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The effect of quotas on female representation in local politics

Monika Köppl-Turyna[1] and Jarosław Kantorowicz[2]

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Abstract

This work looks at the policies aimed at promoting female participation in local legislative bodies using a series of changes to electoral law in Poland. We use a difference-in-discontinuities design to examine the effect of an introduction of a female quota on female participation in local councils. We find that the female quota has a strong positive effect on the percentage of females in the local council by increasing the pool of female candidates. It does not, however, affect the individual probability of being elected as a female, suggesting that its effect on voters' preferences is limited.

Keywords: female quota; electoral rules; female representation; regression discontinuity; difference in discontinuities

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1. Introduction

The question of female representation in politics has recently gained more attention. It is important for at least two reasons. Firstly, women are grossly under-represented on the political stage across the globe, e.g. only approx. 25 percent of legislators are females, even though women constitute roughly half of the population (Davidson-Schmich, 2020), and thus scholarship is looking for policies that would help establish a more gender-balanced political process. Secondly, a growing body of literature shows that female politicians take different decisions from their male counterparts (Chattopadhyay and Duflo, 2004; Adams and Funk, 2012; Bhalotra and Clots-Figueras, 2014; Brollo and Troiano, 2016; Hicks et al., 2016; Clayton and Zetterberg, 2018), so understanding the factors behind differences in female representation across countries can help understand the differences in policies and their impact.

This work looks at the policies aimed at promoting female participation in legislative bodies using a series of changes to electoral law in Poland. Previous research studying the effects of gender quota on female participation in Poland was mainly focused on the elections to the national parliament and used different identification strategy (see, e.g., Górecki and Kukołowicz, 2014; Jankowski and Marcinkiewicz, 2019; Gendźwiłł and Żółtak, 2020). We use local elections, specifically elections to municipal councils, as our empirical laboratory. The identification strategy builds on the fact that in the 2018 elections a female quota was introduced in the municipalities with the population size above 20,000 inhabitants. If no confounding treatments exist at the threshold of 20,000 inhabitants, a straightforward strategy to measure the effect of the female quota would be a regression discontinuity. This, however, is not a valid strategy in the context of this paper as the 20,000 inhabitants threshold determines the application of two different electoral systems to local legislatures (municipality councils) in Poland. The municipalities below this threshold are ruled by the majoritarian elections, whereas those above this threshold by the proportional repre-

sentation. The state of the art solution to remedy the problem of multiple (compound) treatments at the studied threshold is to apply a difference-in-discontinuities approach (Grembi et al., 2016; Eggers et al.), given that there exists an additional setting where the policy of interest is present, but confounding policies are not, or vice-versa. This is precisely the setting which we deal with, whereby in 2010 the 20,000 population threshold served to divide the municipalities into those with majoritarian and proportional electoral regimes, but the female quota has not been introduced yet. Overall, we look at the effect the discontinuity in the female participation at the threshold of 20,000 inhabitants in 2018 (the combined effect of the electoral rule and quota) and compare it with the discontinuity observed in 2010, the latter being the effect of the electoral rule itself on female representation. It has to be noted that the 2014 municipal elections observed no threshold for either electoral systems (all municipalities were subject to first-past-the-post-system) nor for a female quota, thus this year allows us to run placebo regressions as no discontinuity in outcomes (female representation) is expected.

Quotas are believed to reduce gender bias in elections (Beaman et al., 2009) and therefore help clear way for more females in politics (Baskaran and Hessami, 2018; Bhalotra et al., 2017). Several mechanisms are believed to be responsible for the "pathbreaking": affecting voter attitudes, changes in party behavior, or affecting behavior of females themselves. Nevertheless, contrary results have also been observed (Broockman, 2014; Bertrand et al., 2018; Geys and Sørensen, 2019; Joo and Lee, 2018; Ferreira and Gyourko, 2014). Secondly, quotas might affect the quality of elected officials (O'brien and Rickne, 2016). Besley et al. (2017) find, for instance, that female quota help replace mediocre males with more qualified females. Other studies have found a positive link between (both male and female) politicians' education levels and quota implementation (Baltrunaite et al., 2014; Casas-Arce and Saiz, 2015; Weeks and Baldez, 2015). Also in this case, however, there is evidence to the contrary: Allen et al. (2016) find that "quota" females are no different

than other elected officials, and Campa (2011) finds no effect of quotas on quality.

We find that the female quota has a strong positive effect on the percentage of females in the local council. We identify two effects responsible for this increase: firstly, the quota increases the pool of available female candidates. While in 2010 there were no differences between the fraction of female candidates in the overall candidate pool, in 2018 there is a sharp jump at the population threshold. The quota does not, however, affect the individual probability of being elected as a female, which leads us to a conclusion that its effect on the voting behavior is rather limited. Secondly, using a comparison with the effect of the electoral rule, we can conclude that the quota has counteracted the negative party bias associated with proportional representation.

2. The institutional background

Municipalities (Polish: *gmina*) are the principal units of administrative division in Poland. There are currently 2,478 municipalities, varying in size between 1,400 and 1.7 million inhabitants. The legislative and controlling body of each gmina is the elected municipal council (*rada gminy*) or, in a town, the town council (*rada miasta*). Executive power is, since 2002, held by the directly elected mayor of a municipality.

In 2010, in municipalities below 20,000 inhabitants the councillors were elected in small districts via plurality rule. In most municipalities that meant elections from single-seat districts. In contrast, the municipalities with the population size above 20,000 inhabitants applied proportional electoral system, meaning that councillors were elected in larger districts where 5 to 8 mandates were at stake, as stipulated by the law.

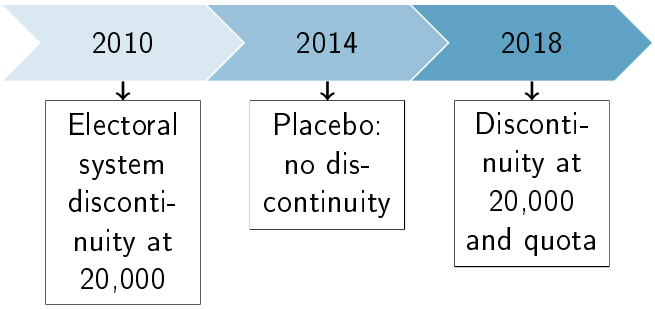
According to the electoral law enacted in 2011[3], the local elections conducted in November 2014 have used an entirely new election procedure. In particular, the 20,000 inhabitants

[3] *Ustawa z dnia 5 stycznia 2011 r. Kodeks wyborczy, DzU 2011, nr 21, poz. 112.*

threshold has been removed and all members of the councils in all municipalities have been elected in single-seat districts.

A further change to the electoral law has been introduced for the elections in 2018 by the electoral law of 2018[4]. Firstly, the 20,000 inhabitants threshold has been reintroduced, resulting in the municipalities above the 20,000 population threshold being assigned to proportional representation. Secondly and crucially from the point of view of this study, in the proportional elections, thus in municipalities above 20,000 inhabitants, a gender quota has been introduced, which prescribes that on each list at least 35 percent of candidates have to be female (and male). No particular brackets for list placements for each gender are in place. Overview of the reforms, informing the empirical identification of the study, is shown in Figure 1.

Figure 1: Overview of the institutional design



3. Data and the empirical model

3.1. Data

The data used comes from the National Electoral Commission of the Republic of Poland. It contains information about all candidates to local councils, including their gender, age, citizenship, position on the electoral list, the fraction of obtained votes, and whether the

[4] *Ustawa z dnia 15 czerwca 2018 r. o zmianie ustawy - Kodeks wyborczy oraz niektórych innych ustaw, Dz.U. 2018 poz. 1349*

person has been elected to the council or not. In the 2010 municipal election, a total of 159,863 candidates, among which 51,035 women, competed for 37,818 seats in local councils. The fractions of female candidates above and below the 20,000 inhabitants threshold are almost the same at 31.6% and 32.4%, respectively. In this study, we consider only the municipalities, which had more than 75 percent of seats elected from single-seat districts in 2010. If we exclude block voting (plurality vote in districts of more than one mandate), there are 146,227 candidates, among which 31.7% were female.

In year 2018, there were 118,059 candidates, among which 45,083 were women. Candidates competed for 34,464 councils seats. The gender quota was binding only above the 20,000 threshold. This resulted in a higher fraction of female candidates in these municipalities. Below the threshold the fraction of female candidates was at 35.2% and it increased to 45.9% above the threshold (about 13 percentage points higher than in 2010). Most of the parties in 2018, however, kept the fraction of females at or only slightly above the required quota. Only about 40% of the lists have more than 50% females.

3.2. Empirical approach and identification

The question of how electoral institutions affect female participation in politics can be addressed in two ways:

1. What is the probability of a female candidate being elected?
2. What is the probability of encountering a woman among elected candidates?

The relationship between the two approaches can be easily summarized by the Bayes' formula:

$$P(female|elected) = \frac{P(elected|female) \times P(female)}{P(elected)}, \tag{1}$$

where $P(female)$ is the pool of females among all candidates and $P(elected)$ is the general, gender-independent probability of getting elected in a particular electoral system. As it is *a priori* unclear which approach gives a better answer to the question of female

representation in politics, we shall look at both probabilities and establish the institutional reasons underlying the differences. Using our data, we can separately estimate each of the probabilities in the formula. The dependent variables are: the fraction of females in the council, and the fraction of elected among female candidates in a municipality. The latter corresponds to the individual probability of being elected as a female, i.e. the question of whether the quota affects this probability (while keeping the number of female candidates constant). Looking at this probability allows us to investigate to what extent quota has an effect on voters' preferences regarding female candidates.

We exploit the difference-in-discontinuities (D-in-RD) design, as proposed by e.g. Grembi et al. (2016), who implemented it with local linear (or polynomial) regression (LLR) as

$$y_{it} = \alpha_0 + \alpha_1 \times p_{it} + P_i \times (\gamma_0 + \gamma_1 \times p_{it}) + D_i[\delta_0 + \delta_1 \times p_{it} + P_i(\underbrace{\beta_0}_{\text{D-in-RD estimator}} + \beta_1 \times p_{it})] + \varepsilon_{it}. \quad (2)$$

In this paper, we use the non-parametric approach to D-in-RD. If $\mu_t(x) = \mathbb{E}[Y|X = x, t]$ is the expectation of Y at time t and the conventional RD estimator is given by $\tau_t = \lim_{x\to 0^+} \mu_t(x) - \lim_{x\to 0^-} \mu_t(x) = \mu_{t+} - \mu_{t-}$, the D-in-RD estimator is given by

$$\Delta\tau = [\mu_{1+} - \mu_{1-}] - [\mu_{=0+} - \mu_{0-}]. \quad (3)$$

Optimal bandwidth can be calculated analogously to the RD method of e.g., Calonico et al. (2014) (CCT), but replacing $\hat{\tau}$ with $\Delta\hat{\tau}$ in the formula.

As between 2010 and 2018, the only major change to the electoral system (above 20,000), was the introduction of the female quota, this specification allows us to clearly identify the effect of the quota on our variables of interest, and also compare it to the effect of the electoral system. The validity of the RD design is analyzed in more detail in the Online Appendix.

4. Results

Table 1 presents the estimation results. Introduction of the quota had a strong positive effect on the percentage of females elected to the local councils. Nevertheless, as it is clear from Table 1, this effect does not come from increasing the probability of being elected among female candidates, but rather by increasing the pool of available candidates - the probability of being elected as a female has not changed. What these results suggest, is that while quota can "mechanically" increase the number of females to become members of local councils, it does not have an effect on their individual probabilities of becoming elected. Keeping the number of females constant, probability of encountering an elected female among all female candidates is not affected by the quota.

Table 1: Female representation, difference in discontinuities between 2010 and 2018

	Percentage of females in the council			Percentage of elected among females		
D-in-RD Estimate	0.116**	0.151**	0.168**	0.037	0.041	0.054
	[0.050]	[0.068]	[0.077]	[0.044]	[0.057]	[0.063]
Robust 95% CI	[.016 ; .216]	[.017 ; .286]	[.016 ; .321]	[-.049 ; .123]	[-.071 ; .152]	[-.069 ; .177]
Kernel Type	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
BW Type	CCT	CCT	CCT	CCT	CCT	CCT
Conventional p-value	0.021	0.020	0.022	0.463	0.421	0.387
Robust p-value	0.022	0.027	0.030	0.400	0.473	0.392
Order Loc. Poly. (p)	1	2	3	1	2	3
Order Bias (q)	2	3	4	2	3	4
BW Loc. Poly. (h)	6.764	8.159	10.541	6.980	8.686	12.113
BW Bias (b)	11.267	10.614	12.732	10.773	11.561	14.082

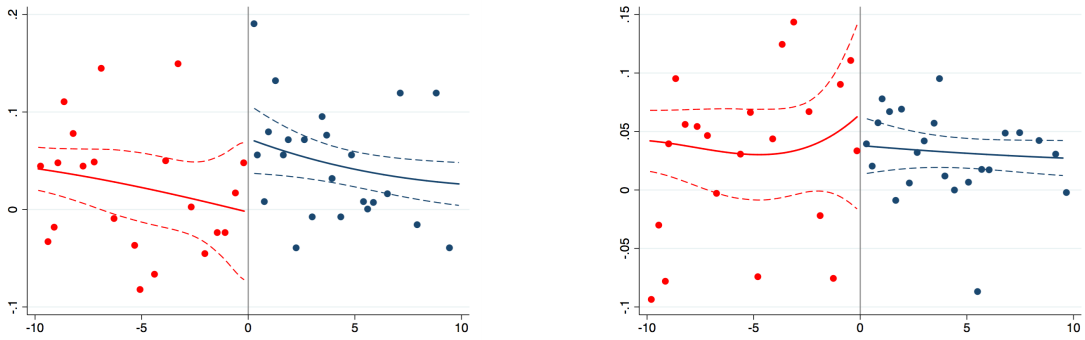
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in brackets. CCT corresponds to the bandwidth selection procedure of Calonico et al. (2014).

Figure 1 shows the difference in discontinuities between 2010 and 2018. As a robustness check, in Figure B.1 in the Appendix, we show that the coefficient on the difference in discontinuity (the effect of the quota) is stable across bandwidth lengths.

4.1. Partisanship as a channel of transmission

In Kantorowicz and Köppl-Turyna (2019), we show that the 20,000 population threshold is responsible for a jump in partisanship of local councils. In particular, it can be

Figure 1: Difference in discontinuities between 2010 and 2018



(a) Percentage of females in the council

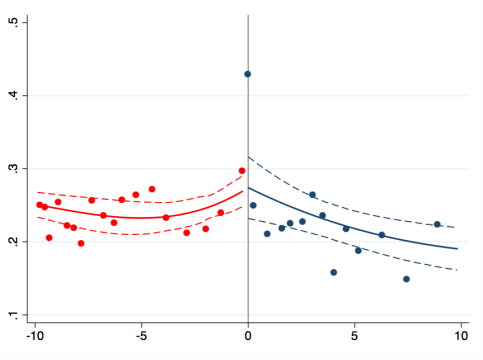
(b) Percentage of elected among females

established that the proportional system is associated with a much higher percentage of local councilors and mayors who are members of nation-wide parties, as opposed to independent voter committees which prevail in the majoritarian system. We link this observation to lower costs of participation in elections below the threshold. The question arises of whether the observed patterns with regard to female participation can be linked to different partisanship. To answer this question we calculate the percentage of females in the electoral council, looking separately at candidates elected from independent lists vs nation-wide parties. Figure 2 presents the results, whereas instead of showing the difference in discontinuities, we show the RD in both years, as it presents more clearly what is happening.

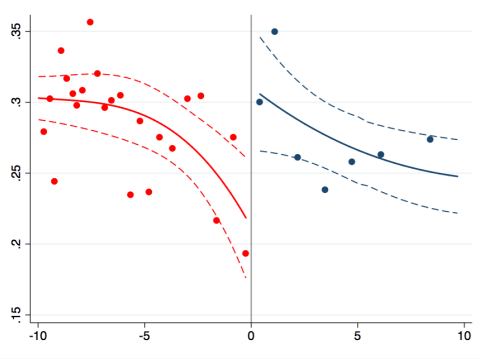
According to the results, partisanship is an important driver of the results. In year 2010, no difference can be observed in the percentage of councillors from independent committees in the two systems. Difference in year 2018, which is a result of the female quota, is also weaker than in the case of all councillors. The latter results, is also confirmed by the difference-in-discontinuities estimates, which show that the quota had a much weaker effect on the independent committees. On the other hand, taking only the members of the council elected from nation-wide countries, the effects are much stronger than the overall effect. Above the threshold in 2010, there are almost 20 percentage points less females elected

from nation-wide parties. This effect disappears completely in 2018 and no discontinuity is present. The difference-in-discontinuity results (Table 2) point to a strong and significant change as a result of the quota. Thus, the quota has primarily an effect on nation-wide parties, where less females are present. In 2018, the quota has just barely equalized the share of females between the systems, when it comes to nation-wide candidates.

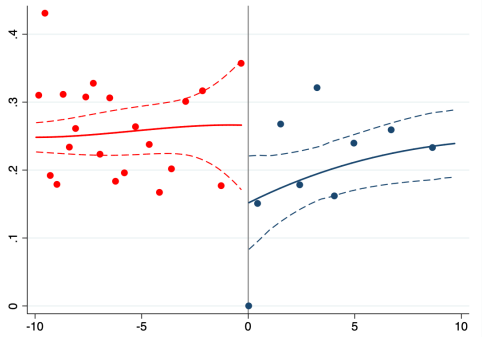
Figure 2: Percentage of females in council elected from:



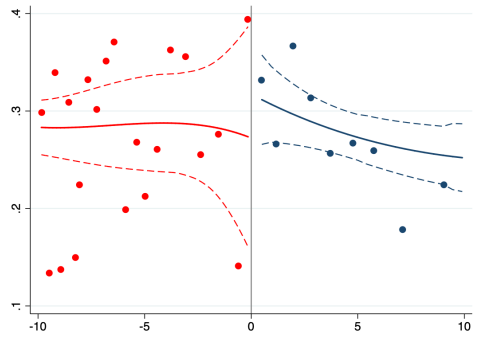
(a) independent committees in 2010



(b) independent committees in 2018



(c) nation-wide parties in 2010



(d) nation-wide parties in 2018

5. Conclusions

We show that implementing a binding gender quota helps increase the representation of females in local councils. Yet, the effect here does not come from changing the probability of each female being elected, but simply through increasing the pool of eligible females. For the case of nation-wide parties, the quota also barely raises the percentage of females in the council to the level achieved in single-seat districts.

Table 2: Percentage of females in the council elected from independent committees and nation-wide parties, difference in discontinuities between 2010 and 2018

	Independent committees			Nation-wide parties		
D-in-RD Estimate	0.195*	0.134	-0.068	0.268***	0.311***	0.382***
	[0.106]	[0.138]	[0.202]	[0.119]	[0.136]	[0.160]
Robust 95% CI	[-.012 ; .404]	[-.137 ; .406]	[-.465 ; .327]	[.075; .543]	[.075; .612]	[.068; .697]
Kernel Type	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
BW Type	CCT	CCT	CCT	CCT	CCT	CCT
Conventional p-value	0.039	0.199	0.920	0.008	0.008	0.014
Robust p-value	0.065	0.334	0.735	0.009	0.012	0.017
Order Loc. Poly. (p)	1	2	3	1	2	3
Order Bias (q)	2	3	4	2	3	4
BW Loc. Poly. (h)	4.064	4.974	4.320	6.021	9.895	13.148
BW Bias (b)	6.270	6.847	5.593	10.135	13.103	15.348

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in brackets. CCT corresponds to the bandwidth selection procedure of Calonico et al. (2014).

The natural–experiment setup, which we exploit in this study, ensures high internal validity, which is typically not given in previous analyses of the topic. Yet, because we estimate the local average treatment effect (around threshold of 20,000) and because we examine sub-national electoral systems, we caution against generalization of the results to the central level elections.

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Appendix A. Validy of the RD design (Online Appendix)

Several conditions have to be met or the design to be valid, or the treatment considered randomized. Firstly, assignment must predict the treatment - which is the case, as the law prescribes, which municipalities belong in which electoral system. Secondly, no manipulation of assignment should be possible - which is analyzed in Appendix A.1. Thirdly, assignment must not be correlated with any outcome-determining factor - this assumption is looked at in Appendix A.2. Finally, confounding factors should not be present at the analyzed population threshold.

Table A.1: Institutional details of electoral systems in 2010

	Majoritarian	**Proportional**
Population size	<20,000	>=20,000
Electoral rule	Plurality	Proportional (d'Hondt)
District magnitude	1 to 5	5 to 8
No of signatures to register a party list in a district	Min. 25	Min. 150
No. of candidates on the list	Min. 1	Min. 5
Confounding factors		
Council size	15	21
Campaign spending limitation	750PLN	1000PLN

As indicated in Table A.1, two policies change at the 20,000 threshold: the size of the council and the limit to campaign financing. Regarding campaign expenditure limits, there is evidence that these are not strictly enforced, and thus are not binding (Szyszko, 2014). It is a well-known practice in Poland for parties to engage in so-called "pre-campaigning", in order to circumvent expenditure limits. This means that politicians begin agitation before the beginning of the official campaign, i.e., when the expenses of campaigning go unreported (Szyszko, 2014; Kantorowicz and Köppl-Turyna, 2019). When it comes to the council size, we look at the changes to female representation at a different threshold. We exploit the fact, that in municipalities above 50,000 inhabitants, the council size increases to 23 persons, and above 100,000 to 25. We find no changes in the outcome variables at this threshold (Tables A.2 and A.3), which is a strong indicator of no effect at the 20,000 threshold present.

Table A.2: Percentage of females in the council at the placebo 50,000 threshold

	(1)	(2)	(3)
RD Estimate	0.003	0.026	0.048
	[0.090]	[0.121]	[0.153]
Robust 95% CI	[-.202 ; .212]	[-.228 ; .325]	[-.283 ; .394]
Kernel Type	Triangular	Triangular	Triangular
BW Type	CCT	CCT	CCT
Eff. Observations L	27	42	51
Eff. Observations R	17	21	25
Conventional p-value	0.974	0.829	0.754
Robust p-value	0.961	0.730	0.748
Order Loc. Poly. (p)	1	2	3
Order Bias (q)	2	3	4
BW Loc. Poly. (h)	4.145	5.265	6.171
BW Bias (b)	6.796	6.831	7.372

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in brackets. CCT corresponds to the bandwidth selection procedure of Calonico et al. (2014).

Table A.3: Elected among females in a municipality at the placebo 50,000 threshold

	(1)	(2)	(3)
RD Estimate	0.002	0.019	0.039
	[0.041]	[0.042]	[0.067]
Robust 95% CI	[-.073 ; .102]	[-.06 ; .116]	[-.106 ; .185]
Kernel Type	Triangular	Triangular	Triangular
BW Type	CCT	CCT	CCT
Eff. Observations L	22	31	26
Eff. Observations R	14	18	17
Conventional p-value	0.960	0.658	0.554
Robust p-value	0.748	0.531	0.592
Order Loc. Poly. (p)	1	2	3
Order Bias (q)	2	3	4
BW Loc. Poly. (h)	3.003	4.362	3.983
BW Bias (b)	4.792	6.503	6.063

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in brackets. CCT corresponds to the bandwidth selection procedure of Calonico et al. (2014).

Appendix A.1. Sorting

For the regression-discontinuity assumptions to be valid, we need to establish whether sorting around the cut-off does not appear. Following **?**, there is evidence that the density test of McCrary (2008) is sensitive to the choice of the bin sizes and assignment of borderline integer observations (as in the case of population) to the first bin on the left of the threshold. Table A.4 presents results of density testing with different bandwidths and bin sizes, to control for sensitivity.

Table A.4: McCrary density tests - p-values reported

	2010		2018	
Bin size	Bwidth=10	Bwidth=5	Bwidth=10	Bwidth=5
100	0.2384	0.3096	0.3588	0.6535
200	0.2192	0.3040	0.3620	0.6347
300	0.3349	0.3850	0.3669	0.6922
400	0.2320	0.3103	0.3639	0.6263
500	0.1876	0.2214	0.3273	0.7138
1000	0.4196	0.2784	0.2828	0.7767

Bandwidths in thousand.

Alternatively, one can test density continuity with local polynomial density estimators (see, Cattaneo et al., 2016, 2019), which avoids pre-binning of the data. Results are summarized in Table A.5 and similarly point to no sorting present at the population threshold.

Table A.5: Polynomial density tests - p-values reported

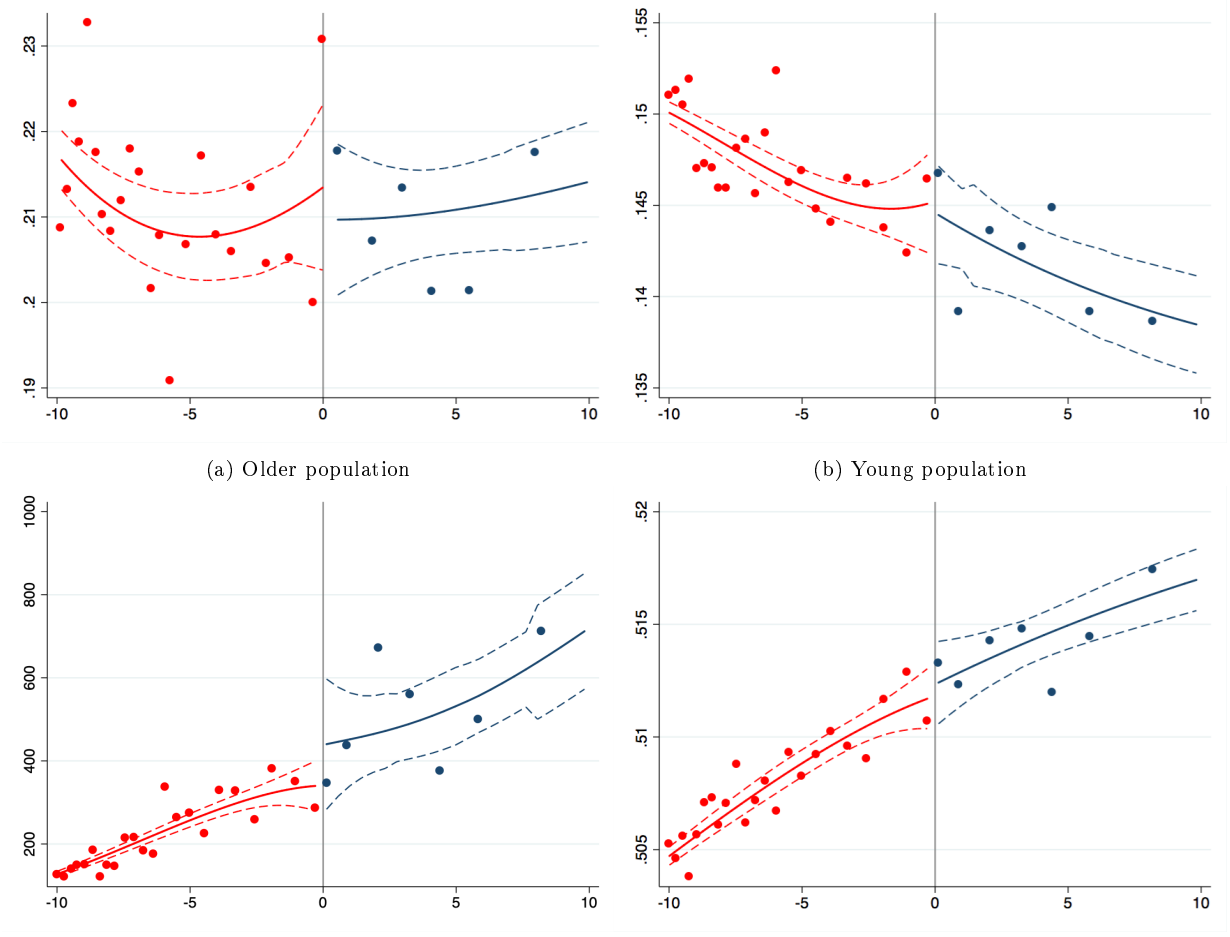
	2010		2018	
Order	Triangular	Uniform	Triangular	Uniform
1	0.3256	0.3776	0.8329	0.9537
2	0.4722	0.5664	0.7537	0.7892
3	0.3754	0.7862	0.5249	0.7272
4	0.6309	0.7129	0.7743	0.8826

Appendix A.2. Continuity of the municipal characteristics

Further, we need to make sure that variables potentially affecting the female representation - determined prior to the realization of the assignment variable - have the same distribution just above and just below the cutoff, so that local randomization is given. In

the Appendix (Figure A.1), we show a variety of continuity checks of several important variables. Since the variables are very stable over time, we only report the values for the year 2010, other years look virtually the same. Population variables could affect the probability of voting for females independent of the electoral system: young people could vote more "progressively" (young defined as population between 18 and 30 ears of age), as opposed to elder population (defined as above 65). More dense areas, that is cities, could be more positive towards females, but there is no visible discontinuity in the population density. Finally, percentage of females in the overall population could matter. Also in this case, we do not observe any discontinuity.

Figure A.1: Continuity of the covariates - year 2010



(a) Older population

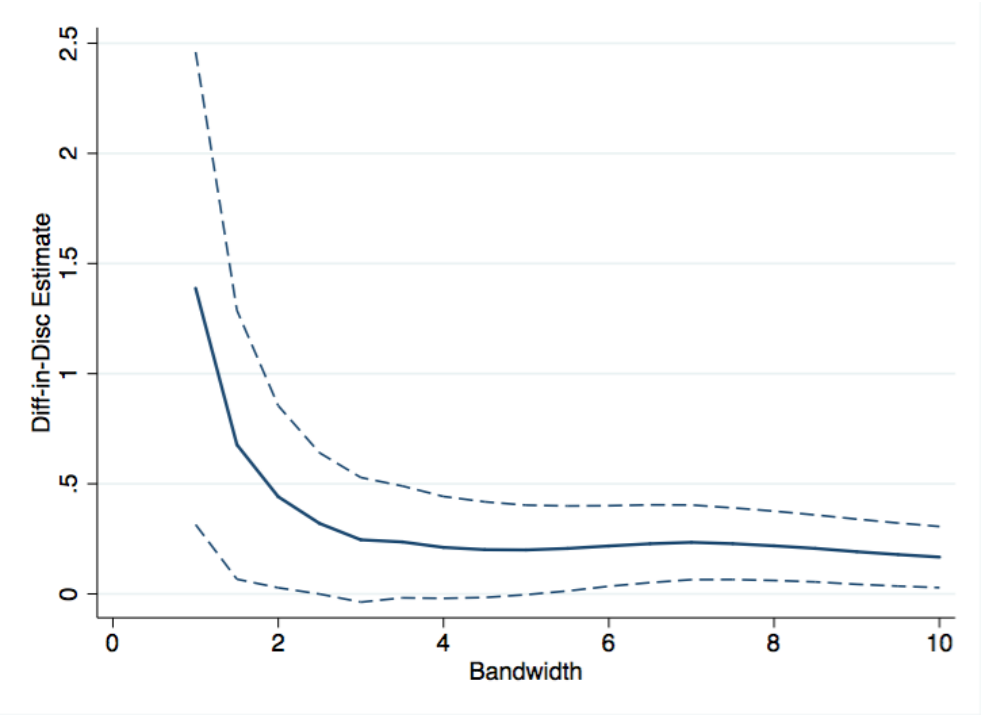
(b) Young population

(c) Population density

(d) Percentage of females

Appendix B. Additional Tables

Figure B.1: Sensitivity with respect to bandwidth: percentage of females in the council - difference in discontinuity



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