

Quality of Politicians and Electoral System. Evidence from a Quasi-experimental Design for Italian Cities

Abstract

We study the effect of the electoral system on the quality of politicians, measured by the average educational attainment, at the local level in Italy over the period 1994-2017. Since 1993, municipalities below 15,000 inhabitants vote with a single-ballot system, whereas cities above 15,000 inhabitants threshold are subject to a double ballot. By exploiting the discontinuous policy change nearby the population cut-off, we have implemented a RDD and found that runoff elections lead to a decrease in the educational attainment of local politicians by about 2% compared to years of schooling of politicians in municipalities voting with a single-ballot scheme. We speculate that the negative effect is driven by the different selection process of candidates adopted by political parties between runoff and single-ballot system. Findings are similar when we use alternative measures of quality of politicians related both to the previous occupation and to previous political experience, and when we control for different measures of political closeness.

JEL codes: C31; D72; I20; J42.

Keywords: Regression discontinuity design; Electoral system; Education; Political competition.

1. Introduction

As the rules by which citizens elect representatives within institutions depend on the electoral law adopted, choosing an electoral system is one of the most crucial decisions for any democracy. Also, since it affects the representativeness of the elective bodies and, in turn, the policies implemented by the politicians eventually elected, the electoral system bears on the effective application of democratic principles. For instance, it has been found that proportional representation and parliamentary systems, when compared to majoritarian and presidential systems, lead to higher levels of public expenditures (Persson and Tabellini, 2005; Milesi-Ferretti *et al.*, 2002) and that under plurality rule two-party systems usually prevail (Bordignon *et al.*, 2016).

The majority of contributions in the literature has focused on the impact of electoral systems on political competitiveness, public policies (see Chamon *et al.*, 2008; Ferraresi *et al.*, 2015; Bracco and Brugnoli, 2012), and turnout (Barone and De Blasio, 2013), even though empirical results are mixed. In particular, about the relationship between electoral rules and political competition, Callander (1999) finds that plurality elections tend to see more candidates running, and Cox and Neto (1997), and Chamon *et al.* (2008) highlight how more candidates are observed in runoff elections. As for Italian municipalities, the same conclusions are reached by Bordignon *et al.* (2016), who find that under runoff elections, the number of candidates is larger, but the influence of extremist voters on equilibrium policy is smaller, because the bargaining power of the political extremes is reduced compared to single round elections. Thus, the literature cited confirms that, compared to cities voting under a single-ballot rule, in cities that adopt a double-ballot voting system more candidates are competing in the elections, and that a larger number of parties are involved, with the effect of increasing the level of political competition.

In this regard, double-ballot systems might also affect the quality of elected politicians. On the one hand, single-ballot elections are characterized by a lower level of political competition, something that, with respect to double-ballot elections, should produce an adverse effect on the quality of politicians and their performance (see, for instance, De Paola and Scoppa, 2011; Galasso and Nannicini, 2011). On the other hand, since in single-ballot majority systems, mayors are supported by one list of candidates only, the risk of total failure for parties in losing the political competition increases. As a consequence, compared to runoff elections, under this electoral scheme, political parties are urged to select highly skilled candidates in support of the mayor. Therefore, the impact of the electoral system on the quality of politicians is not unequivocal, and the local Italian scenario seems to be appropriate in empirically stressing the causal effect of interest.

Our paper aims at providing evidence on the effect of the electoral system on the quality of politicians using data for Italian municipal administrations over the period 1994-2017. With D.L. 81/1993 a new electoral scheme based on population size was introduced: according to it, municipalities below 15,000 inhabitants adopt a single-ballot electoral system, whereas cities above that threshold adopt the double-ballot one. The Italian local institutional framework allows us to exploit a sharp change in the electoral rule and to implement a quasi-experimental design, namely a regression discontinuity design (RDD). In our analysis, we focus on a narrow sample of municipalities (Local Linear Regression) nearby the cut-off and compare cities just below and just above the threshold. These municipalities are assumed to be comparable in all their baseline characteristics (we discuss this assumption later in the paper). Consequently, municipalities adopting a single ballot provide a valid counterfactual for municipalities with runoff voting rule and by comparing these outcomes we identify the causal effect of interest. To the best of our knowledge, this is the first contribution that explicitly identifies a causal link between electoral rules and quality of politicians as measured by the average years of schooling.

Our results show that in cities with a double-ballot voting system, the educational attainment of local politicians decreases on average by about 2% compared to local politicians in cities just below the threshold. Findings tend to be the same when as an alternative measure of quality of politicians we use: (1) the rate of local elected politicians who were engaged in entrepreneurial and professional activities before being appointed in the municipal council (previous job/occupational status); (2) the rate of local elected politicians who have a college degree (those with a number of years of education equal to or greater than 16); and (3) the rate of elected politicians within the municipal bodies who had already been appointed as councilors or aldermen in the previous legislature. Also, our results are not sensitive to different specifications of our model, in which we add polynomials of the forcing variable higher than one, and use different optimal bandwidths.

The main explanation driving our results relies on the fact that in municipalities below 15,000 inhabitants candidates running for mayor are supported only by one single list. In the case of victory, the designated mayor, together with his or her supporting list of candidates, will gain full control of local government; otherwise, if he/she loses the competition, the opposition will hold the majority of seats within the council. For this reason, parties have a strong incentive in selecting high-quality politicians. Conversely, in cities above the cut-off candidates may be supported by one or more lists. The more candidates in each list, the higher the chance that a candidate supported by parties becomes mayor. In other words, in runoff elections, rather than selecting high-skilled candidates, political parties choose those who are more capable of attracting electors to cast their vote in their favor at polls, and in turn parties may find it optimal to attract low-quality politicians, in order to keep the overall level of party service sufficiently high (Mattozzi and Merlo, 2010).

In addition — and especially in large cities (in Italy only 9% of municipalities have a population size larger than 15,000 inhabitants, and in small municipalities most parties cannot be framed in the traditional Right/Left political dichotomy) — voters are more sensitive to ideology and party affiliation rather than to the candidates' characteristics. In the first round, when voters have to express their preference for the political parties, they cast their vote for the party that they believe to be most likely to fulfill their expectations (expressive voting). However, it is only in the second round, when votes have to be cast in favor of the candidates running for a mayor position (strategic voting), that voters are likely to focus on the two best candidates' features, including their educational attainment.

No other potential channel seems capable of explaining the negative effect of the electoral rule on the educational attainment of local politicians. In the literature, it has been shown that, compared to single-ballot elections, runoff elections are characterized by a larger number of candidates and political parties (these two measures of political closeness are potentially endogenous). Consequently, as a further robustness check, we have added some predetermined indicators of political competition: these are the electoral margin at the candidate and party level respectively measured at time $t-1$, and the number of candidates and parties running at previous electoral races. Also, after controlling for political closeness indicators, we still find that municipalities voting with the runoff system are characterized by worse local government apparatus where politicians have lower educational attainment.

Our paper also deals with the literature that focuses on the debate about the selection of good politicians for enhancing adequate policies and improving economic performance (see among others, Besley, Persson, and Sturm, 2007; Jones and Olken, 2005; Besley, 2007). In particular, Besley and Coate (1997) and Osborne and Slivinski (1996) provide a theoretical framework in which political competition is represented as a game where citizens compete to hold public office and show the relevance of politicians' identity for policy choices. Following this approach, Pande (2003) and Chattopadhyay and Duflo (2004) investigate the impact of caste and gender reservations on policy choices. Other papers focus, instead, on the effects of politicians' education on economic outcomes. Jones and Olken (2005) and Besley, Montalvo, and Reynal-Querol (2011) look at the relationship between the quality of politicians and growth, finding that growth is higher when leaders are more educated. Gagliarducci and Nannicini (2011) and Ferraz and Finan (2009), investigating the effects of remuneration on the quality and productivity of politicians, show that better-paid politicians perform better. Finally, Baltrunaite *et al.* (2014) and Daniele and Geys (2015) look at the causal effect of gender quotas and organized crime on local politicians' educational attainment. We add to this literature, investigating the effect produced by an exogenous change in the electoral rule on the quality of politicians.

Finally, our work is also related to the literature investigating the effect of the electoral system on the accountability of politicians and their performance. Bracco and Brugnoli (2012) find that cities voting under runoff levy lower taxes, compared to municipalities voting under a single-ballot scheme, and receive more transfers from the upper-tier government, especially if there is a political alignment between central and local government. Conversely, Cipullo (2018) show that runoff system leads to an increase in municipal expenditures by 20 percent roughly, and this effect is essentially driven by an increase in expenditures on administrative services. Instead, no effect is detected on expenses related to culture, education and welfare. We add to this literature showing that cities voting under runoff are characterized not only by a lower level of accountability due to larger coalitions, but also to a lower educational attainment of elected politicians.

The paper is structured as follows. In Section 2 we describe the local Italian institutional framework and the datasets used in the empirical analysis. Section 3 describes the methodology design and its validity. Section 4 and 5 present the main results, whereas in Section 6 some robustness checks are considered. The conclusions are in Section 7.

2. Institutional setting and data

2.1. Municipal elections in Italy

In Italy, municipal administrations are involved in many important tasks, such as managing of public utilities (local roads, water, sewage, and garbage collection), providing public housing, transportation, nursery schools, and assistance to the elderly. In particular, the main bodies of a municipality are the Executive Committee (“Giunta Comunale”) and the City Council (“Consiglio Comunale”). The executive authority is assigned to a Mayor (“Sindaco”) heading the Executive Committee, while the City Council is endowed with a monitoring role and some residual powers, especially regarding budgetary controls. Since the services provided by municipalities have a significant impact on the citizens’ daily lives, voters are generally very interested in the composition as well as in the performance of the municipal apparatus.

The system currently regulating municipal elections in Italy was introduced in 1993 (D. L. 81/1993), providing for the direct election of the mayor with some differences according to the size of the city. Since 1993, mayors have been subject to a two-term limit, while members of the Executive Committee and the City Council can be re-elected indefinitely. Municipal elections in Italy are held every 5 years¹ and municipal governments cannot choose the election schedule. In certain circumstances, the legislature may not survive until the end of its legislative term, e.g., because of a mayor’s early resignation. In these cases, elections are held earlier than their original schedule and, as a consequence, compared to the other municipalities that have completed their legislative term according to the regular schedule, all subsequent elections will be held at different times. Municipalities keep a registry of eligible voters, which is revised whenever there is an election. All citizens who are 18 or older on the election date are automatically registered to vote. Voting takes place in polling stations organized by the local authorities. Elections are organized according to a traditional paper ballot system.

Moreover, in municipalities with a population size smaller than 15,000 inhabitants elections are held with single ballot: the candidate with the highest number of votes is elected (relative majority). Whoever has obtained the highest number of votes becomes a mayor and the connected list wins 2/3 of the council seats; the remaining third is divided among the other parties or coalitions based on the percentages obtained. If the two leading candidates running for a mayor position have received the same number of votes, a second ballot will be held on the second following Sunday. In case of further tie, the oldest candidate is elected.

Conversely, in municipalities with more than 15,000 inhabitants, elections are held with double ballot: if in the first round none of the candidates obtains an absolute majority (50% + 1 of the votes), a second ballot is held between the two most voted candidates on the following second Sunday. Each candidate can be connected to *one or more lists* and electors can express two choices: one for the mayor and one for the list of councilors. It is possible to choose a different list from that in which the candidate to whom the elector has expressed his vote is grouped (separate vote). In the intermediate

¹ With the exception of the years between 1993 and 1999, when the electoral mandate lasted 4 years.

phase between the first and second round, the two candidates who go to ballot can link to lists other than those who had supported them in the first round. In the second round, electors can only express a vote for candidates running for a mayor position, while votes on the lists are not allowed.

As far as the election of councilors within the municipal apparatus is concerned, in municipalities with a population size smaller than 15,000 inhabitants each mayor candidate is connected to *only one* list. Therefore, when a candidate is elected, the list of councilors connected to him/her is chosen automatically. Each electoral list must be composed by a number of candidates not higher than the number of councilors to be elected by law and not less than 3/4 of the total. Voters can express a preference for the councilors of the list connected to the chosen mayor candidate by writing their last name under the list. In municipalities with more than 15,000 inhabitants, instead, the lists must include a number of candidates not exceeding the number of councilors to be elected by law and not less than 2/3 of the total. Once votes are cast, three different situations can arise for the election of the council: 1) the mayor is elected in the first round, but the list or lists linked to the mayor do not reach 50% of the votes: in this case the seats are distributed according to the proportional d'Hondt rule and it is possible that the City Council may be composed for the majority by members of the opposition in the event that the list or the lists of one of the defeated candidates have obtained more than 50% of the votes; 2) the list or the lists connected to the candidate elected in the first round reaches 40% of the votes and no other list exceeds 50%. In this case, the list attached to the elected candidate is awarded the majority prize (60% of the seats). The remaining seats are assigned with the d'Hondt method; 3) the mayor is elected at the ballot, but the supporting list gets already in the first round 40% of the votes and none of the other lists has reached 50%: even in this case the list is awarded the majority prize (60%) and the rest of the seats is assigned with the proportional method (d'Hondt system). Lists that have not reached the 3% threshold of votes are not admitted to the distribution of seats.

Summing up, it is clear that in municipalities with less than 15,000 inhabitants the elected mayor will undoubtedly have a majority in council; this may not happen in municipalities with more than 15,000 inhabitants, where the mayor may be elected along with a council controlled by the opposition.

2.2 Data description

In our analysis we have used three different sources of data: first, an administrative dataset provided by the Ministry of the Interior containing detailed information on gender, age, and education level of all politicians in charge at December 31st of each year from 1985 to 2017; second, an electoral dataset provided by the Italian Ministry of the Internal Affairs containing information for all municipal elections on the number of voters and the number of individuals eligible to vote over the period 1994-2017; and third, 1991, 2001 and 2011 Italian Census of Population. Since the electoral reform introducing the double ballot came into force in 1993, we restrict our analysis over the period 1994-2017 for first-round elections, and after selecting an optimal bandwidth as proposed by Imbens and Kalyanaraman (2012), we end up with a sample of 4,165 observations for 1,173 municipalities in the neighborhood of the 15,000 inhabitants cut-off.

Table 1 reports the descriptive statistics of the variables used in our empirical exercise. We build our main outcome variable *Education of Politicians* (with a mean of 14) as the average educational attainment of all members within local municipalities at the time of elections. In our sample, the rate of politicians with a college degree is about 36% (*Graduated Politicians*). We have adopted this variable from previous work by, among others, De Paola and Scoppa (2010), and Baltrunaite *et al.*

(2014), where human capital is considered as a valid proxy for individuals' ability and skills. The average education level of local politicians in a given municipality is calculated on an annual basis by expressing their degrees with the minimum number of years necessary to obtain them². Also, given the detailed information of the dataset, we are also able to distinguish between the educational level of mayors, i.e., *Education of Mayors* (with a mean of 15.38 and a standard deviation of 3.08), the educational attainment of councilors, namely *Education of Councilors* (with a mean of 13.76 and a standard deviation of 1.31), and of members of the Executive Committee, i.e., *Education of Aldermen* (with a mean of 14.21 and a standard deviation of 2.09). Moreover, we also distinguish between the average years of schooling of male and female local politicians, namely *Education of Male Politicians* and *Education of Female Politicians*, with a mean of 13.81 and 14.86 respectively.

Table 1. Descriptive Statistics for the Discontinuity Sample

Variables	Mean	S.D.	Min	Max	Observations ³
Education of Politicians	14.0018	1.3771	8	18	4,165
High Skill	0.3544	0.2392	0	1	4,165
Graduated Politicians	0.3563	0.1701	0	1	4,080
Incumbent Mayor	0.5803	0.4936	0	1	4,165
Incumbent Politicians	0.5029	0.1739	0	1	4,165
Education of Mayors	15.3808	3.0761	5	18	3,913
Education of Councilors	13.7592	1.3066	8	18	3,985
Education of Aldermen	14.2099	2.0912	7	18	3,346
Education of Male Politicians	13.8084	1.4570	8	18	4,149
Education of Female Politicians	14.8565	2.1852	5	18	3,701
Rate of Female Politicians	0.1966	0.1255	0.0344	1	3,783
Age of Politicians	44.2797	3.9833	30	71	4,165
Female Politicians	0.9083	0.2886	0	1	4,165
Population Size/1,000	12.372	3.9431	7.553	22.389	4,165
Voter Turnout	0.7750	0.0795	0.4562	0.9253	4,165
Education Pop	7.7307	1.0171	4.9863	11.7465	4,165
Employment	0.3320	0.1302	0.0549	0.8298	4,165
Area (in sq. km.)	50.0809	53.9059	1.62	551	4,165
Candidates Electoral Margin	0.1371	0.1134	0	0.7144	4,152
Candidates Electoral Margin (t-1)	0.1366	0.1147	0	0.7144	3,454
Parties Electoral Margin	0.1220	0.1105	0	0.7144	3,475
Parties Electoral Margin (t-1)	0.1249	0.1249	0	0.7144	2,847
No. Parties	5.3579	3.9582	1	36	3,484
No. Parties (t-1)	5.0223	3.6272	1	36	2,858
No. Candidates	3.7377	1.3171	2	16	4,152
No. Candidates (t-1)	3.7423	1.3521	2	16	3,454

Source: Local Administrators Data set (1985-2011), Italian Ministry of Internal Affairs; Italian Census of Population (1991- 2001-2011)

With the information regarding local politicians' previous occupational status, we have built *High Skill*, that is, the rate of politicians (roughly 35% in our sample) in the local government who were engaged in entrepreneurial and professional activities before obtaining a seat in a municipal council. Conversely, using the information about the local administrators' past political experience, we have built two different variables: a dummy variable *Incumbent Mayor* taking the value of 1 when local politicians were appointed mayor during the previous legislature and zero otherwise; and a variable

²In Italy, you need 13 years of schooling to attain a high-school degree, and 16-18 for a college degree. In our sample, the educational attainment of people with a Ph.D. or a M. A. is always indicated in 18 years.

³ Observations refer to the specification in which we regress the average educational attainment of local politicians on all of municipal covariates, including province-year fixed effect and using the optimal bandwidth proposed by Imbens and Kalyanaraman (2012).

Incumbent Politicians as measured by the rate of local politicians serving as councilors or aldermen during the previous legislature. From Table 1, we can find that in 57% of municipal bodies there is a politician who has already served as mayor in the previous legislature, and that the rate of aldermen and councilors who served in the same quality in the past is about 50%.

Furthermore, with the information on candidates' gender we have built a dummy variable *Female Politicians* taking the value of 1 when there is at least one woman among local politicians: the rate of municipal bodies in which there is at least a woman is about 91% with a standard deviation of 0.29, whereas the rate of female politicians within municipal bodies is about 20%. Finally, local politicians are on average 44 years old.

Also, we measure *Voter Turnout* as the ratio between the number of actual voters and the number of eligible voters in the first round. As shown in Table 1, in our sample, the average turnout over the period 1994-2017 has been of 77.5%, with a standard deviation of 0.08. Using the information on Italian local electoral outcomes, we have also built some proxies of the degree of competition characterizing each electoral race. We have information on the number of votes obtained by each candidate/party and have created the variables *Candidates Electoral Margin* and *Parties Electoral Margin* as the difference between the votes obtained by the two leading candidates/parties (divided by the number of eligible voters). These two proxies represent an inverse measure of expected electoral closeness and are on average equal to 0.137 and 0.121 respectively⁴. Another proxy of the degree of political competition is the number of candidates/parties competing at the electoral race (*No. Candidates* with an average of 3.74 and a standard deviation of 1.32, and *No. Parties* with a mean of 5.45 and a standard deviation of 4). Moreover, as further indicators of competitiveness, we use the margin by which the incumbent candidate/party won the previous election and the lagged value of the number of candidates/parties.

Finally, to control for municipalities' demographic characteristics, we use the 1991, 2001 and 2011 Italian Census of Population. Data from the 1991 census are used for elections held in the period 1994-2000, data from the 2001 census are used for elections held between 2001 and 2010, while data from 2011 census are used for elections held over the 2011-2017 period. We have information on the size of the resident population, the average level of employment, the educational attainment of the population, and the municipal area in sq. Km. As shown in Table 1, the average population size in our sample is 12,372, the average educational attainment of the population — by considering only people aged 6 or above — is about 8 years, whereas the fraction of employed people in the population is 33%.

3. Empirical framework and validity of the RDD

3.1 Methodology

To recover the causal effect of the electoral system on local politicians' average years of schooling, we use a quasi-experimental design and implement a sharp Regression Discontinuity Design (RDD), since the local electoral system (single ballot vs. runoff) exogenously changes around the 15,000 inhabitants cut-off. The probability that a municipality has a population just above or just below the threshold is understood to be random and helps us overcome difficulties arising from the presence of confounding and unobservable factors that affect local politicians' educational attainment.

⁴ The value 0 characterizes few elections in which the two leading candidates/parties obtained exactly the same number of votes.

Consequently, we can compare cities adopting a single-ballot system (below the 15,000 inhabitants threshold) to municipalities using a double ballot (just above the same cut-off). We have decided to estimate a Local Linear Regression (henceforth LLR), by means of OLS with fixed effects at the province level, as in Bordignon *et al.* (2016) and Cipullo (2018), controlling for a linear polynomial of the normalized forcing variable, i.e., population size, along with an interaction term of the first order between the treatment and the assignment variable, and choosing an optimal bandwidth as suggested by Imbens and Kalyanaraman (2012). The basic econometric specification is, therefore, the following⁵:

$$\text{Education of Politicians}_{it} = \beta_0 + \beta_1 \text{Runoff}_{it} + \beta_2 X_{it} + \beta_3 P_{it} + \beta_4 (\text{Runoff} * P)_{it} + \varphi_p + \mu_t + \varepsilon_{it}, \quad [1]$$

where *Education of Politicians*_{it} is a variable measuring the educational attainment of local politicians, as computed by the average years of schooling (De Paola and Scoppa, 2010; Baltrunaite *et al.*, 2014; Daniele and Geys, 2015), whereas *P*_{it} is a linear polynomial of the normalized assignment variable (population size minus 15,000)⁶. Furthermore, *X*_{it} is a vector of controls for municipal characteristics (the average educational attainment of inhabitants, the share of employed people in the population, and the municipal area), φ_p and μ_t are respectively a province and a year fixed effect, whereas ε_{it} is the stochastic error term of the model. The fixed effects φ_p account for the time-invariant characteristics of the province, either observable or unobservable.

In all regressions, standard errors are robust to heteroskedasticity and are clustered at the municipal level to take into account that the quality of politicians in the same municipality may be affected by common shocks.

3.2 Regression discontinuity design validity checks

It is standard in the RD design to demonstrate that treatment and control groups are similar in their observed baseline covariates. To verify whether the assumptions of the RD are satisfied, we present a test of the continuity of the distribution of the covariates added in the main specification at the cut-point. The idea behind this kind of test is to regress a covariate on a first or second-order polynomial of the forcing variable along with a dummy for the treatment status: a statistically insignificant coefficient for the treatment dummy is taken as evidence in favor of local random assignment (Caughey and Sekhon, 2011; Lee, 2008; Lee, Moretti and Butler, 2004).

In Table 2, in the neighborhood with the 15,000 inhabitants threshold, by choosing an optimal bandwidth as suggested by Imbens and Kalyanaraman (2012), we test whether the runoff is predictive of a broader set of municipal and candidates' characteristics. We control for a quadratic polynomial of the forcing variable, for a second-order interaction term between the assignment variable and the treatment status, and for province-year fixed effects. Moreover, standard errors are robust to heteroskedasticity and are clustered at the municipal level. Overall, as highlighted in Table 2, the local electoral rule does not predict any of the predetermined characteristics.

⁵ Barone and De Blasio (2013) consider only polynomial approximations using all municipalities, whereas Ferraresi *et al.* (2015) and Bracco and Brugnoli (2012) use municipal fixed effects. For a review of the criticisms to these empirical methodologies see Cipullo (2018).

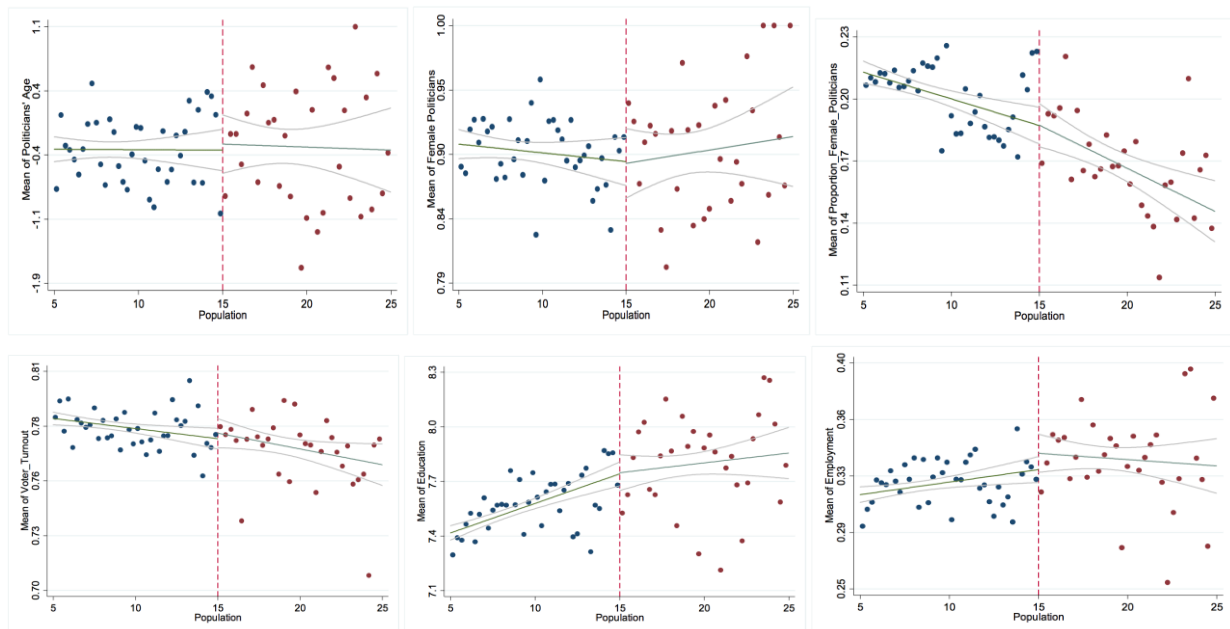
⁶ In the main specification we use a linear polynomial of the forcing variable. As reported in the robustness checks section, we also run a LLR by means of OLS (with province-year fixed effect) with polynomials of population size higher than 1.

Table 2: Balance Test on Control Variables

Variables	Optimal Bandwidth	Obs.
Age of Politicians	-0.5076 (0.4098)	4,165
Female Politicians	0.0445 (0.0319)	4,165
Rate of Female Politicians	-0.0139 (0.0108)	3,783
Voter Turnout	0.0011 (0.0058)	4,165
Education Pop	0.0059 (0.0752)	4,165
Employment	0.0097 (0.0135)	4,165
Area (in sq. Km.)	3.0719 (6.6248)	4,165

Note: Municipalities between 7,550 and 22,450 inhabitants. Baseline RDD estimates. We control for province and year fixed effects and we focus on the period 1994-2017. Estimation method: LLR with a second-order polynomial of the forcing along with an interaction of the second order between the treatment status and the assignment variable. Standard Errors are robust to heteroscedasticity and are clustered at municipal level (shown in brackets). Significance at the 10% level is represented by *, at the 5% level by **, and at 1% level by ***.

As a further test, in Figure 1 we present some descriptive graphs of the predetermined characteristics plotted against population size nearby the 15,000 inhabitants cut-off. Each figure shows the assignment variable cell means of the predetermined characteristics in the proximity of the population threshold along with the fitted values of a locally weighted regression that is calculated within each segment. On the whole, Figure 1 confirms results highlighted in Table 2.



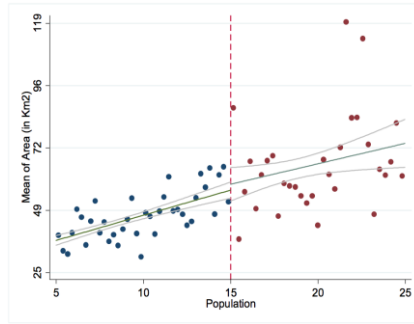


Figure 1: Discontinuity in the predetermined characteristics at the 15,000 cut-off

As a last specification test of our design, we check the continuity of the forcing variable (i.e., population size) nearby the cut-off of 15,000 inhabitants and perform a McCrary test by running a kernel local linear regressions of the log of the density separately on both sides of the threshold (McCrary, 2008). If there were any discontinuities at the cut-off point, one might be concerned that mayors can manipulate the assignment variable and sort below/above the threshold in order to pass from an electoral system to the other. In other words, if units of observation have a great deal of control over the assignment variable and if there is a perceived benefit to a treatment, one would certainly expect units of observation on one side of the threshold (single-ballot municipalities) to be systematically different from those on the other side (double-ballot municipalities)⁷. As we can see in Figure 2, when we consider municipalities with a population size lower than 30,000 inhabitants, the log of the frequency of population size to the right and to the left of the threshold is not statistically significant at conventional levels, as it equals 0.1895 with a standard deviation of 0.1178.

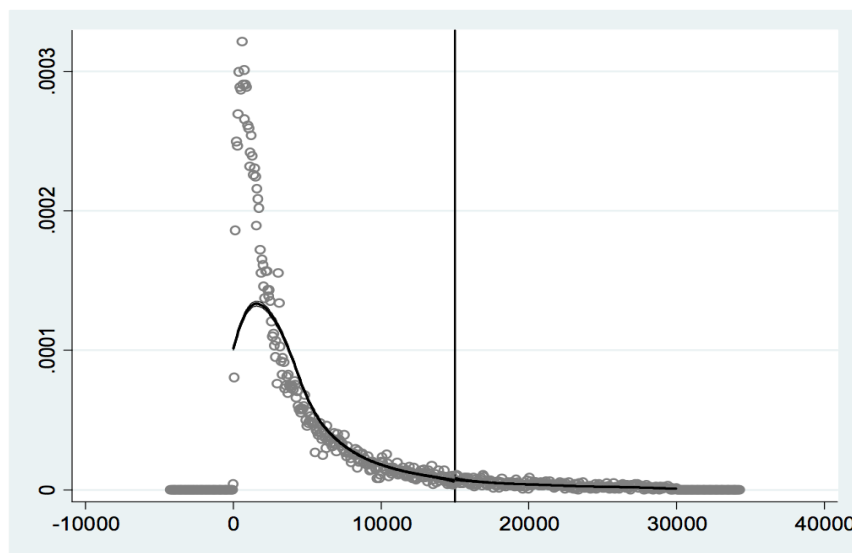


Figure 2: McCrary test. Manipulation of the forcing variable at the 15,000 cut-off

⁷ However, in principle, it is very hard in Italy to manipulate population size at the municipal level: indeed, Census is run independently by the National Statistical Office, so that false reporting should be ruled out.

4. Main results

Table 3 reports the main Sharp RDD results where an optimal bandwidth, as proposed by Imbens and Kalyanaraman (2012) (hereafter IK), has been adopted. In column (1) we have only added a first-order polynomial of the normalized forcing variable and the interaction term between the assignment variable and the treatment status, while in columns (2) and (3) we have added year dummies and province fixed effects respectively. In column (4) we also control for municipal characteristics⁸.

Table 3. Effect of Runoff Elections on Average Education of Elected Politicians. Sharp RDD. LLR Results

	(1)	(2)	(3)	(4)
VARIABLES	Education of Politicians	Education of Politicians	Education of Politicians	Education of Politicians
Runoff	-0.260** (0.120)	-0.254** (0.111)	-0.231** (0.0997)	-0.274*** (0.095)
Employment				-0.118 (0.254)
Area (in sq. Km.)				0.001*** (0.001)
Education Pop				0.662*** (0.054)
Constant	14.15*** (0.075)	14.71*** (0.203)	14.60*** (0.358)	8.555*** (0.522)
Population Polynomial	First	First	First	First
Interaction Term	First	First	First	First
Province FE	No	No	Yes	Yes
Year FE	No	Yes	Yes	Yes
Controls	No	No	No	Yes
Optimal Bandwidth	IK	IK	IK	IK
Observations	4,165	4,165	4,165	4,165
R-squared	0.011	0.127	0.276	0.320

Note: Municipalities between 7,550 and 22,450 inhabitants. Sharp RDD estimates. We focus on the period 1994-2017. Estimation method: LLR with a first-order polynomial of the forcing variable and interaction term. Standard Errors are robust to heteroscedasticity and are clustered at the municipal level (shown in brackets). Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

In all specifications, standard errors are robust to heteroscedasticity and clustered at the municipal level in order to take into account potential common shocks affecting municipalities.

Results highlight how a lower quality of local politicians characterizes municipalities voting under runoff, where the average educational attainment measures the quality of elected politicians, compared to cities using a single-ballot scheme (columns 1-4). The change in the electoral system leads indeed to a reduction in the level of education of local politicians by 0.274 years (see column 4). The coefficient of interest is statistically significant, stable across specifications and not affected by the inclusion of controls. In particular, it corresponds to a 2% decrease roughly compared to the average value of 14 years of education in the 7,550-22,450 population window.

Although the effect we find seems to be small in terms of magnitude (it corresponds to approximately 3 months less of education on average), it is in line with the literature studying the effect of other Italian policies on the quality of local politicians. In fact, Baltrunaite *et al.* (2014) show that after the introduction of gender quotas the level of education of municipal councilors in treated cities increased by 2 months roughly compared to those in the control group; in addition, Daniele and

⁸ We do not control for elected politicians' characteristics as they are potentially endogenous.

Geys (2015) highlight how the average education level of local politicians is 3 months lower in the period before the dissolution of the local government due to mafia infiltration.

The negative impact of the runoff scheme, compared to the single-ballot, on the quality of elected politicians, can be explained through different channels. First, the *ex-ante* selection procedure of candidates by parties might diverge between the two electoral systems. In cities above the 15,000 cut-off candidates running for a mayor position are usually supported by more than one list, whereas in single-ballot elections candidates are affiliated to one list only⁹. In fact, in elections held under runoff voting, political parties may select candidates with no regard for their intrinsic qualities, such as experience or educational attainment, since they know *a priori* that candidates might increase the probability of winning the competition through parties' coalition.

Table 4. Effect of Runoff Elections on Average Education of Mayoral Candidates. Sharp RDD. LLR Results

VARIABLES	(1)	(2)	(3)	(4)
	Education of Candidates	Education of Candidates	Education of Candidates	Education of Candidates
Runoff	-0.416*	-0.379*	-0.284*	-0.319*
	(0.223)	(0.214)	(0.191)	(0.190)
Employment				0.371
				(0.508)
Area (in sq. Km.)				0.001
				(0.001)
Education Pop				0.421***
				(0.092)
Constant	15.72***	15.93***	14.27***	9.493***
	(0.123)	(0.374)	(0.459)	(0.938)
Population Polynomial	First	First	First	First
Interaction Term	First	First	First	First
Province FE	No	No	Yes	Yes
Year FE	No	Yes	Yes	Yes
Controls	No	No	No	Yes
Optimal Bandwidth	IK	IK	IK	IK
Observations	4,112	4,112	4,112	4,112
R-squared	0.012	0.037	0.145	0.151

Note: Sharp RDD estimates. We focus on the period 1994-2017. Estimation method: LLR with a first-order polynomial of the forcing variable and interaction term. Standard Errors are robust to heteroscedasticity and are clustered at the municipal level (shown in brackets). Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

In order to test this channel and to check whether parties select low-quality candidates in runoff elections, compared to the single-ballot scheme, in Table 4 we replicate specifications reported in Table 3 (using the IK optimal bandwidth) and measure the outcome variable as the educational attainment of candidates running at local elections. Unfortunately, as the Italian Ministry of Internal Affairs does not provide any information about candidates that run for a seat in the City Council supporting the mayor, the focus is on those running for a mayor position only.

Results show that the different *ex-ante* selection of candidates by political parties between the two electoral systems matters in explaining the lower quality of elected politicians characterizing cities

⁹ Within the government apparatus, runoff elections positively affect the diversity of local politicians with regards to their average years of schooling, as measured by the standard deviation of the average educational attainment. The coefficient of the treatment variable is 0.1209 (p-value: 0.008) using the IK bandwidth. However, the effect is sensitive to the use of smaller bandwidths.

voting under the runoff scheme. In fact, double-ballot elections lead to a lower educational attainment of candidates running for a mayor position, compared to single-ballot elections, by 0.319 years of education: it corresponds to a 2.1% decrease compared to the average value of 15.37 years of education of candidates in the population window, selected through the IK procedure.

Sharp RDD results are also shown in Figure 3. In particular, we plot the mean of our outcome variables against the 15,000 population threshold, with the IK optimal bandwidth, by estimating a model that assumes a linear relationship between our dependent variables and the forcing variable. The connected points show the predicted values from a linear regression of our different measures of the quality of politicians on population size. In particular, in the left panel we focus on the average educational attainment of all the local elected politicians, whereas in the right panel the focus is on the educational attainment of candidates running for a mayor position. Overall, these descriptive graphs confirm the results displayed in Table 3 and 4.

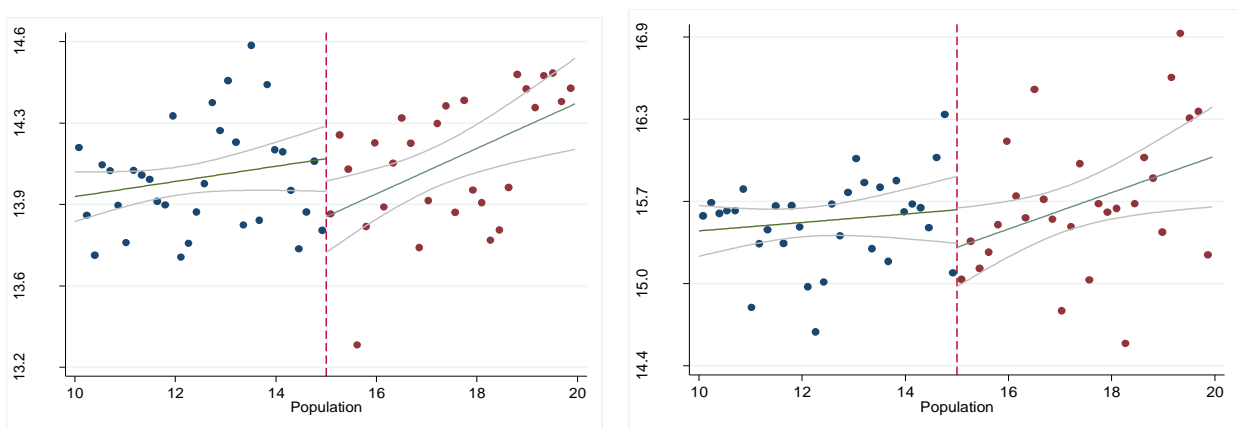


Figure 3: Sharp RDD. Effect of Runoff on the Quality of Elected Politicians and Candidates at the 15,000 cut-off.

Moreover, the ideology of voters or their affiliation to parties can be seen as further channels through which runoff scheme negatively affects the quality of elected politicians, as these elements become more important when compared to candidates' skills in large municipalities,¹⁰ and especially in cities above 15,000 voting under runoff. This applies especially in the first round, as in the second one voters cannot cast any vote to parties and in order to elect their best candidate have to focus exclusively on the latter's qualities, such as their educational attainment.

Another channel explaining the negative impact of the runoff scheme on the quality of elected politicians is related to voters' preferences, as voters' choice about politicians to be elected should reflect their expectations. This is essentially true if low-quality (in terms of educational attainment) electors choose politicians with similar characteristics. In order to test this conjecture we have run separate regressions splitting the sample based on the bottom (below 25th) and top (above 75th) quantile of *Education Pop* distribution.

Table 5 reports the results. In columns (1) and (2) we have focused on the municipalities in our sample (IK optimal bandwidth) with an educational attainment of the resident population below the

¹⁰ In small municipalities, the rate of *liste civiche*, i.e., parties that do not belong to either the Left or the Right, is very high. In these municipalities voters are more sensitive to the candidates' characteristics rather than to ideology or party affiliation.

25th percentile, whereas in columns (3) and (4) we look at cities characterized by a high level of education (above the 75th percentile). Moreover, in odd specifications, we have controlled for province and year fixed effects only, while in even columns we have added municipal controls. In all specifications, we have used a linear polynomial of the forcing variable along with a linear interaction term between the treatment and the normalized population size.

Table 5. Runoff Elections and Education of Politicians. Heterogeneity based on Education pop. LLR Results

VARIABLES	(1) <25th Education of Politicians	(2) <25th Education of Politicians	(3) >75th Education of Politicians	(4) >75th Education of Politicians
Runoff	-0.262 (0.181)	-0.267 (0.188)	-0.043 (0.179)	-0.050 (0.178)
Constant	13.46*** (0.592)	6.844*** (1.194)	14.79*** (0.757)	10.52*** (1.181)
Population Polynomial	First	First	First	First
Interaction Term	First	First	First	First
Controls	No	Yes	No	Yes
Province and Year FE	Yes	Yes	Yes	Yes
Optimal Bandwidth	IK	IK	IK	IK
Observations	1,043	1,041	1,040	1,040
R-squared	0.403	0.437	0.225	0.249

Note: Municipalities between 7,550 and 22,450 inhabitants. Sharp RDD estimates. We focus on the period 1994-2017. Estimation method: LLR with a first-order polynomial of the forcing variable and interaction term. Standard Errors are robust to heteroscedasticity and are clustered at the municipal level (shown in brackets). Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

In sum, as highlighted in Table 5, we do not find any impact of our treatment variable on the educational attainment of local politicians in municipalities with a low and high level of education¹¹. The coefficient on *Runoff* is always negative but far away from being significant at conventional levels. Also, there is no statistically difference between the coefficients on the treatment across municipalities with a low and a high level of education¹². This reassures us that the runoff impact previously found in Table 3 is not due to voter's preferences, otherwise we would have expected: (1) the coefficient on *Runoff* to be negative and significant only in those cities with a low level of education; (2) a statistically difference in the size of the runoff effect between the two groups of municipalities.

In addition, this channel would also work if changing the electoral system leads to a change in the electoral body. Again, we do not find any significant effect of the runoff scheme on the number of voters, the number of electors, and in turn on voter turnout (as highlighted in section 3.2). Findings are similar when we control for municipal fixed effects, exploiting the within variation among those cities that changed the electoral system over time (results are available upon request).

¹¹ The change in the electoral system negatively affects the quality of elected politicians only in those municipalities with an average educational attainment of residents between the 25th and the 75th percentile of *Education Pop* distribution (results are available upon request).

¹² We have performed the *suest* test in Stata, comparing the coefficient attached to our treatment variable between specification (4) and (2), and (3) and (1) respectively.

5. Runoff and Quality of Politicians: Different Measures and Heterogeneous Effects

In Table 6 we re-estimate the specification reported in column (4) of Table 3, but as alternative measures of the quality of elected politicians we have used: (1) the rate of local politicians who hold a college degree (column 1); (2) the share of local politicians who were engaged in entrepreneurial and professional activities before obtaining a seat in a municipal council; (3) a dummy variable for the presence of the incumbent mayor within the municipal apparatus (column 3); and (4) the rate of local politicians who in the previous legislature had already served as councilors or aldermen (column 4).

Table 6. Effect of Runoff Elections on Alternative Measures of Politicians' Quality. Sharp RDD. LLR Results

	(1)	(2)	(3)	(4)
VARIABLES	Graduated Politicians	High Skill	Incumbent Mayor	Incumbent Politicians
Runoff	-0.031** (0.013)	-0.021* (0.012)	-0.025 (0.033)	-0.107*** (0.011)
Constant	0.191*** (0.065)	0.099 (0.075)	0.154 (0.157)	0.538*** (0.048)
Population Polynomial	First	First	First	First
Interaction Term	First	First	First	First
Province and Year FE	Yes	Yes	Yes	Yes
Municipal Controls	Yes	Yes	Yes	Yes
Optimal Bandwidth	IK	IK	IK	IK
Observations	4,080	4,165	4,165	4,165
R-squared	0.235	0.555	0.100	0.301

Note: Municipalities between 7,550 and 22,450 inhabitants. Sharp RDD estimates. We focus on the period 1994-2017. Estimation method: LLR with a first-order polynomial of the forcing variable and interaction term. Standard Errors are robust to heteroscedasticity and are clustered at the municipal level (shown in brackets). Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

In particular, under runoff voting, municipalities display a lower rate of politicians with a college degree in municipal councils by 3.10% compared to cities voting under a single-ballot scheme. In column (2) we look at a different measure of the quality of politicians, namely their previous occupation. We have built the variable *High Skill* with a mean of 0.3543 within the 7,550-22,450 population range, and a standard deviation of 0.2392. A higher rate of politicians whose previous occupation is skill-intensive would be interpreted as an indicator of the higher quality of the political body. We have found that runoff elections lead to a lower rate of high-skilled local politicians by 2.1% (corresponding to a decrease of about 6%).

Conversely, in column (3) and (4) we have looked at local politicians' past political experience: runoff elections lead to a lower share of individuals with "political skills" (incumbent councilors and aldermen) by 10.7%, whereas, no effect is found on the probability of having an incumbent mayor in the municipal apparatus¹³.

Furthermore, the richness of our collected dataset also allows us to investigate whether the change in the electoral system affects the educational attainment — measured by years of schooling — of

¹³ Descriptive graphs confirm results displayed in Table 5. We do not report them for reasons of space, but they are available upon request.

mayors, councilors, aldermen, male and female local politicians around the 15,000 threshold separately. Table 7 reports the results.

In cities above the cut-off, mayors have an educational attainment lower than the level of education of mayors in municipalities below the threshold by 0.481 years. In other words, under runoff voting, the education of mayors is lower by roughly 3.1% compared to the average value of 15.48 in our sample, using the IK optimal bandwidth. The coefficient attached to our treatment variable is significant at the 10% level. We have found similar results (the significance is at the 1% level) when our outcome variable is measured by years of schooling of councilors (we observe a decrease of 2.83% passing from single to double ballot). Moreover, under runoff voting, the educational attainment of male politicians in the local government apparatus is lower compared to municipalities voting under single-ballot by roughly 0.3 years of schooling. Conversely, no effect is found on the education of female politicians and aldermen (in this case we did not expect to detect any impact, given that mayors directly choose aldermen once the local government is composed).

Table 7. Effect of Runoff Elections on Education for Mayors, Councilors and Aldermen. Sharp RDD.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Education of Mayors	Education of Councilors	Education of Aldermen	Education of Male Politicians	Education of Female Politicians
Runoff	-0.481* (0.292)	-0.390*** (0.092)	-0.024 (0.184)	-0.321*** (0.104)	-0.086 (0.170)
Constant	15.75*** (0.498)	8.128*** (0.618)	8.994*** (0.864)	8.021*** (0.685)	11.07*** (0.832)
Population Polynomial	First	First	First	First	First
Interaction Term	First	First	First	First	First
Province and Year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Optimal Bandwidth	IK	IK	IK	IK	IK
Observations	3,913	3,985	3,346	4,149	3,701
R-squared	0.026	0.378	0.185	0.292	0.181

Note: Municipalities between 7,550 and 22,450 inhabitants. Sharp RDD estimates. We control for province and year fixed effects and we focus on the period 1994-2017. Estimation method: LLR with a first-order polynomial of the forcing. Standard Errors are robust to heteroscedasticity and are clustered at the municipal level (shown in brackets). Significance at the 10% level is represented by *, at the 5% level by **, and at 1% level by ***.

In Figure 4, we plot Sharp RDD results presented in Table 7. In particular, we focus on the average educational attainment of all mayors (top-left panel), councilors (top-right panel), aldermen (middle-left panel), male politicians (middle-right panel), and female politicians (bottom panel). Again, descriptive graphs confirm results displayed in Table 6 and, in passing from a single to a double ballot, highlight a sharp decrease in the education level of local politicians.

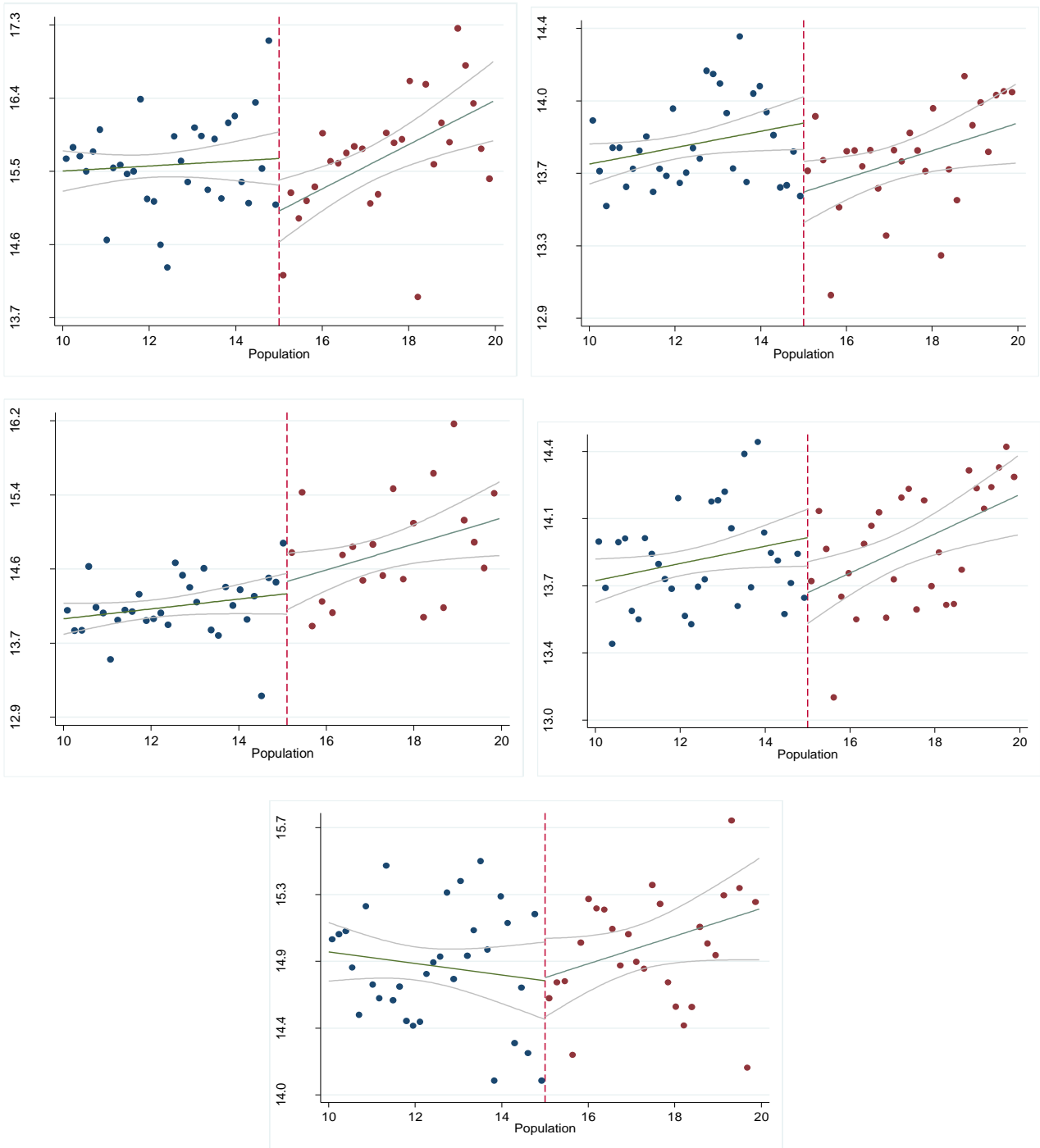


Figure 4: Sharp RDD. Heterogeneous Effect of Runoff on Education at the 15,000 cut-off

6. Robustness checks

As a first check, in Table 8 we have adopted several specifications of our model in order to assess the sensitivity and magnitude of the runoff system effect on the quality of politicians. In particular, in column (1) of Table 8, as done previously in Table 3, we have used an IK optimal bandwidth and added a quadratic function of the normalized forcing variable along with a second-order interaction term between *Runoff* and population size. In column (2) we have replicated the specifications of column (1), but adding the full set of municipal controls. Results are similar to those previously

presented: runoff elections lead to a decrease in the average years of schooling of local politicians by 0.254 years (see column 2).

One potential concern with estimates presented in Table 3 and in the first two columns of Table 8 might be that the IK optimal bandwidth, a $-/+49%$ above and below the threshold, is quite wide and includes election outcomes that might be reasonably considered far from close. To address this potential issue, we have replicated specifications reported in column (4) of Table 3 after narrowing the bandwidth to half the optimal. This alternative method leads to an optimal bandwidth of 3,725 inhabitants above and below the 15,000 inhabitants cut-off. Results for the educational attainment of elected politicians and for the share of high skilled politicians are displayed in columns (3) and (4) of Table 8 respectively. The impact of runoff is still negative, statistically significant at conventional levels, and similar in terms of magnitude to the impact described in the tables previously presented. Under runoff voting, the educational attainment of local politicians and the rate of high-quality administrators reduce by 0.26 years and 2.8% respectively (see columns 3 and 4).

Table 8. Effect of Runoff Elections on Average Education with Several Bandwidths and Polynomials. Sharp RDD.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Education of Politicians	Education of Politicians	Education of Politicians	High Skill	Education of Politicians	High Skill
Runoff	-0.246* (0.135)	-0.254* (0.130)	-0.257** (0.120)	-0.028* (0.017)	-0.316** (0.134)	-0.035* (0.020)
Constant	14.590*** (0.365)	8.525*** (0.523)	10.340*** (0.738)	0.509*** (0.0913)	10.830*** (0.821)	0.534*** (0.107)
Population Polynomial	Second	Second	First	First	First	First
Interaction Term	Second	Second	First	First	First	First
Province and Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Optimal Bandwidth	IK	IK	Half IK	Half IK	MSE	MSE
Observations	4,165	4,165	1,688	1,688	1,270	1,270
R-squared	0.276	0.320	0.353	0.612	0.373	0.632

Note: Sharp RDD estimates. We control for province and year fixed effects and we focus on the period 1994-2017. Estimation method: LLR. Standard Errors are robust to heteroscedasticity and are clustered at the municipal level (shown in brackets). Significance at the 10% level is represented by *, at the 5% level by **, and at 1% level by ***.

In columns (5) and (6), instead, as optimal bandwidth we have used the mean square error proposed by Calonico *et al.* (2018) (hereafter: MSE). We have collected a sample of 2,700 observations above and below the 15,000 cut-off. The effect of runoff rule on the average level of education of elected politicians is still negative and statistically significant at the 5% level. Finally, in column (6), using MSE optimal bandwidth, we have measured our outcome variable as the share of high-skilled local politicians in the municipal bodies. Again, the effect of runoff rule on the quality of politicians is negative and significant at conventional levels¹⁴.

In sum, findings are not sensitive to the inclusion of higher order polynomials of the population size and to the use of different optimal bandwidths. In all specifications we have found a negative and statistically significant effect of runoff elections on the quality of politicians.

As a second test, using the IK optimal bandwidth and a linear polynomial of the forcing variable with a first-order interaction term, we have presented estimations, where we have included different

¹⁴ Results are similar when we use the alternative measures of the quality of politicians as those presented in Table 6.

predetermined measures of political competition among control variables. Another potential channel explaining the adverse effect of the electoral system on the educational attainment of politicians is indeed the level of political competition characterizing the electoral race. Many authors (see, for instance, Bordignon *et al.*, 2016; Cox and Neto, 1997, and Chamon *et al.*, 2008) found that compared to single-ballot elections, under runoff voting a larger number of candidates and political parties compete. We have not expressly added among regressors either the number of candidates running for a mayor position or the number of parties competing at the electoral race in the previous estimations, because they are potentially endogenous.

Results are reported in Table 9. In columns (1) and (2) respectively, we have included the difference in the votes obtained by the two most voted candidates over the total number of eligible voters at time $t-1$, and the percentage difference in votes between the two leading parties at time $t-1$, which are two inverse measures of expected electoral closeness. In columns (3) and (4) respectively, we have simply used the number of candidates and parties competing in the previous electoral race. In all specifications, the effect of runoff system on the average years of schooling of candidates is still negative and significant at the 1% level, independently of the political closeness measure used. This suggests that the lower educational level of politicians in cities above the threshold compared to that in municipalities below the cut-off is not driven by the divergence in the level of political closeness characterizing the two electoral regimes.

Table 9. Effect of Runoff Elections on Average Education with Measures of Political Competition. Sharp RDD.

	(1)	(2)	(3)	(4)
VARIABLES	Education of Politicians	Education of Politicians	Education of Politicians	Education of Politicians
Runoff	-0.315*** (0.101)	-0.414*** (0.108)	-0.310*** (0.102)	-0.369*** (0.116)
Candidates Elect. Margin (t-1)	-0.535** (0.211)			
Parties Elect. Margin (t-1)		-0.411 (0.253)		
# Candidates (t-1)			-0.002 (0.018)	
# Parties (t-1)				-0.007 (0.011)
Constant	8.666*** (0.551)	9.417*** (0.688)	8.635*** (0.555)	9.407*** (0.690)
Population Polynomial	First	First	First	First
Interaction Term	First	First	First	First
Controls	Yes	Yes	Yes	Yes
Province and Year FE	Yes	Yes	Yes	Yes
Optimal Bandwidth	IK	IK	IK	IK
Observations	3,454	2,847	3,454	2,858
R-squared	0.303	0.300	0.301	0.298

Note: Municipalities between 7,550 and 22,450 inhabitants. Sharp RDD estimates. We control for province and year fixed effects and we focus on the period 1994-2017. Estimation method: LLR with a first order polynomial of the forcing. Standard Errors are robust to heteroscedasticity and are clustered at the municipal level (shown in brackets). Significance at the 10% level is represented by *, at the 5% level by **, and at 1% level by ***.

As a further robustness check, in Table 10 we have carried out a falsification exercise in the spirit of Lee (2008). We have used fake thresholds (11,000, 12,000, 13,000, 17,000 18,000, 19,000)¹⁵ where no significant change in policy is expected, in order to assess the possibility that our results depend on random factors rather than on a specific cause-effect relationship. In particular, we have replicated the aforementioned Sharp RDD estimations with a MSE optimal bandwidth (to stay enough away from other population cut-offs where policies change in their neighborhood), adding a linear polynomial of the forcing variable along with a first-order interaction term. We can notice that the effect of our variable of interest is far from being significant at conventional levels.

Table 10. Effect of Electoral System on Average Education. Placebo Test. Sharp RDD.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Education of Politicians 11,000	Education of Politicians 12,000	Education of Politicians 13,000	Education of Politicians 17,000	Education of Politicians 18,000	Education of Politicians 19,000
Fake Cut-off	-0.021 (0.120)	-0.230 (0.153)	0.179 (0.124)	0.109 (0.140)	0.034 (0.157)	0.013 (0.164)
Constant	7.814*** (0.738)	9.440*** (0.983)	8.930*** (0.828)	9.797*** (0.870)	9.107*** (1.113)	9.693*** (1.021)
Population Polynomial	First	First	First	First	First	First
Interaction Term	First	First	First	First	First	First
Control	Yes	Yes	Yes	Yes	Yes	Yes
Province and Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Optimal Bandwidth	MSE	MSE	MSE	MSE	MSE	MSE
Observations	2,183	1,211	1,937	1,407	1,186	1,207
R-squared	0.345	0.409	0.352	0.367	0.389	0.398

Note: Sharp RDD estimates. We control for province and year fixed effects and we focus on the period 1994-2017. Estimation method: LLR. Standard Errors are robust to heteroscedasticity and are clustered at the municipal level (shown in brackets). Significance at the 10% level is represented by *, at the 5% level by **, and at 1% level by ***.

As a last check in Table 11 we present estimates on the impact of runoff scheme on the quality of elected politicians controlling for municipal fixed effect. This way we are able to exploit within variation among cities that changed the voting system over time. In our sample 78 municipalities passed from the single ballot to the double ballot or *vice versa*. In columns (1) and (2) we select the IK optimal bandwidth, whereas in columns (3) and (4) we use the MSE-optimal bandwidth as suggested by Calonico *et al.* (2018). In all specifications we control for a linear polynomial of the normalized forcing variable along with a first-order interaction term between the assignment variable and the treatment, and for year dummies.

Overall, results confirm that changing the voting system leads to a decrease in the average educational attainment of elected politicians (see columns 1 and 3), and in the share of high skilled elected politicians (see columns 2 and 4). In the last two columns of Table 11 we instead focus on the average education of candidates running for a mayor position. Again, the effect of the change in the electoral system on the educational attainment of candidates who run for a mayoral position is negative and significant at conventional levels, no matter the optimal bandwidth selected.

¹⁵ For each fake threshold (11,000, 12,000, 13,000, 17,000, 18,000 and 19,000) we have built our variable of interest as a dummy that takes the value of 1 if the population size is larger than the value of the forcing variable at the cut-off, and 0 otherwise.

Table 11. Effect of Runoff Elections on Average Education with Municipal FE. Sharp RDD.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Education of Politicians	High Skill	Education of Politicians	High Skill	Education of Candidates	Education of Candidates
Runoff	-0.196* (0.121)	-0.034* (0.018)	-0.404** (0.176)	-0.069*** (0.025)	-0.619* (0.332)	-0.960** (0.413)
Constant	19.44*** (3.085)	0.238 (0.288)	5.071 (10.85)	-1.158 (2.675)	33.16*** (4.680)	64.27** (30.04)
Population Polynomial	First	First	First	First	First	First
Interaction term	First	First	First	First	First	First
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Optimal Bandwidth	IK	IK	MSE	MSE	IK	MSE
Observations	4,165	4,165	1,270	1,270	4,112	1,249
R-squared	0.220	0.584	0.231	0.592	0.029	0.052
Number of municipalities	1,173	1,173	398	398	1,169	397

Note: Sharp RDD estimates. We control for municipal and year fixed effects and we focus on the period 1994-2017. Estimation method: LLR. Standard Errors are robust to heteroscedasticity and are clustered at the municipal level (shown in brackets). Significance at the 10% level is represented by *, at the 5% level by **, and at 1% level by ***.

7. Concluding remarks

One of the major concerns in all modern democracies is that the general level of education might register a dramatic downward shift. As a matter of fact, since the 1990s the percentage of newly elected politicians with a degree has decreased steadily by roughly 28% at the national level in Italy. This trend can also be observed at the municipal level. Consequently, the selection of high-quality politicians is crucial for the well-functioning of any democracy, as widely highlighted by the theoretical literature (Caselli and Morelli, 2004; Messner and Polborn, 2004).

In our paper, we have empirically investigated the effect of an exogenous change — as decided by population threshold — in the electoral system (single ballot vs. runoff) on the quality of local politicians as measured by the average educational attainment. Findings show that in municipalities voting under runoff rule (just above the threshold) the average years of schooling of local politicians is lower by roughly 2% compared to the educational attainment of politicians in cities where a single-ballot scheme is applied (just below the threshold). We have also found that changes in the electoral system negatively affect the level of education of mayors, councilors, and male local politicians, whereas no effect is found on aldermen and female politicians.

The results yielded are similar when we measure the quality of politicians in terms of past employment and past political experience, and when we control for different predetermined measures of political closeness. Also, findings do not change when we adopt several specifications of our model (different optimal bandwidths and second-order polynomials of the forcing variable) to check the sensitivity concerning the significance, and the magnitude of the runoff effect on our outcome variables.

We speculate that the adverse effect is exclusively driven by the different selection process of politicians adopted by parties under the two different regimes. In municipalities voting under a single ballot, the candidate who collects a majority of votes (elected mayor) wins the control of the government (along with the only list that supported him/her during elections) and appropriates all office rents, because he/she will certainly have a majority within the council. In this case, if the ultimate goal is to win the electoral competition thereby securing the whole office rents, then the only

list supporting the mayor candidate is assumed to be composed by high-quality candidates who can achieve that goal. On the contrary, in municipalities voting under runoff, this may not happen, because the mayor may be elected along with a council controlled by the opposition. Also, the parties winning the elections can aspire to influence government, and hence participate in the division of office rents, depending on the share of votes obtained in the election. This mechanism explaining the willingness of parties not to select high-skilled candidates in runoff elections suggest how parties should think carefully both on which candidates they should invest more as well as who is more appropriate in terms of educational attainment to become politician, as political parties' actions are likely to generate possibly unintended differences in terms of politicians' quality, and in turn, in terms of efficiency of the local public administration and of citizens' well-being.

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