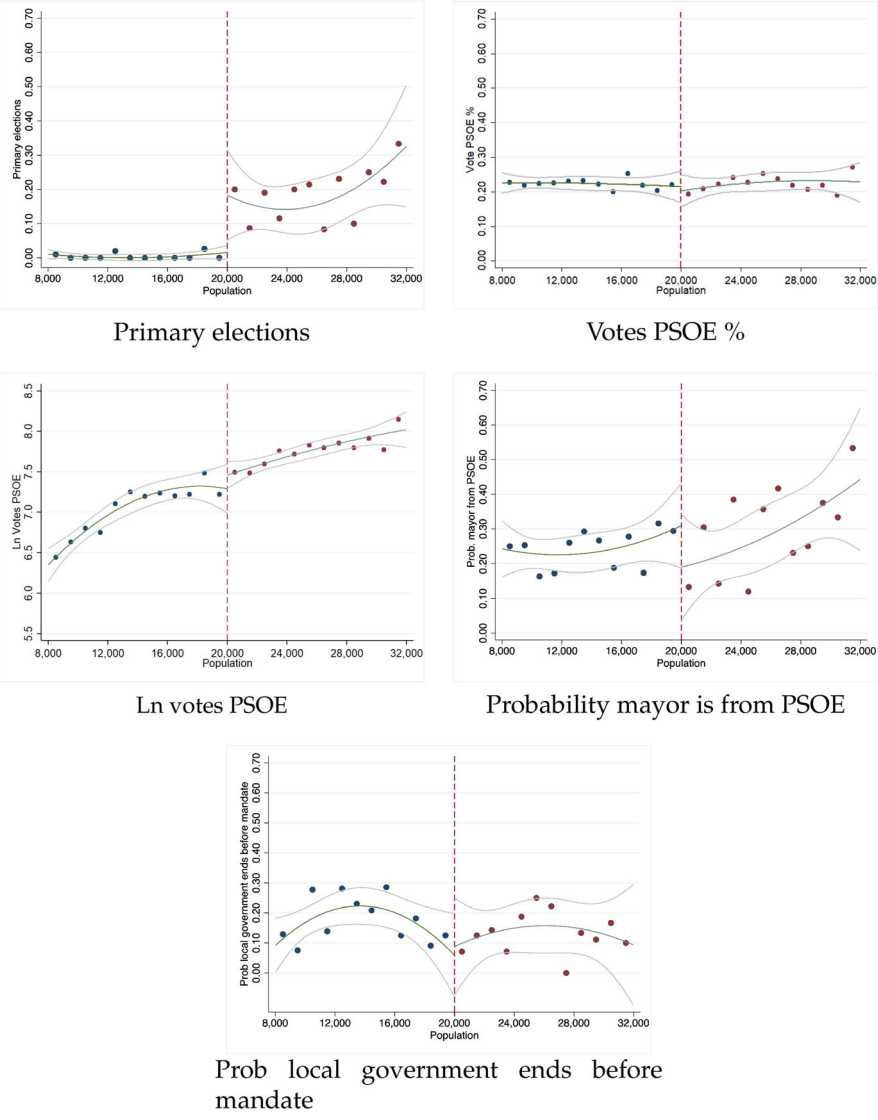

Fig. 3 Restricted sample of municipalities: quadratic polynomials

primary elections were held did not belong to PSOE and the sample that includes all the municipalities.

Column (1) uses as the dependent variable Y_m, an indicator variable taking a value of 1 if primaries were held in municipality m, and 0 otherwise. As expected we find that the probability of holding primary elections is much larger in municipalities just above the cut-off than in municipalities just below 20,000-inhabitants cut-off (Column (1)). It is reassuring to find evidence of this sort in all four of the regressions we considered.

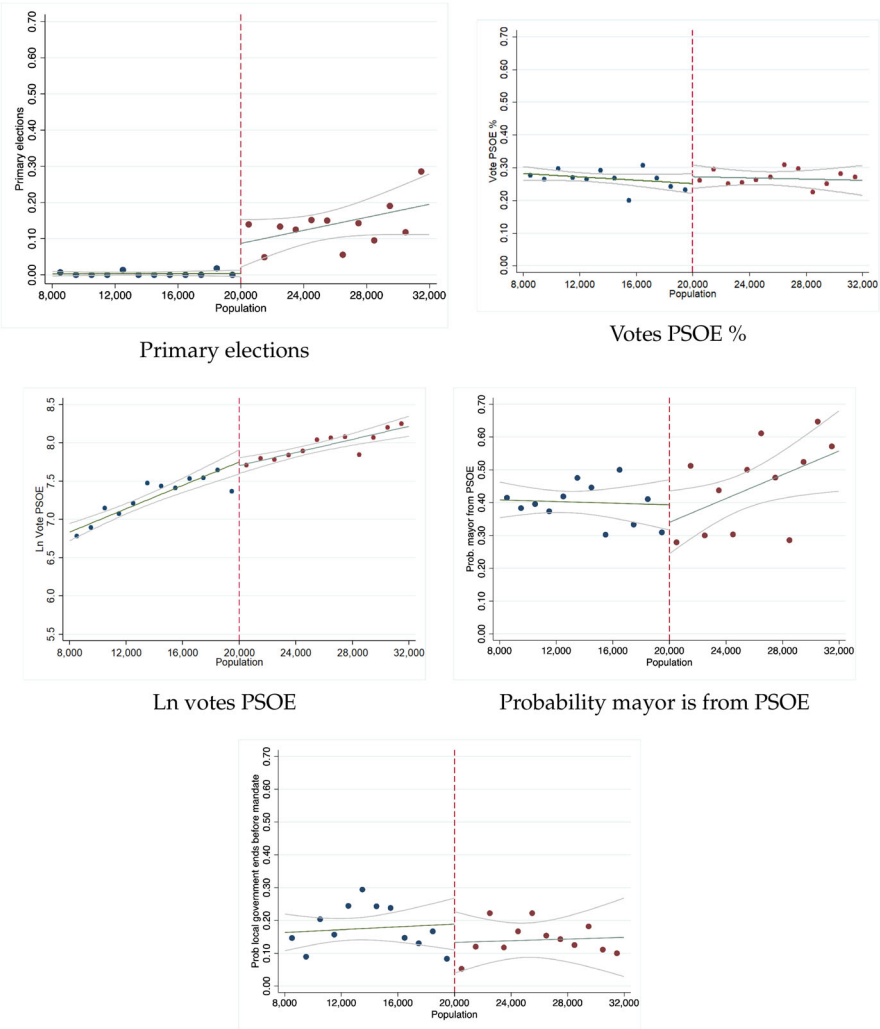

Fig. 4 Sample all municipalities: linear polynomials

Specifically, our results suggest that being on the right of the threshold increases the probability of organizing primaries between 13 and 16 percentage points for municipalities in the restricted sample and between 9 and 10 percentage points for the whole sample. Since municipalities where the current mayor was from PSOE and want to run for re-election did not celebrate primary elections, we find that the effect of being on the right of the threshold on the probability of organizing primaries is larger in the restricted sample than in the entire sample.

With this evidence at hand, we turn to analyze the effect of increasing the probability of organizing primaries on different electoral outcomes. Column (2) uses as dependent

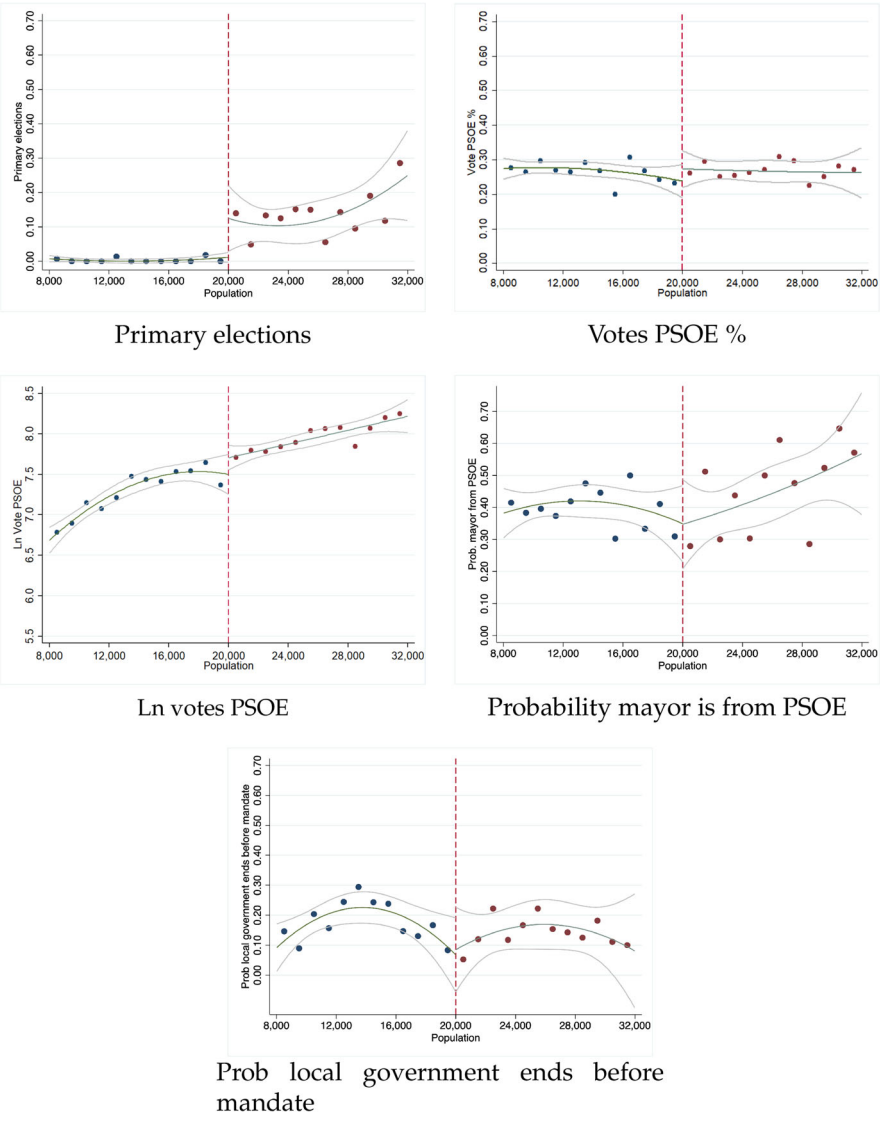

Fig. 5 Sample all municipalities: quadratic polynomials

variable Y_m the percentage vote received by the PSOE in municipality m. Our results suggest that the increase in the probability of holding primaries for municipalities just above 20,000 inhabitants does not lead to an effect on the votes received by the PSOE. Put it differently, being on the right of the threshold does not change the votes received by the political party. The magnitudes of the estimates are small, the sign of the effect varies across samples, and the polynomials and coefficients are statistically indistinguishable from 0 in all the specifications. Indeed, the 95% confidence interval

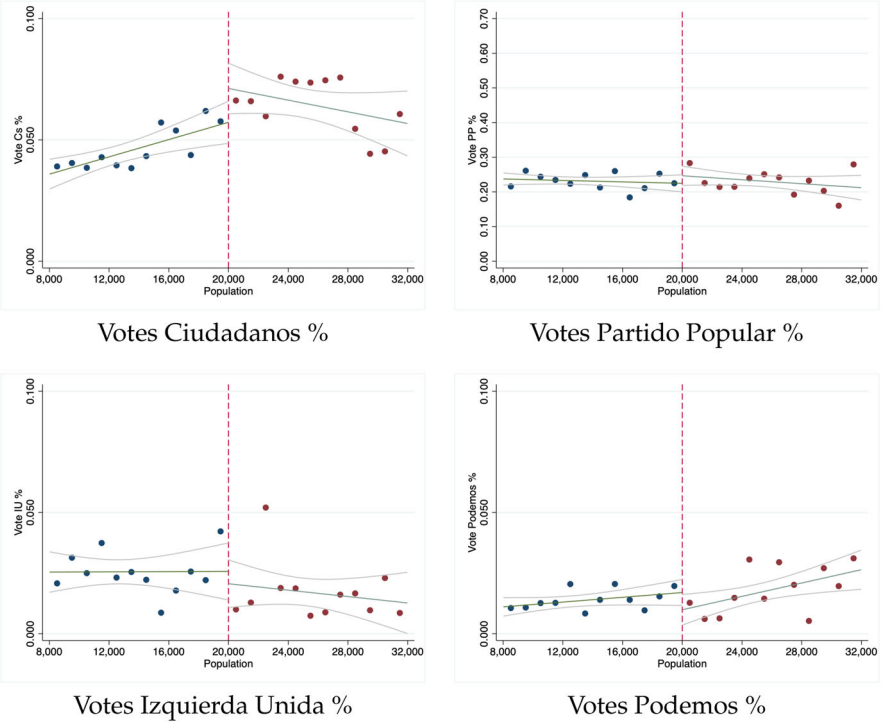

Fig. 6 Vote share of different political parties (restricted sample)

associated with estimates from Panel A, first-order polynomial, suggests that the effect lies between (−0.026 and 0.044).

We also explore whether being on the right of the threshold increases the total number of votes received, and we find consistent statistically insignificant coefficients. In line with these results, we find that primaries do not affect either the probability of electing a PSOE mayor or the probability that the mayor did not end the 4-year mandate. It is reassuring to find that, for each outcome variable, confidence intervals of estimates across specifications overlap, and this evidence suggests our results are robust and are not driven by lack of precision. Namely, our 95% confidence interval associated with estimates from Panel A, first-order polynomial, rules out reductions larger than 3% in the former probability and larger than 10% in the latter probability.

We assess the robustness of our results to different empirical exercises. First, we show in Tables 4 and 5 that our results are robust to the use of alternative bandwidths. Table 4 presents the results of running our main specification, Eq. (3.1), using 1.5 times the optimal bandwidth. It is encouraging to find that also in this case being on the right of the threshold is positively correlated with holding a primary election. It is worth noting that in this case estimates are similar in size to the main estimates, ranging from 7.5 to 13 percentage points. Additionally, in line with previous results, there is no discontinuity at the cut-off in terms of electoral outcomes when the new bandwidth is used. Table 5 shows the results of running our main specification, Eq.

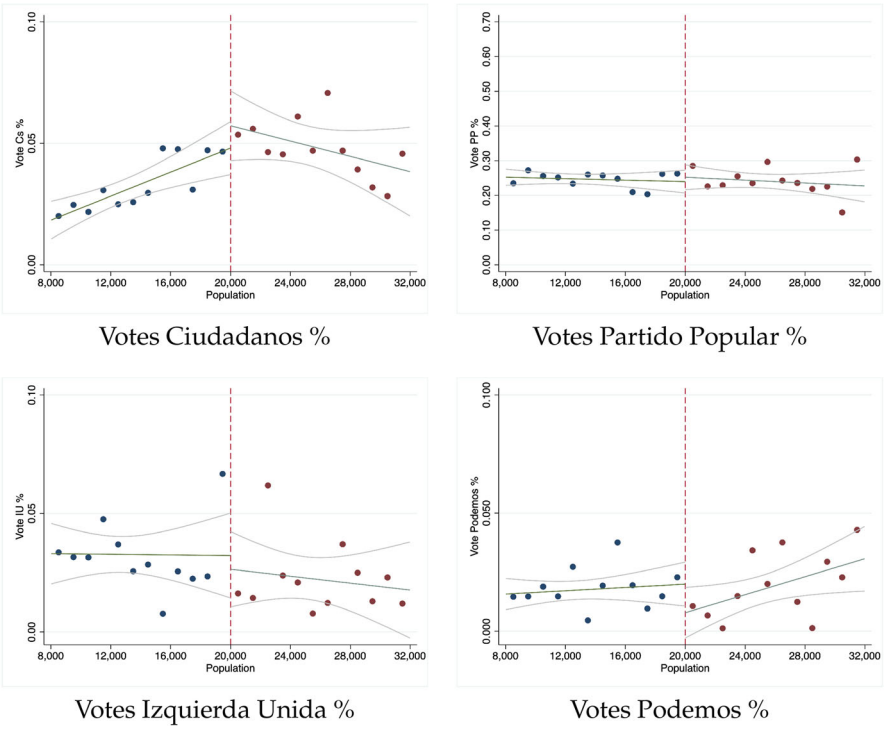

Fig. 7 Vote share of different political parties (all municipalities sample)

(3.1), using 0.75 times the optimal bandwidth. The results do not change: being on the right of the threshold significantly increases the probability of holding primaries, but it has no effect on electoral outcomes on average. Second, we estimate the main results of the paper weighting observations by the population size of the municipality. The results, reported in Table 13 in Appendix, are largely consistent with those reported in the main analysis. Finally, we also estimate the results separately for the 2015 and 2019 electoral cycle. The results, reported in Tables 14 and 15 in Appendix 1, show similar results in both electoral cycles.

4.1 Discussion of the findings

The results presented above suggest that the PSOE primary elections have limited effects on the electoral outcomes of the party. However, do PSOE's primary elections influence the electoral outcomes of other political parties? Theoretical studies have suggested that candidates elected by primaries are different from those that party leaders would have elected (Serra 2011; Adams and Merrill III 2008). If militants have different preferences from party leaders, the candidates will be more skewed towards the militants' preferences, potentially at one extreme of the party's ideology, which would change the political landscape in multi-party systems.

Table 2 OLS analysis: primary elections and PSOE electoral results

	(1) Percentage vote PSOE in municipality	(2) Percentage vote PSOE in municipality	(3) Prob. PSOE mayor	(4) Prob. PSOE mayor	(5) Prob. mayor did not end 4-year mandate	(6) Prob. mayor did not end 4-year mandate
Primary elections	−0.112***	−0.0725***	−0.125***	0.0485	−0.0349	−0.0389
	(0.00836)	(0.00766)	(0.0416)	(0.0434)	(0.0366)	(0.0384)
ln (Population)	0.00893***	0.0184***	0.0356***	0.0359***	0.0189***	0.0182***
	(0.00113)	(0.00101)	(0.00267)	(0.00260)	(0.00234)	(0.00277)
Observations	14,491	10,393	14,491	10,393	8085	5868
Province FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	N/A	N/A
Sample	All	Restricted	All	Restricted	All	Restricted
Mean Dep var	0.31	0.215	0.334	0.141	0.0794	0.0821

Multivariate regression analysis using either all villages or the villages in which PSOE was not governing at the time of the elections. Robust standard errors are in parentheses.*** $p < 0.01$;** $p < 0.05$;*** $p < 0.1$

Table 3 Results of the RDD: electoral outcomes of the PSOE at the discontinuity

	(1) Hold primary election	(2) Percentage vote PSOE in municipality	(3) Prob. PSOE mayor	(4) Prob. mayor did not end 4-year mandate
PANEL A: All villages				
First-order polyn.				
Village> 20000 inhab.	0.092***	−0.007	−0.061	−0.066
	(0.026)	(0.022)	(0.067)	(0.063)
Second-order polyn.				
Village> 20000 inhab.	0.104***	0.023	−0.036	0.025
	(0.039)	(0.032)	(0.100)	(0.096)
N	927	741	927	691
Mean Dep var.	0.040	0.286	0.416	0.161
Bandwidth	10,183	7970	9411	12,143
PANEL B: Restricted sample				
First-order polyn.				
Village> 20000 inhab.	0.135***	−0.009	−0.076	−0.036
	(0.034)	(0.018)	(0.059)	(0.074)
Second-order polyn.				
Village> 20000 inhab.	0.159***	−0.013	−0.123	0.005
	(0.050)	(0.027)	(0.088)	(0.113)
N	711	646	1310	491
Mean Dep var.	0.052	0.222	0.247	0.161
Bandwidth	10,963	10,226	14,820	11,785

Each coefficient provided in the table is estimated using a separate regression and measures the discontinuity at the cut-off (villages with more than 20,000 inhabitants) in terms of different electoral outcomes. In PANEL A the sample includes all villages, while in PANEL B the sample includes only villages in which the mayor before the elections was from PSOE. Following Gelman and Imbens, we estimate the results using polynomials of order 1 and 2. The bandwidth used is the optimal bandwidth as defined in Calonico et al. (2014). Standard errors are in parentheses.$^{***}p < 0.01;^{**}p < 0.05;^{***}p < 0.1$

Using data from the European Social Survey, Appendix Table 6 in Appendix shows the correlation between actively militating in the PSOE party and having left-wing political views. Our results suggest that militants of the PSOE are more leftist than the voters of this political party. Thus, it is plausible to think that the PSOE candidate running for mayor in places where the mayor is chosen via primary elections by its militants is more leftist than PSOE candidates in places where candidates are chosen by the local committee of the political party. We find evidence that supports this claim using data from a survey conducted to over a thousand mayors in Spain (Janezic and Gallego 2020). The majors were asked about their spending preferences. We regressed every answered option on whether the mayor was from PSOE and elected by primaries. We control for age, gender, the log of the population of the municipality, and we use province fixed effects. PSOE mayors elected via militant consultation in 2014–2015 are more likely to report preferences over social services spending versus those selected by the party committee (Table 7). These preferences are often associated with more

Table 4 Results of the RDD: electoral outcomes of the PSOE at the discontinuity (bandwidth=1.5 × OB)

	(1) Hold primary election	(2) Percentage vote PSOE in municipality	(3) Prob. PSOE mayor	(4) Prob. mayor did not end 4-year mandate
PANEL A: All villages				
First-order polyn.				
Village> 20000 inhab.	0.084***	0.010	−0.040	−0.084*
	(0.017)	(0.018)	(0.056)	(0.046)
Second-order polyn.				
Village> 20000 inhab.	0.094***	0.017	−0.032	−0.031
	(0.025)	(0.028)	(0.083)	(0.070)
N	2045	1373	1905	2259
Mean Dep var.	0.026	0.285	0.412	0.133
Bandwidth	15,274	12,829	14,891	18,214
PANEL B: Restricted sample				
First-order polyn.				
Village> 20000 inhab.	0.129***	−0.008	−0.071	−0.092*
	(0.023)	(0.017)	(0.059)	(0.055)
Second-order polyn.				
Village> 20000 inhab.	0.138***	−0.014	−0.130	−0.014
	(0.034)	(0.026)	(0.087)	(0.083)
N	1426	945	1328	1618
Mean Dep var.	0.030	0.225	0.133	0.144
Bandwidth	16,444	15,340	22,230	17,677

Each coefficient provided in the table is estimated using a separate regression and measures the discontinuity at the cut-off (villages with more than 20,000 inhabitants) in terms of different electoral outcomes. In PANEL A the sample includes all villages, while in PANEL B the sample includes only villages in which the mayor before the elections was from PSOE. Following Gelman and Imbens, we estimate the results using polynomials of order 1 and 2. The bandwidth used is equal to 1.5 times the optimal bandwidth as defined in Calonico et al. (2014). Standard errors are in parentheses.$^{***}p < 0.01;^{**}p < 0.05;^{***}p < 0.1$

left-oriented policies. Therefore, one may argue that rather than revealing no effects on voting patterns, the null net effect of primary elections on PSOE's political outcomes reflects that the political party gains some voters at the expense of political parties on the left while losing some right-centre voters. In other words, the primary elections held by the PSOE should increase the votes received by parties at the right margin of the PSOE (Ciudadanos and Partido Popular) and reduce the number of votes received by parties at the left margin (Podemos and Izquierda Unida). In this section we test this hypothesis by examining the effect of PSOE primary elections on the electoral outcomes of other political parties.

We start by examining the statistical association between PSOE holding primary elections and the electoral results of other political parties. The results of this analysis, reported in Table 8, show that controlling for population, year, and province, the right-wing parties (VOX, PP, and Ciudadanos) obtain better electoral results in municipalities where PSOE select its candidate to mayor via primary elections. The

Table 5 Results of the RDD: electoral outcomes of the PSOE at the discontinuity (bandwidth = 0.75 × OB)

	(1) Hold primary election	(2) Percentage vote PSOE in municipality	(3) Prob. PSOE mayor	(4) Prob. mayor did not end 4-year mandate
PANEL A: All villages				
First-order polyn.				
Village> 20000 inhab.	0.094***	0.014	−0.046	−0.017
	(0.032)	(0.025)	(0.080)	(0.075)
Second-order polyn.				
Village> 20000 inhab.	0.088*	0.056	0.054	0.035
	(0.047)	(0.038)	(0.119)	(0.115)
N	636	532	618	445
Mean Dep var.	0.044	0.279	0.408	0.175
Bandwidth	7637	6414	7446	9107
PANEL B: Restricted sample				
First-order polyn.				
Village> 20000 inhab.	0.130***	−0.023	−0.122	−0.012
	(0.045)	(0.023)	(0.086)	(0.086)
Second-order polyn.				
Village> 20000 inhab.	0.157**	−0.007	−0.156	0.020
	(0.065)	(0.034)	(0.125)	(0.130)
N	435	366	423	331
Mean Dep var.	0.060	0.222	0.249	0.172
Bandwidth	8222	7670	11,115	8839

Each coefficient provided in the table is estimated using a separate regression and measures the discontinuity at the cut-off (villages with more than 20,000 inhabitants) in terms of different electoral outcomes. In PANEL A the sample includes all villages, while in PANEL B the sample includes only villages in which the mayor before the elections was from PSOE. Following Gelman and Imbens, we estimate the results using polynomials of order 1 and 2. The bandwidth used is equal to 0.75 times the optimal bandwidth as defined in Calonico et al. (2014). Standard errors are in parentheses.*** $p < 0.01$;** $p < 0.05$;*** $p < 0.1$

Table 6 PSOE militants and left-wing ideology

	Left-wing ideology (scale 0–10)
Militant (participate in PSOE events)	0.92***
	(0.29)
Mean dep var	5.53

Using information from the round 2016 of the European Social Survey and restricting the analysis to individuals that voted for PSOE in the 2015 national elections, this table reports the correlation between actively militating in PSOE and left-wing ideology. The results suggest that PSOE militants are more left leaned than PSOE voters.*** indicates $p < 0.01$

Table 7 Spending priorities

	Education	Health	Housing	Local services	Culture	Infrastructure	Security	Gender	Social services	Sports
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Primaries in 2015	0.05	0.11	0.09	0.12	0.06	0.07	−0.13	0.01	0.30***	−0.04
	(0.18)	(0.21)	(0.21)	(0.17)	(0.15)	(0.19)	(0.10)	(0.15)	(0.06)	(0.16)
Observations	391	391	391	391	391	391	391	391	391	391
R-squared	0.13	0.15	0.17	0.17	0.14	0.19	0.15	0.14	0.13	0.13
No Primaries PSOE mean	0.58	0.32	0.30	0.49	0.10	0.46	0.20	0.25	0.78	0.14

Standard errors in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$. All regressions include control for the log of population in the municipality, age, gender, and belonging to one of the two major parties. The regressions include province fixed effects. All columns report coefficients from a linear model

Table 8 OLS analysis: primary elections in PSOE and electoral results of other political parties

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Percentage vote VOX in municipality (Only 2019)	Percentage vote PP in municipality	Percentage vote Cs in municipality	Percentage vote Podemos in municipality	Percentage vote IU in municipality	Percentage vote Cs− Podemos in municipality	Percentage vote VOX + PP+ Cs − Podemos − IU in municipality
PANEL A: Restricted sample							
Primary elections	0.021***	0.026**	0.020***	0.009*	−0.008**	0.011	0.048***
	(0.004)	(0.011)	(0.004)	(0.005)	(0.004)	(0.007)	(0.014)
ln (Population)	0.003***	−0.024***	0.009***	0.003***	0.001***	0.007***	−0.017***
	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)
Observations	4525	10,393	10,393	10,393	10,393	10,393	10,393
Province FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	N/A
Sample	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted
Mean Dep var	0.006	0.369	0.032	0.006	0.009	0.025	0.388
PANEL B: All municipalities							
Primary elections	0.017***	0.034***	0.019***	0.011**	−0.005	0.008	0.048***
	(0.004)	(0.011)	(0.004)	(0.005)	(0.004)	(0.007)	(0.015)
ln (Population)	0.004***	−0.017***	0.010***	0.003***	0.002***	0.007***	−0.010***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Observations	6406	14,491	14,491	14,491	14,491	14,491	14,491
Province FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	N/A
Sample	All	All	All	All	All	All	All
Mean Dep var	0.007	0.336	0.030	0.007	0.010	0.023	0.353

Multivariate regression analysis of the associations between PSOE's primary elections and the vote sharing of received by other political parties. In PANEL B the sample includes all municipalities, while in PANEL A the sample includes only municipalities in which the mayor at the time the primary elections were held in the country was not from PSOE. Robust standard errors are in parentheses.***$p < 0.01$;**$p < 0.05$;*$p < 0.1$

Table 9 Results of the RDD: electoral outcomes of other parties at the discontinuity

	(1) Percentage vote PP in municipality	(2) Percentage vote Cs in municipality	(3) Percentage vote Podemos in municipality	(4) Percentage vote IU in municipality	(5) Percentage vote Cs− Podemos in municipality	(6) Percentage vote PP+ Cs − Podemos − IU in municipality
PANEL A: All villages						
First-order polyn.						
Village> 20000 inhab.	0.039*	0.006	−0.008*	−0.003	0.022***	0.056**
	(0.023)	(0.008)	(0.004)	(0.010)	(0.008)	(0.026)
Second-order polyn.						
Village> 20000 inhab.	0.042	0.002	−0.008	−0.020	0.013	0.080**
	(0.034)	(0.012)	(0.007)	(0.015)	(0.012)	(0.039)
N	737	739	1470	925	1182	872
Mean Dep var.	0.228	0.056	0.014	0.023	0.037	0.246
Bandwidth	8653	8711	13,358	10,163	11,872	9775
PANEL B: restricted sample						
First-order polyn.						
Village> 20000 inhab.	0.047	0.004	−0.009	0.001	0.022**	0.056*
	(0.030)	(0.010)	(0.006)	(0.012)	(0.010)	(0.033)
Second-order polyn.						
Village> 20000 inhab.	0.062	0.002	−0.004	−0.023	0.008	0.096*
	(0.044)	(0.015)	(0.009)	(0.018)	(0.015)	(0.050)
N	510	511	1015	640	817	604
Mean Dep var.	0.240	0.052	0.015	0.019	0.035	0.258
Bandwidth	9505	9853	12,704	9393	10,539	9470

Each coefficient provided in the table is estimated using a separate regression and measures the discontinuity at the cut-off (villages with more than 20,000 inhabitants) in terms of different electoral outcomes. In PANEL A the sample includes all villages, while in PANEL B the sample includes only villages in which the mayor before the elections was from PSOE. Following Gelman and Imbens, we estimate the results using polynomials of order 1 and 2. The bandwidth used is the optimal bandwidth as defined in Calonico et al. (2014). Standard errors are in parentheses.***$p < 0.01$;**$p < 0.05$;***$p < 0.1$

Table 10 Results of the RDD: electoral outcomes of other parties at the discontinuity

	(1) Ln Total votes in municipality	(2) Ln Votes VOX in municipality (2019)	(3) Ln Votes PP in municipality	(4) Ln Votes Cs in municipality	(5) Ln Votes Podemos in municipality	(6) Ln Votes IU in municipality
PANEL A: Restricted sample						
First-order polyn.						
Municipality> 20000 inhab.	−0.015	0.607	0.082	0.971**	−0.231	−0.302
	(0.039)	(0.242)	(0.242)	(0.475)	(0.662)	(0.278)
Second-order polyn.						
Municipality> 20000 inhab.	0.090	0.469	0.241	0.481	−0.544	−0.028
	(0.059)	(0.946)	(0.360)	(0.703)	(0.955)	(0.411)
N	259	330	816	799	228	1723
Mean Dep var.	9.081	1.080	6.843	3.849	0.998	0.957
Bandwidth	5256	17,855	12,346	9509	15,381	9827
PANEL B: All municipalities						
1storder polyn.						
Municipality> 20000 inhab.	−0.023	0.991	0.052	0.714*	−0.194	−0.193
	(0.034)	(0.177)	(0.177)	(0.387)	(0.549)	(0.256)
Second-order polyn.						
Municipality> 20000 inhab.	0.067	0.319	0.243	0.500	−0.672	−0.101
	(0.053)	(0.767)	(0.266)	(0.581)	(0.800)	(0.379)
N	379	536	1181	1158	358	2502
Mean Dep var.	9.089	2.299	6.957	3.674	1.639	1.064
Bandwidth	4552	12,197	11,854	11,656	9364	16,482

Each coefficient provided in the table is estimated using a separate regression and measures the discontinuity at the cut-off (municipalities with more than 20,000 inhabitants) in terms of different electoral outcomes. In PANEL B the sample includes all municipalities, while in PANEL A the sample includes only municipalities in which the mayor at the time the primary elections were held in the country was not from PSOE. Following Gelman and Imbens, we estimate the results using polynomials of order 1 and 2. The bandwidth used is the optimal bandwidth as defined in Calonico et al. (2014). Standard errors are in parentheses.***$p < 0.01$;**$p < 0.05$;*$p < 0.1$

association is mixed and weaker for Podemos and Izquierda Unida, the political parties in the left. The statistical associations are overall consistent for the restricted and full sample of municipalities. We re-estimate the same regressions in Table 16 in Appendix using only those municipalities within the bandwidth of interest. The latter analysis reveals weaker correlations between PSOE's primary elections and electoral results of other political parties within this sample of municipalities.

Table 9 shows the RDD results for the share of votes of other political parties. The coefficient that measures the effect of being just above the cut-off on the percentage of voters of the political party is consistently positive for political parties to the right of PSOE (Ciudadanos, Partido Popular and VOX[4]) and negative for parties to the left (Podemos and Izquierda Unida), which is consistent with the previous hypothesis. On the other hand, the statistical significance of these coefficients depends on the functional form of the running variable and the sample. This lack of significance might be due either to a lack of an effect or to a lack of precision of our estimates. To this end, column (5) presents the results for the difference in percentage vote between Ciudadanos and Podemos. If we believe that through primaries the PSOE selects more left-wing candidates, it might be that the main party to the left of the PSOE (i.e. Podemos) experiences a decay in its votes, while the main party to the right of the PSOE (i.e. Ciudadanos) exhibits an increment in its votes. Column (6) repeats this same analysis but adds votes received by Partido Popular, VOX, and Izquierda Unida. This regression might be seen as the difference between the share of votes received by the main political parties to the right of PSOE and the main political parties to the left of PSOE. The use of these variables increases the statistical power of the analysis by increasing the variability of the dependent variable (which now can range between -1 and 1). The results of these estimations suggest a positive and statistically significant effect of PSOE primary elections on the vote share received by the parties to the right of PSOE relative to the vote share received by parties to the left of PSOE in most specifications. We re-estimate the analysis of the effect of the primary elections on the electoral outcomes of other political parties using total votes received by different political parties rather than vote shares. The estimates reported in Table 10 show results consistent with those obtained in the analysis of vote shares in terms of direction and magnitudes although most of the coefficients are statistically indistinguishable from 0 at conventional confidence levels. Additionally, Column (1) shows no discontinuity at the cut-off in terms of total participation rates suggesting that primary elections do not increase total participation rates in the municipality.

While there are some studies that look at the effect of primaries on electoral outcomes (Hacker 1965; Kenney and Rice 1987; Atkeson 1998), most of them use data from the USA. Our results speak to the scarce literature on the causal estimates of primaries on electoral outcomes in Europe. Furthermore, to the best of our knowledge, we are the first ones to look at the effect that primaries in one party might have in the broader political landscape. Finally, it is important to acknowledge that since our results are based on RDD estimates in municipalities of approximately 20,000 people, we should be cautious when extrapolating these results to larger municipalities or national-level elections.

[4] The analysis for the populist right-wing party VOX is only conducted using the 2019 electoral cycle. While the party formally exists since 2013, it was marginal until 2019 elections.

5 Conclusion

This article leverages an original research design to study the effect of primaries on various electoral outcomes. Namely, we make use of data from PSOE primaries in 2014 and 2018 to select the candidates running for office in the mayoral elections of 2015 and 2019.

We find evidence that PSOE primary elections did not seem to have any effect on PSOE electoral outcomes. On the other hand, we find suggestive evidence that PSOE primary elections increased the vote of competing parties to the right of the PSOE and reduced the votes of competing political parties to the left. These results are consistent with the hypothesis that although primary elections have a null overall effect on voting, they probably increase the number of votes for the PSOE among left voters and reduce it among centre-right voters.[5,6,7,8,9,10,11]

[5] This figure shows the results of the McCrary test for discontinuities in the density of the forcing variable (population of the municipality) at the cut-off (20,000 inhabitants) for the sample including all municipalities and for the restricted sample of municipalities. The results reveal no discontinuity in the density of the forcing variable at the cut-off. The outer lines are 95% confidence intervals.

[6] This figure shows the probability of holding primary elections, the share of votes obtained by PSOE, the probability of having a PSOE's mayor, and the probability of the local government fall before the 4-year mandate in municipalities with different populations around the cut-off (20,000 inhabitants) for the sample that includes the restricted sample of municipalities that at the moment the primary elections were held did not have a mayor from PSOE. A linear polynomial is fit at each side of the cut-off. The outer lines are 95% confidence intervals.

[7] This figure shows the probability of holding primary elections, the share of votes obtained by PSOE, the probability of having a PSOE's mayor, and the probability of the local government fall before the 4-year mandate in municipalities with different populations around the cut-off (20,000 inhabitants) for the sample that includes the restricted sample of municipalities that at the moment the primary elections were held did not have a mayor from PSOE. A quadratic polynomial is fit at each side of the cut-off. The outer lines are 95% confidence intervals.

[8] This figure shows the probability of holding primary elections, the share of votes obtained by PSOE, the probability of having a PSOE's mayor, and the probability of the local government fall before the 4-year mandate in municipalities with different populations around the cut-off (20,000 inhabitants) for the sample that includes all municipalities. A linear polynomial is fit at each side of the cut-off. The outer lines are 95% confidence intervals.

[9] This figure shows the probability of holding primary elections, the share of votes obtained by PSOE, the probability of having a PSOE's mayor, and the probability of the local government fall before the 4-year mandate in municipalities with different populations around the cut-off (20,000 inhabitants) for the sample that includes all municipalities. A quadratic polynomial is fit at each side of the cut-off. The outer lines are 95% confidence intervals.

[10] This figure shows the share of votes obtained by Ciudadanos, Partido Popular, Izquierda Unida, and Podemos in municipalities with different populations around the cut-off (20,000 inhabitants) for the restricted sample. A linear polynomial is fit at each side of the cut-off. The outer lines are 95% confidence intervals.

[11] This figure shows the share of votes obtained by Ciudadanos, Partido Popular, Izquierda Unida, and Podemos in municipalities with different populations around the cut-off (20,000 inhabitants) for the sample that includes all municipalities. A linear polynomial is fit at each side of the cut-off. The outer lines are 95% confidence intervals.

Declarations

Conflict of interest: There are no conflicts of interests to disclose. Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

Appendix

See Tables 11, 12, 13, 14, 15, 16, 17.

Table 11 Summary statistics for municipalities within the bandwidth

	(1) Mean	(2) SD	(3) Min	(4) Max	(5) Median
PANEL A: restricted sample					
Population	17,490.62	5628.02	9899	30,036	16,609
Primary elections	0.06	0.23	0	1	0
Percentage vote PSOE in municipality	0.22	0.11	0	0.62	0.20
Prob. PSOE mayor	0.25	0.43	0	1	0
Prob. mayor did not end 4-year mandate	0.18	0.39	0	1	0
PANEL B: all municipalities					
Population	17,276.30	5529.37	9898	30,036	16,244
Primary elections	0.04	0.19	0	1	0
Percentage vote PSOE in municipality	0.28	0.15	0	0.79	0.27
Prob. PSOE mayor	0.41	0.49	0	1	0
Prob. mayor did not end 4-year mandate	0.18	0.39	0	1	0

This table shows descriptive statistics for the main variables of interest for municipalities within the optimal bandwidth for primary elections estimated using the procedure described in Calonico et al. (2014). Panel B shows statistics for the whole sample of municipalities, while Panel A shows summary statistics for municipalities in which the mayor at the time the primary elections were held in the country was not from PSOE

Table 12 OLS analysis: primary elections and PSOE's electoral results (only observations within the optimal bandwidth)

	(1) Percentage vote PSOE in municipality	(2) Percentage vote PSOE in municipality	(3) Ln Votes PSOE in municipality	(4) Ln Votes PSOE in municipality	(5) Prob. PSOE mayor	(6) Prob. PSOE mayor	(7) Prob. mayor did not end 4-year mandate	(8) Prob. mayor did not end 4-year mandate
Primary elections	−0.055***	−0.011	−0.144	−0.016	−0.198**	−0.013	−0.041	−0.084
	(0.018)	(0.014)	(0.089)	(0.091)	(0.077)	(0.071)	(0.065)	(0.060)
ln (Population)	−0.007	0.017	1.095***	1.219***	0.074	0.031	−0.022	−0.069
	(0.019)	(0.012)	(0.151)	(0.180)	(0.056)	(0.023)	(0.037)	(0.047)
Observations	729	646	494	335	890	1310	691	491
Province FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	N/A	N/A
Sample	All	Restricted	All	Restricted	All	Restricted	All	Restricted
Bandwidth	8552	10,226	5932	5724	9927	14,820	12,143	11,785
Mean Dep var	0.281	0.222	7.625	7.416	0.403	0.247	0.161	0.161

Multivariate regression analysis using either all municipalities or the municipalities in which PSOE was not governing at the time primary elections were held which are also within the optimal bandwidth for primary elections defined by Calonico et al. (2014). Robust standard errors are in parentheses. ***$p < 0.01$;**$p < 0.05$;*$p < 0.1$

Table 13 Results of the RDD: electoral outcomes of the PSOE at the discontinuity using population weights

	(1) Hold primary election	(2) Percentage vote PSOE in municipality	(3) Ln votes PSOE in municipality	(4) Prob. PSOE mayor	(5) Prob. mayor did not end 4-year mandate
PANEL A: restricted sample					
First-order polyn.					
Municipality > 20000 inhab.	0.129***	−0.008	0.076	−0.081	−0.012
	(0.038)	(0.017)	(0.148)	(0.049)	(0.065)
Second-order polyn.					
Municipality > 20000 inhab.	0.165***	−0.013	0.073	−0.125*	0.003
	(0.056)	(0.025)	(0.224)	(0.072)	(0.099)
N	700	645	335	1310	491
Mean Dep var.	0.053	0.222	7.416	0.247	0.161
Bandwidth	10,881	10,225	5724	14,820	11,785
PANEL B: all municipalities					
First-order polyn.					
Municipality > 20000 inhab.	0.094***	0.018	0.123	−0.011	−0.040
	(0.028)	(0.020)	(0.122)	(0.064)	(0.056)
Second-order polyn.					
Municipality > 20000 inhab.	0.100**	0.027	0.290	−0.011	0.033
	(0.043)	(0.031)	(0.186)	(0.096)	(0.085)
N	915	727	494	890	691
Mean Dep var.	0.039	0.281	7.625	0.403	0.161
Bandwidth	10,114	8552	5932	9927	12,143

This analysis uses the population of the municipality as weights in the regressions. Each coefficient provided in the table is estimated using a separate regression and measures the discontinuity at the cut-off (municipalities with more than 20,000 inhabitants) in terms of different electoral outcomes. In PANEL B the sample includes all municipalities, while in PANEL A the sample includes only municipalities in which the mayor at the time the primary elections were held in the country was not from PSOE. Following Gelman and Imbens, we estimate the results using polynomials of order 1 and 2. The bandwidth used is the optimal bandwidth as defined in Calonico et al. (2014). Standard errors are in parentheses. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 14 Results of the RDD: electoral outcomes of the PSOE at the discontinuity (only 2015)

	(1) Hold primary election	(2) Percentage vote PSOE in municipality	(3) Ln votes PSOE in municipality	(4) Prob. PSOE mayor	(5) Prob. mayor did not end 4-year mandate
PANEL A: restricted sample					
First-order polyn.					
Municipality> 20000 inhab.	0.167***	0.004	0.050	−0.060	−0.012
	(0.049)	(0.021)	(0.190)	(0.088)	(0.065)
Second-order polyn.					
Municipality> 20000 inhab.	0.218***	−0.027	0.070	−0.194	0.003
	(0.074)	(0.033)	(0.288)	(0.135)	(0.099)
N	544	418	256	424	491
Mean Dep var.	0.064	0.222	7.352	0.285	0.161
Bandwidth	12,480	10,659	7491	10,836	11,785
PANEL B: all municipalities					
First-order polyn.					
Municipality> 20000 inhab.	0.126***	0.027	0.138	−0.020	−0.040
	(0.035)	(0.023)	(0.165)	(0.077)	(0.056)
Second-order polyn.					
Municipality> 20000 inhab.	0.153***	0.032	0.209	0.032	0.033
	(0.052)	(0.035)	(0.257)	(0.117)	(0.085)
N	855	577	324	664	691
Mean Dep var.	0.044	0.268	7.537	0.410	0.161
Bandwidth	13,578	10,933	7056	11,871	12,143

Electoral outcomes only from 2015 local elections. Each coefficient provided in the table is estimated using a separate regression and measures the discontinuity at the cut-off (municipalities with more than 20,000 inhabitants) in terms of different electoral outcomes. In PANEL B the sample includes all municipalities, while in PANEL A the sample includes only municipalities in which the mayor at the time the primary elections were held in the country was not from PSOE. Following Gelman and Imbens, we estimate the results using polynomials of order 1 and 2. The bandwidth used is the optimal bandwidth as defined in Calonico et al. (2014). Standard errors are in parentheses. ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

Table 15 Results of the RDD: electoral outcomes of the PSOE at the discontinuity (only 2019)

	(1) Hold primary election	(2) Percentage vote PSOE in municipality	(3) Ln votes PSOE in municipality	(4) Prob. PSOE mayor
PANEL A: restricted sample				
First-order polyn.				
Municipality > 20000 inhab.	0.128***	−0.008	0.107	−0.132
	(0.015)	(0.020)	(0.153)	(0.090)
Second-order polyn.				
Municipality > 20000 inhab.	0.075***	−0.017	0.004	−0.068
	(0.022)	(0.029)	(0.219)	(0.130)
N	4495	488	165	292
Mean Dep var.	0.005	0.216	7.440	0.192
Bandwidth	81,828	14,641	7235	11,193
PANEL B: all municipalities				
First-order polyn.				
Municipality > 20000 inhab.	0.000	−0.002	0.110	−0.083
	(0.022)	(0.030)	(0.140)	(0.073)
Second-order polyn.				
Municipality > 20000 inhab.	0.054*	0.034	0.163	0.004
	(0.032)	(0.044)	(0.207)	(0.105)
N	1073	341	245	715
Mean Dep var.	0.014	0.300	7.732	0.413
Bandwidth	16,532	9092	6541	14,061

Electoral outcomes only from 2019 local elections. Each coefficient provided in the table is estimated using a separate regression and measures the discontinuity at the cut-off (municipalities with more than 20,000 inhabitants) in terms of different electoral outcomes. In PANEL B the sample includes all municipalities, while in PANEL A the sample includes only municipalities in which the mayor at the time the primary elections were held in the country was not from PSOE. Following Gelman and Imbens, we estimate the results using polynomials of order 1 and 2. The bandwidth used is the optimal bandwidth as defined in Calonico et al. (2014). Standard errors are in parentheses. ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

Table 16 OLS analysis: primary elections in PSOE and electoral results of other political parties (only municipalities within the optimal bandwidth)

	(1) Percentage vote VOX in municipality (Only 2019)	(2) Percentage vote PP in municipality	(3) Percentage vote Cs in municipality	(4) Percentage vote Podemos in municipality	(5) Percentage vote IU in municipality	(6) Percentage vote Cs− Podemos in municipality	(7) Percentage vote VOX+ PP+ Cs − Podemos − IU in municipality
PANEL A: restricted sample							
Primary elections	0.013*	−0.003	−0.009	0.007	0.015	−0.012	−0.021
	(0.007)	(0.019)	(0.008)	(0.006)	(0.009)	(0.011)	(0.023)
ln (Population)	0.010***	−0.016	0.028***	0.007**	−0.011	0.019**	0.026
	(0.002)	(0.016)	(0.007)	(0.003)	(0.010)	(0.008)	(0.022)
Observations	593	589	609	922	574	676	592
Province FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	N/A
Sample	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted
Mean Dep var	0.016	0.240	0.052	0.015	0.019	0.035	0.266
PANEL B: all municipalities							
Primary elections	0.000	0.026	−0.005	0.004	0.012	−0.014	0.007
	(0.008)	(0.018)	(0.009)	(0.006)	(0.008)	(0.010)	(0.020)
ln (Population)	0.024***	−0.005	0.040***	0.007***	−0.014**	0.021***	0.036**
Observations	432	786	739	1439	887	1053	866
Province FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	N/A
Sample	All	All	All	All	All	All	All
Mean Dep var	0.022	0.232	0.056	0.014	0.025	0.037	0.256
Bandwidth	10,719	9104	8701	13,152	9914	11,780	9706

Multivariate regression analysis of primary elections and the vote sharing received by other political parties. In PANEL B the sample includes all municipalities, while in PANEL A the sample includes only municipalities in which the mayor at the time the primary elections were held in the country was not from PSOE. Sample includes only municipalities within the optimal bandwidth as described by Calonico et al. (2014). Robust standard errors are in parentheses. ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

Table 17 Results of the RDD: second-stage estimations of the effect of holding primary elections on different outcomes

	(1) Percentage vote PSOE in municipality	(2) Prob. PSOE mayor	(3) Prob. mayor did not end 4 years mandate	(4) Percentage vote VOX in municipality (Only 2019)	(5) Percentage vote PP in municipality	(6) Percentage vote Cs in municipality	(7) Percentage vote Podemos in municipality	(8) Percentage vote IU in municipality	(9) Percentage vote Cs− Podemos in municipality	(10) Percentage vote PP+ Cs + VOX − Podemos − IU in municipality
PANEL A: restricted sample										
First-order polyn.										
PSOE holds primary elections	−0.070	−0.594	−0.216	0.177	0.285	0.091	−0.075	−0.008	0.152*	0.416*
	(−0.339; 0.200)	(−1.530; 0.342)	(−1.091; 0.660)	(−0.453; 0.806)	(−0.104; 0.674)	(−0.057; 0.238)	(−0.178; 0.027)	(−0.164; 0.149)	(−0.023; 0.327)	(−0.073; 0.905)
Second-order polyn.										
PSOE holds primary elections	−0.076	−0.888	0.021	0.042	0.435	−0.028	−0.021	−0.184	0.017	0.671
	(−0.416; 0.264)	(−2.210; 0.434)	(−0.913; 0.954)	(−0.131; 0.216)	(−0.195; 1.066)	(−0.198; 0.142)	(−0.124; 0.081)	(−0.486; 0.118)	(−0.189; 0.222)	(−0.162; 1.504)
N	645	1310	491	593	589	609	922	574	676	592
Mean Dep var.	0.222	0.247	0.161	0.016	0.240	0.052	0.015	0.019	0.035	0.266

Table 17 continued

	(1) Percentage vote PSOE in municipality	(2) Prob. PSOE mayor	(3) Prob. mayor did not end 4 years mandate	(4) Percentage vote VOX in municipality (Only 2019)	(5) Percentage vote PP in municipality	(6) Percentage vote Cs in municipality	(7) Percentage vote Podemos in municipality	(8) Percentage vote IU in municipality	(9) Percentage vote Cs− Podemos in municipality	(10) Percentage vote PP+ Cs + VOX − Podemos − IU in municipality
Bandwidth	10,225	14,820	11,785	15,826	9506	9853	12,704	9393	10,539	9606
PANEL B: all municipalities										
First-order polyn.										
PSOE holds primary elections	0.144	−0.250	−0.527	0.260	0.339	0.060	−0.103	−0.039	0.270**	0.633*
	(−0.256; 0.544)	(−1.714; 1.213)	(−1.559; 0.504)	(−0.393; 0.914)	(−0.094; 0.773)	(−0.105; 0.225)	(−0.228; 0.022)	(−0.259; 0.182)	(0.030; 0.510)	(−0.004; 1.270)
Second-order polyn.										
PSOE holds primary elections	0.390	−0.151	0.142	0.043	0.539	0.021	−0.079	−0.186	0.070	0.815
	(−0.601; 1.382)	(−2.049; 1.747)	(−0.924; 1.208)	(−0.228; 0.313)	(−0.341; 1.420)	(−0.269; 0.311)	(−0.197; 0.039)	(−0.496; 0.124)	(−0.172; 0.311)	(−0.170; 1.800)

Table 17 continued

	(1) Percentage vote PSOE in municipality	(2) Prob. PSOE mayor	(3) Prob. mayor did not end 4 years mandate	(4) Percentage vote VOX in municipality (Only 2019)	(5) Percentage vote PP in municipality	(6) Percentage vote Cs in municipality	(7) Percentage vote Podemos in municipality	(8) Percentage vote IU in municipality	(9) Percentage vote Cs− Podemos in municipality	(10) Percentage vote PP+ Cs + VOX − Podemos − IU in municipality
N	727	890	691	432	786	739	1439	887	1053	866
Mean Dep var.	0.281	0.403	0.161	0.022	0.232	0.056	0.014	0.025	0.037	0.256
Bandwidth	8552	9927	12,143	10,719	9105	8701	13,152	9914	11,078	9706

These tables reported the results of the second-stage estimates of the effect of PSOE's primary elections on different outcomes of interest at the discontinuity (municipalities with more than 20,000 inhabitants). In PANEL B the sample includes all municipalities, while in PANEL A the sample includes only municipalities in which the mayor at the time the primary elections were held was not from PSOE. Following Gelman and Imbens, we estimate the results using polynomials of order 1 and 2. The bandwidth used is the optimal bandwidth as defined in Calonico et al. (2014). 95% confidence intervals are in parentheses. $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

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