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Quasi-experimental evidence from Germany.

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Mayor Games in Bavaria: Self Selection of Local Politicians is not influenced by constitutionally defined remuneration increases! Quasi-experimental evidence from Germany

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Abstract Remuneration for politicians has been discussed frequently and thus, has been the subject of many reforms in recent decades. Remuneration has an influence on whether or not citizens choose to run for office as well as the amount of effort they might invest once elected. In this paper, I investigate the impact of variations in remuneration on the quality of politicians. It is well known that the amount of remuneration of a Bavarian mayor is regulated by constitutionally defined population thresholds. Utilizing this exogenous variation in the remuneration of politicians, I apply the quasi-experimental regression discontinuity design to six different population thresholds. My analysis demonstrates that positive or negative correlations between remuneration and quality of politicians are found for all six thresholds when simple ordinary least squares regression analysis is used. However, further analysis using regression discontinuity design shows that, in fact, no causal relationship between remuneration and quality exists. This result holds when using the Difference-in-Discontinuities approach. When comparing my results to other empirical findings, one possible explanation for the absence of effects might be rooted in the fact that Bavarian mayors do not face term limits.

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1. Introduction

Selection and payment mechanisms for politicians have differed greatly throughout the history of democracy. In ancient Athens, the constitution excluded most Athenian inhabitants from the political process, and only a few politicians received remuneration. When democratic movements began in western countries, the newly created constitutions gave the majority of political rights and powers to wealthy citizens and nobleman. Equal political rights were only recently given to ordinary (male) citizens. Beginning in 1906, the German constitution granted remuneration to each elected politician to assure material independence while working in the parliament (Braun et al., 2002).[1] Today, legal rules and regulations based, in part, on population thresholds limit the amount of remuneration politicians are allowed to receive, whereas the salaries of executive staff in the private sector are determined through negotiation. Nevertheless, the media and society as a whole frequently criticize current remuneration and pension allowances for politicians as being too high, too low, or altogether badly designed. This continual criticism leads to frequent reforms of the remuneration systems at various levels of political representation.

Whereas US reporter Vardis Fisher argued in the 1950s that citizens running for political office should be intrinsically motivated [from Besley (2004)], Max Weber argued at the beginning of the 19th century that there exist different types of politicians, those who live 'for' politics and those who live 'off' politics [from Gerth and Mills (1946)]. Researchers in the field of political economics follow Weber's thinking and consider politicians to be regular economic agents, and therefore, are susceptible to various incentives.[2] As investigative stories uncovering corrupt politicians often appear in the media, at least some politicians do seem to pursue egoistic goals while in office. In addition to remuneration, the quality of politics is frequently debated and evaluated. By quality of politicians, I refer here to the degree to which politicians are capable of performing their jobs effectively (skills), whereas I use the term integrity to refer to the degree to which they can be trusted to act in the best interest of their constituents and not in their own best interest.[3]

Theoretical work in the field does yield ambiguous results when modelling the response of potential political candidates to increasing (legal) monetary rewards.[4] Some theoretical models predict a rise in the overall quality of the pool of candidates whenever rewards increase, while others report an expected drop in the quality of the candidate pool and therefore (due to imperfect

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[1] Material independence was especially important for politicians of the working class.
[2] The economist Josef Schumpeter introduced this idea into economics.
[3] In the literature, quality sometimes refers to all characteristics of politicians, and sometimes just to certain abilities. I define quality based only on skills that can be determined from available data.
[4] Cf. Besley (2004), Mattozzi and Merlo (2008), Messner and Polborn (2004), Ferraz and Finan (2009), Gagliarducci and Nannicini (2013); see Gagliarducci and Nannicini (2013) for broad overview on related work.

information) a decrease in the overall quality of politics. Level of remuneration, personal integrity,[5] and individual quality[6] of politicians are key variables in the theoretical model created by Caselli and Morelli (2001). Assuming that highly qualified citizens have higher earning potential in the private sector, less qualified citizens hold a comparative advantage when engaging in politics. Different opportunity costs of holding office for citizens with differing labor market qualifications translate to heterogeneous effects from increases in remuneration. Depending on the relative importance and power of a given office, highly qualified persons might abstain from running for public office and opt instead to stay in the private sector.

In this paper, I empirically analyze the impact of remuneration increases on the characteristics of politicians running for mayor in the German federated state of Bavaria. In particular, I examine whether an increase in remuneration of politicians has differing effects for different clusters of municipalities (with respect to size, employment, expenditures, etc.), as predicted by the theoretical model created by Caselli and Morelli (2001).[7] An important feature of the Bavarian system is that constitutionally determined population thresholds set the remuneration cap for mayors. By applying the quasi-experimental (fuzzy) regression discontinuity design, data from six exogenous remuneration increases can be used to identify causal effects. Whereas existing literature (e.g. Gagliarducci and Nannicini, 2013) analyzes the effects of rising remuneration on the quality of the candidate pool at only one specific threshold, this paper contributes to the literature by providing specific results for six different remuneration increases. In addition, enabled through changes in the constitutionally defined Bavarian population thresholds in 1989, this paper is the first to apply a difference-in-discontinuities approach on the analysis of remuneration increases in local politics.

Using a sample of Bavarian municipalities for 1978-2008, I find that the quality of political candidates is not causally affected by the level of remuneration. The effects predicted by Caselli and Morelli (2001) are not found for either the pool of candidates or for those candidates who actually obtained the office they sought. My results, however, do confirm previously published results showing that the presence of an incumbent running for a particular office has significant negative effects on the level of political competition, on the quality of political candidates and on the quality of elected officials.

My results are contrary to findings by Gagliarducci and Nannicini (2013) and Ferraz and Finan (2009). Similar to my approach, Gagliarducci and Nannicini (2013) use the quasi-experimental regression discontinuity design to analyze the consequences of remuneration increases in Italian municipalities. The authors focus on municipalities of a similar size (close to 5,000 inhabitants) and

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[5] Personal integrity refers to the willingness to accept bribes or to do prominent donors a favor.
[6] Personal skills include education, working experience, negotiating skills, and the like.
[7] Theory predicts differing effects of increases in remuneration due to the heterogeneity of incentives among a heterogeneous pool of potential candidates.

with similarities in other characteristics. The authors show that an exogenous variation in the remuneration at the 5,000 inhabitants population threshold leads to an increase in the average years of education among mayoral candidates and elected mayors. Another empirical study conducted by Ferraz and Finan (2009) analyzes the influence of increases in the remuneration caps of Brazilian mayors. The authors apply the fuzzy regression discontinuity design on a normalized population threshold and show that higher level of quality of political candidates and a greater amount of political competition follow from higher remuneration caps. However, other recent evidence by Fisman et al. (2012) and Hoffman and Lyons (2013) is in line with my results, whereat their studies do not analyze local data.

This paper is organized as follows. Section 2 gives information on the institutional framework that governs how municipalities function as defined by the Bavarian constitution. The section also contains a detailed description of the data used in this analysis, the justification for choosing these particular data and the survey instrument and method used for data collection. Section 3 describes my empirical strategy, while section 4 presents and discusses the main findings from this research and explores the validity and robustness of these findings. Conclusions are elaborated in section 5.

2. Institutional Framework and Data

The data used for the empirical research presented are from municipalities located in the German federated state of Bavaria. One benefit of analyzing data on local politics is the relative ease with which normal citizens can become candidates. Even though political parties are active in Bavarian municipalities, the process of becoming part of the candidate pool is often short in comparison to the process of achieving candidacy for the national or state assembly (especially because of the possibility for independent candidates to run for office).

A second justification for using data on local politics in this analysis is that most national and state parliaments are dominated by academics. As education is one of the proxies for politician quality used in this analysis, data on members of the German national parliament, for example, would not likely be a source of sufficient heterogeneity. Furthermore, Caselli and Morelli (2004) emphasize that monetary rents might especially play a role on local level because ego-rents might be great at state level.[8] Restricting data analysis to one federated state ensures a relatively homogeneous political and economic landscape with the same legal requirements for voting, uniform regulations regarding remuneration, and identical rights and duties of politicians.

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[8] Other incentives might be power, reputation, connections, and the like. Categorization into monetary rents (e.g. remuneration, pension plans, and accommodation) and ego-rents (e.g. power, social respect) is appropriate.

Figure 1: Thresholds and Remuneration
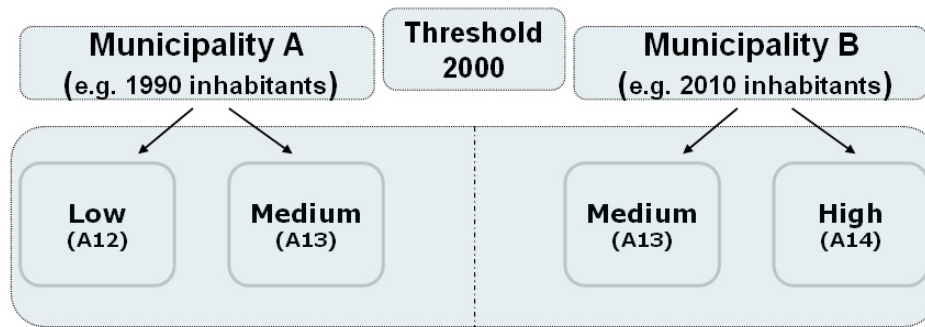
Notes: The figure shows the effect of constitutionally defined thresholds on the remuneration of full-time mayors.   Source: Bayerisches Gesetz- und Verordnungsblatt (1989); own design

Observations for political candidates, mayors, and municipal councils of 2.056 Bavarian municipalities were obtained from the Bayerisches Landesamt für Statistik und Datenverarbeitung.[9] Elections are held every six years in Bavaria, and, in general, municipal councils and mayors are elected in simultaneous, but independent elections. Council seats are allocated according to proportional representation;[10] mayoral candidates must achieve an absolute majority of votes to be elected.[11] The direct election method of the mayor and the mayor's role as both leader of the administration and head of the municipal council make Bavarian mayors particularly appropriate subjects for my research question.[12]

The legal framework of the Bavarian Constitution ties the remuneration level of mayors to the size of the municipalities they govern. All of the municipalities in Bavaria are divided into eleven categories based on population size. For each of these categories, a set of possible remuneration amounts has been defined.[13] The municipal council can choose from one of two remuneration categories for full-time mayors and can fix remuneration within well-defined limits for part-time mayors (see figure 1). The two categories for full-time mayors and the limits for part-time mayors change at each population threshold; and, therefore, the maximum possible remuneration amount rises significantly whenever a population threshold is crossed.[14] As previously mentioned, the council is free to assign remuneration within the official limits defined by the constitution. Therefore it is

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[9] In addition, the main statistical body of Bavaria did provide data for all mayor elections since 1948. Because of several constitutional changes in 1989, the four elections since 1990 are considered for main analysis. Data of mayoral elections from 1966 – 1984 are considered in section IV.4 for robustness checks (Difference-in-Discontinuities).

[10] Votes are converted to seats with the d'Hondt method.

[11] If no candidate gets majority of votes in the first round, a run-off election is held.

[12] Boettcher (2013) states, that Bavarian mayors are the second-most powerful in Germany. (Besley, 2004) discusses the adequacy of using data on mayors when analyzing the response of politicians to economic incentives.

[13] These thresholds remained unchanged after a constitutional reform concerning the remuneration of mayors that occurred in 1989. An individual remuneration amount is defined by the constitution for each of the three largest cities in Bavaria (Munich, Nuremberg and Augsburg).

[14] There are ten population thresholds for the eleven population categories.

possible that a municipality with a population just above a given threshold and a municipality just below the same threshold pay their mayors exactly the same amount. Likewise, a huge payment gap is possible if a municipality below a given threshold pays the minimum and another municipality above the same threshold pays the maximum. When both municipalities pay either the minimum or the maximum, a wage gap also exists.

As data on the actual remuneration categories and remuneration amounts that mayors receive are not compiled by the state, I developed and conducted my own survey to gather data on categories and amounts.[15] For this purpose I contacted all Bavarian municipalities in 2011 and requested information on the actual amount of remuneration received by incumbent mayors (for the period from 2008-2014) and the remuneration levels of mayors in the past.[16]

The key variables used to address my research question are political rents and political quality. In the context of local politics, some rents, such as power, respect, prestige, or level of responsibility,[17] have a non-monetary character. The decision to seek a leadership position in a municipality might depend to a large extent on such "ego-rents", but these are difficult to observe and even harder to measure objectively. As the basic remuneration received by Bavarian mayors represents the largest portion of their compensation,[18] I chose to use it alone as a proxy for political rents as a whole.

As a proxy for the quality of politicians, I use education level and working experience. To capture not only academic skills but also leadership abilities and working experience, I took into account the former professions of candidates and office holders.[19] Following the definitions used by the Bundesagentur für Arbeit (2011),[20] each political candidate in my data set was assigned to one of four categories, depending on his or her most recently practiced profession. According to this employment office ranking, unskilled workers and skilled workers represent stage one and two, respectively. Working on the level of a master craftsman or work which includes a high level of responsibility is equivalent to stage three. Everyone with an academic degree or a leading role in business is assigned to the category with the highest skill-level (see table 1). The consideration of both education and working experience is preferred to other quality proxies such as the well-being of the governed municipality. Household proxies have severe drawbacks, as welfare functions can differ

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[15] This information must be made available to the citizens of a municipality and thus, can normally be obtained from each individual city hall.

[16] 353 municipalities (17.2% of all municipalities) responded to my query. Most responses contained information for the election period beginning in 2008. Questions differed for full-time (one out of two possible categories) and part-time Mayors (concrete figure or categorization (low, medium, or high remuneration)).

[17] A higher level of responsibility might be either a positive or a negative incentive

[18] Attendance fees, pension plans, travel expenses, and per head allowance are continuously increasing with municipal population; bribes and illegal grants are possible but not observed.

[19] Gagliarducci and Nannicini (2013) apply a similar method.

[20] The German federal employment office.

Table 1   Quality level of Bavarian Politicians running for election as a Mayor

Time period	N	Population (mean)	SD (Population)	Quality (mean)	SD (Quality)	share candidates basic quality	share candidates high quality
1990 - 1996	3900	9124.549	58962.71	3.43	0.83	0.35	0.65
1996 - 2002	3780	10198.27	64670.91	3.46	0.81	0.34	0.66
2002 - 2008	3776	9509.404	54350.84	3.27	0.86	0.46	0.54
1990 - 2008	11456	9605.993	59475.45	3.38	0.84	0.38	0.62
1948 - 1966	16321	-	-	3.07	0.95	0.48	0.52
1966 - 1978	6986	9294.709	74582.09	3.31	0.88	0.41	0.59
1978 - 1990	7371	8284.975	51365.2	3.41	0.85	0.35	0.65

Notes: Quality is appointed according to the Federal Employment Office - taking education and experience into account. Basic quality stands for quality levels 1, 2, and 3. High Quality stands for quality level 4. Findings are given for different time periods. Population data available from 1972 onwards. Note that between 1948 and 1960 elections were held every 4 years, since than every 6 years.

among municipalities; observed levels of municipal spending and municipal tax revenues do not clearly reflect a mayor's quality. This means that using simple economic outcome variables as proxies for the quality of municipal mayors is insufficient. Moreover, the economic situation of a municipality is, to a certain extent, predetermined by a mayor's predecessors. Changing a municipality's situation (for the better or the worse) might not happen in the short-run.

The compiled data set contains information on each of the candidates themselves (e.g. gender, age, profession [self-declared], party affiliation, incumbency, vote share, full-time / part-time occupation, majority in city council, remuneration category) and on each municipality's political and financial situation (e.g. expenditures, revenues, debt, population). Due to the fact that various legal differences appear for the municipalities at population thresholds above the 5,000 threshold (see table 2), analysis concentrates on a subset of 1,645 small communities with up to 6,500 inhabitants. This subset represents about 80% of Bavarian municipalities and includes three population thresholds for full-time mayors and three population thresholds for part-time mayors. Analyzing bigger thresholds would disallow causal interpretation because besides remuneration other incentives might influence politicians' behavior.

Table 2   Population Thresholds and Consequences defined by Constitution

Population Threshold	Default Status	Part-time Mayor			Default Status	Full-time Mayor		
		remuneration	council size	vehicle tax		remuneration	council size	vehicle tax
1,000	Part-time	yes (73.4%)	yes	no	Part-time	no	yes	no
2,000	Part-time	no	yes	no	Part-time	yes (10.75%)	yes	no
3,000	Part-time	yes (18.8%)	yes	no	Part-time	yes (10.75%)	yes	no
5,000	Full-time	yes (7.9%)	yes	yes	Full-time	yes (11.4%)	yes	yes

Population Threshold	Consequences when crossing threshold
10,000	Council size, wage of elected civil servants, wage of full-time mayor, petition for referendum, open council, fiscal equalization.
20,000	Council size, petition for referendum.
30,000	Council size, wage of elected civil servants, wage of full-time mayor, petition for referendum, status of larger city.
50,000	Council size, wage of elected civil servants, wage of full-time mayor, petition for referendum, referendum quota, county free city, fiscal equalization.

Notes: Table shows whether crossing a threshold does have consequences for municipality. All mayors in municipalities smaller than 5000 inhabitants normally are part-time mayors. Municipalities with more than 5000 inhabitants normally have full-time mayors. Council does define status before election. The listed thresholds are in effect since 1990. Threshold can have influence on remuneration of mayors; increase of remuneration cap is given in parenthesis (in effect in March 2010). Thresholds do increase size of municipal council; municipalities with more than 5,000 inhabitants get a share of vehicle taxes. For bigger thresholds, consequences are given.   Source: own research; Ade and Freier (2011)

3. Empirical Strategy

To uncover causal relationships, I apply the quasi-experimental regression discontinuity design (RDD). The RDD exploits the fact that the treatment status for a particular observation unit often depends on exogenously determined decision rules (e.g. crossing population thresholds). Whenever treatment is perfectly determined by a population threshold, entities which are very similar in all respects but the treatment status are analyzed using the sharp form of the RDD.

RDD can be used whenever a single variable is decisive for the determination of treatment status, where marginal disparity can change that status. The idea is that entities close to a threshold[21] are more or less randomly divided into a treatment group and a control group. Therefore, sharp RDD is similar to a social experiment and is understood to be quasi-experimental.

As previously mentioned, population thresholds (N_{ci}) are commonly used by the legislator to govern municipalities. With the given data for Bavarian municipalities, treatment status (i.e. higher maximal remuneration) changes whenever a population threshold N_{ci} is exceeded. Thus, mayoral

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[21] 'Close to a threshold' is not very concrete! There exist some methods for bandwidth selection (as discussed in Section 4.3). Recommendation in general is that a researcher has to adapt the selection of the bandwidth on each individual situation.

remuneration amounts for full-time mayors follow a step function which can lead to payment discrepancies of up to 12%, in cases where population sizes are nearly identical. To analyze the general effect of this trend, population thresholds N_{ci} can be normalized to the single threshold N_c .[22] A dummy variable which indicates treatment, T_i, can then be adopted. It takes the value of one for each municipality whose normalized population N_i^n is greater than N_c , and a value of zero for smaller municipalities.[23] This approach allows for the separation of the discontinuous effect on quality caused by the increased level of remuneration (due purely to the exogenously determined population thresholds) from possible continuous effect caused by higher responsibilities, more competition, or a rising share of highly educated citizens.

The following equation formulates the simple local linear regression of the sharp regression discontinuity approach:

$$Q_{it} = \beta_0 + \tau T_{it} + \beta_1 \left(logN_{it}^n - logN_c\right) + \gamma \left(logN_{it}^n - logN_c\right) * T_{it} + \epsilon_{it}, \qquad (1)$$

where Q_{it} is the dependent variable measuring quality of a politician, β_1 captures some continuous effects and τ measures the discontinuous effect of interest. With a very small bandwidth around the threshold, a linear representation of the correlation might be a good approximation. For certain research settings widening the bandwidth and including more observations can be reasonable; in such situations it makes sense to use some type of polynomial equation to increase the robustness of the results.[24]

Whenever assignment status is not absolutely deterministic (e.g. two possibilities exist) but the probabilities change significantly at certain thresholds, the fuzzy form of the RDD is more appropriate. In contrast to the sharp design, the fuzzy RDD is a more general form that can handle situations in which for example an applicable decision rule is not fully implemented. Here, the probability of treatment does not jump discontinuously from zero to one at a given population threshold, but rather increases continuously with increases in the decisive variable, whereas a probability gap (discontinuous increase) at the threshold exists. The fuzzy regression discontinuity approach can handle such deviations as long as data about the actual treatment status are available. As Angrist and Pischke (2009) note, the fuzzy RDD can be interpreted as an instrumental variable approach, usually a two stage least squares (2SLS) estimation can is applied:

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[22] Normalization means that all observations below (above) any of the thresholds N_{ci} are rearranged in such a way to be below (above) a single threshold N_c, that the relative distance to threshold is maintained.
[23] $T_i = 1[N_i \geq N_c]$.
[24] polynomial equation: $Q_{it} = \beta_0 + \tau T_{it} + \beta_1 \left(logN_{it}^n - logN_c\right) + \beta_2 \left(logN_{it}^n - logN_c\right)^2 + \cdots +$
$$\gamma_1 \left(logN_{it}^n - logN_c\right) * T_{it} + \gamma_2 \left(logN_{it}^n - logN_c\right)^2 * T_{it} + \cdots + \epsilon_{it} \qquad (3)$$

$$Q_{it} = \beta_{0t} + \tau\, T_{it} + \beta_{1t} \left(logN_{it}^n - logN_c \right) + \epsilon_{it} \; ; \tag{2}$$

$$T_{it} = \gamma_t + \delta\, D_{it} + \zeta \left(logN_{it}^n - logN_c \right) + \eta_{it} \; ,$$

where $D_{it} = 1[N_{it}^n \geq N_c]$ is the excluded instrument and indicates whether the forcing variable exceeds the threshold.

In the first stage, the correlation between crossing a given threshold and higher remuneration is estimated. The resulting information with regard to correlation allows for the generation of the estimated treatment variable. The second stage identifies the causal effects of the treatment variable (i.e. higher remuneration) on politician quality. This strategy also accounts for possible fuzziness of the treatment effect around thresholds.

4. Results

A preliminary analysis using ordinary least squares (OLS) regression finds some positive correlations between population size and politician quality in Bavarian municipalities. Using all sample data indicates that a rise of population by 10% leads to a unit change in the quality of running candidates by 0.025 (specification (1) in table 3). This positive correlation is robust over several specifications (see other specifications of table 3; see figure 2 in appendix). As rising remuneration comes with rising population, it seems reasonable that highly qualified citizens react on given monetary incentives and become political candidates. But simple OLS cannot depict causal effects; the differences in politician quality might result on differences in the municipalities. Because Bavarian municipalities of different sizes fall into different categories with respect to responsibilities, tasks, rights, and political rents, the personal and professional requirements for politicians might differ between big cities and small villages. These differences render OLS unable to determine a causal effect of increased remuneration on politician quality. Restricting data to municipalities with fewer than 6,500 inhabitants might help, but still existing correlation (see specifications (5)-(6) in table 3) does not proof a causal relationship. As discussed in section IV.3, regression discontinuity design can help identify causal effects.

4.1. Sharp Regression Discontinuity Design

The simple local linear regression of the sharp regression discontinuity design first concentrates on observations that were close to a given population threshold and compares the outcomes on either side of that threshold. Estimating equation *(1)* table 4 shows that political candidates, running for a part-time office in a municipality that has a population size close to 1000 inhabitants, below and

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Table 3   Quality of Candidates and Mayors increases with population size – OLS Regression

	Candidates		Mayors	
	(1)	(2)	(3)	(4)
Effect	0.260***	0.155***	0.328***	0.198***
	(0.015)	(0.035)	(0.014)	(0.047)
Covariates	no	yes	no	yes
N	16,371	11,523	8,264	6,897
R^2	0.090	0.094	0.112	0.116
F	302.5	100.5	534	104
	(5)	(6)	(7)	(8)
Effect	0.304***	0.161***	0.299***	0.140**
	(0.019)	(0.044)	(0.027)	(0.058)
Covariates	no	yes	no	yes
N	12,335	9,097	6,843	5,865
R^2	0.040	0.042	0.040	0.047
F	251.8	43.2	127.2	29.8

Notes: Effect of population size (log of inhabitants) on the quality of Mayors and Candidates. Quality is appointed according to the Federal Employment Office - taking education and experience into account. Data of four elections are used (1990, 1996, 2002, and 2008). (1) and (2) use all data in the Candidates Pool, (3) and (4) use only data for elected mayors. (5) and (6) use data of candidates pool for municipalities with less than 6,500 inhabitants; (7) and (8) use data of elected mayors for municipalities with less than 6,500 inhabitants. In (2), (4), (6), and (8) covariates (status of mayor, age of candidate, surface, county dummies, debt, expenditures) are part of the regression. Standard errors robust to clustering at the municipality level are in parentheses. ***, ** and * indicate that coefficients are significantly different from zero at 1%, 5% and 10% level, respectively.

Table 4   Effect of Crossing Population Threshold on Politicians Quality - Sharp RDD Estimate – Municipalities with Part-time Mayors - Bandwidth 10%

	Quality	Highly Qualified	Age	Female	No. Candidates	Jurisdic. Service	Public Service
				Threshold 1,000			
Effect	-0.083	-0.057	-0.273	-0.001	-0.178**	0.003	-0.005
	(0.089)	(0.043)	(1.005)	(0.019)	(0.089)	(0.012)	(0.046)
N	1 288	1 319	1 312	1 319	1 319	1 319	1 319
				Threshold 3,000			
Effect	-0.074	-0.042	-0.112	-0.031	-0.111	0.002	-0.035
	(0.102)	(0.054)	(1.021)	(0.022)	(0.119)	(0.016)	(0.050)
N	1182	1203	1201	1203	1203	1203	1203
				Threshold 5,000			
Effect	0.013	0.002	0.236	0.059*	-0.192	-0.01	-0.083
	(0.142)	(0.076)	(1.390)	(0.031)	(0.188)	(0.020)	(0.074)
N	652	673	669	673	673	673	673
				Normalized Threshold			
Effect	-0.056	-0.036	-0.12	0	-0.135	0.001	-0.029
	(0.062)	(0.032)	(0.640)	(0.013)	(0.082)	(0.009)	(0.031)
N	3 122	3 195	3 182	3 195	3 195	3 195	3 195

Notes: This table shows the effect of increased remuneration cap on Candidates. Sharp RDD estimate. Quality is appointed according to the Federal Employment Office - taking education and experience into account (four categories). Highly Qualified is a quality dummy which takes the value of one for candidates in the highest quality category and zero otherwise. Age is measured in years. Female is a sex dummy. Jurisdictional Service is a dummy for jobs including judges, lawyers and legal assistants. Public Service is a dummy for jobs including teachers and other public employees. All estimates are Local Linear Regression (LLR) as in equation (1), bandwidth is 10% around the thresholds. Standard errors robust to clustering at the municipality level are in parentheses. ***, ** and * indicate that coefficients are significantly different from zero at 1%, 5%, and 10% level, respectively.

Table 5	Effect of Crossing Population Threshold on Politicians Quality - Sharp RDD Estimate - Municipalities with Full-time Mayors - Bandwidth 10%						
	Quality	Highly Qualified	Age	Female	No. Candidates	Jurisdic. Service	Public Service
	Threshold 1,000						
Effect	0.018	0.024	-0.01	-0.007	-0.253*	-0.026	-0.047
	(0.136)	(0.071)	(1.292)	(0.036)	(0.150)	(0.017)	(0.072)
N	654	677	674	677	677	677	677
	Threshold 2,000						
Effect	-0.01	-0.052	-1.618*	-0.044	0.002	0.024	0.065
	(0.103)	(0.055)	(0.941)	(0.027)	(0.118)	(0.018)	(0.056)
N	1201	1241	1238	1 241	1 241	1241	1241
	Threshold 5,000						
Effect	-0.022	0.03	0.894	0.023	-0.11	0.003	-0.015
	(0.089)	(0.050)	(0.828)	(0.020)	(0.119)	(0.016)	(0.049)
N	1 532	1 568	1 562	1 568	1 568	1568	1568
	Normalized Threshold						
Effect	0.003	0.006	-0.096	-0.007	-0.089	0.005	0.007
	(0.061)	(0.033)	(0.562)	(0.015)	(0.074)	(0.010)	(0.033)
N	3 387	3 486	3 474	3 486	3 486	3486	3486

Notes: This table shows the effect of increased remuneration cap on elected Mayors. Sharp RDD estimates are given. Quality is appointed according to the Federal Employment Office - taking education and experience into account. Highly Qualified is a quality dummy which takes the value of one for candidates in the highest quality category and zero otherwise. Age is measured in years. Female is a sex dummy. Jurisdictional Service is a dummy for jobs including judges, lawyers and legal assistants. Public Service is a dummy for jobs including teachers and other public employees. All estimates are Local Linear Regression (LLR) as in equation (1), bandwidth is 10% around the thresholds. Standard errors robust to clustering at the municipality level are in parentheses. ***, ** and * indicate that coefficients are significantly different from zero at 1%, 5%, and 10% levels, respectively.

above the remuneration threshold differ in their quality. The quality of candidates eligible for the higher remuneration cap is in average 0.08 units lower, however the effect is not significant. Table 4 (part-time) and table 5 (full-time) do show that the direction of the effects is different for municipalities of different size categories and different office status but none of the effects is statistically significant. Therefore, findings do not support the hypothesis that increased remuneration caps, which are indicated through the crossing of population thresholds, produce significant effects on politicians' quality (measured through education and working experience). Neither could robust effects on other communal variables such as the number of candidates be determined.

The sharp RDD estimations point at differing effects for different civil circumstances. Not finding statistically significant effects might be due to the fact that sharp regression discontinuity analysis does not perfectly fit to the analyzed data. For more reliable evidence on the differing effects of increasing remuneration caps, fuzzy regression discontinuity design seems adequate.

Table 6   Population Thresholds and Treatment Status - Normalized Thresholds

	(1)	(2)	(3)	(4)	(5)	(6)
			Full-time and Part-time Mayors			
Effect	0.534***	0.485***	0.529***	0.487***	0.393**	0.367*
	(0.147)	(0.141)	(0.112)	(0.089)	(0.199)	(0.191)
Covariates	no	yes	no	yes	no	yes
N	135	128	302	286	302	286
			Full-time Mayors			
Effect	0.435***	0.362***	0.440***	0.414***	0.350*	0.344*
	(0.162)	(0.134)	(0.131)	(0.113)	(0.208)	(0.187)
Covariates	no	yes	no	yes	no	yes
N	101	96	247	233	247	233
			Part-time Mayors			
Effect	0.843***	0.769***	0.939***	0.895***	0.893***	0.728***
	(0.165)	(0.230)	(0.129)	(0.149)	(0.159)	(0.260)
Covariates	no	yes	no	yes	no	yes
N	34	32	55	53	55	53

Notes: Effect of population thresholds on treatment status. Estimates in (1) and (2) with 10% bandwidth (LLR), estimates (3) and (4) with 20% bandwidth (LLR), estimates (5) and (6) local polynomial regression. In (2), (4), and (6) covariates are part of the regression. Standard errors robust to clustering at the municipality level are in parentheses. ***, ** and * indicate that coefficients are significantly different from zero at 1%, 5% and 10%, respectively.

4.2. Fuzzy Regression Discontinuity Design

As discussed above, at every population threshold, the cap for mayors' remuneration increases, and the decision as to whether or not giving the maximum possible remuneration to mayors is made by the municipal council. A survey was conducted to obtain information on the actual remuneration treatment status of municipal mayors. A remuneration variable with three possible values was created: value 0 stands for minimum remuneration in municipalities below threshold; value 1 stands either for maximum remuneration in municipalities below thresholds or for minimum remuneration in municipalities above thresholds; value 2 stand for maximum remuneration in municipalities above thresholds. As Table 6 shows crossing a threshold means that the average difference in remuneration status between municipalities just above and just below the threshold is approx. 0.5 points. This clearly indicates that population thresholds entail higher remuneration categories for mayors, whereas remuneration is obviously not perfectly determined by population thresholds. As the likelihood of receiving higher remuneration is increasing discontinuously when crossing the threshold, fuzzy regression discontinuity approach is applicable.[25]

    Fuzzy RDD estimates the effects through a two-sample least squares regression. Third order polynomial estimation is used because this form of estimation allows for using all available

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[25] See figure 4 and figure 5 in the appendix. Remuneration status 0 represents the fact that the minimum wage for municipalities below a given threshold is paid; status 1 represents either payment of the maximum wage for municipalities below a given threshold or payment of the minimum wage for municipalities above a given threshold; status 2 indicates payment of the maximum wage for municipalities above a given threshold.

Table 7: Effect of Crossing Population Threshold on Politicians Quality - Fuzzy RDD Estimate - Third order Polynomial

	Quality	Highly Qualified	Age	Female	No. Candidates	Jurisdic. Service	Public Service
	Municipalities with Part-time Mayors - Threshold 1,000						
Effect	1.446	0.721	-11.233	0.222	1.114*	0.058	0.248
	(1.374)	(0.651)	(7.472)	(0.281)	(0.599)	(0.131)	(0.435)
N	58	59	59	59	59	59	59
	Municipalities with Part-time Mayors - Threshold 3,000						
Effect	0.913	0.306	23.221***	-0.098	-1.087	-0.343	-0.524
	(0.801)	(0.440)	(7.805)	(0.187)	(0.803)	(0.212)	(0.536)
N	62	63	63	63	63	63	63
	Municipalities with Full-time Mayors - Threshold 2,000						
Effect	-0.671	-0.099	-8.574	0.376	2.668	-	-0.633
	(0.965)	(0.543)	(14.162)	(0.405)	(2.381)	-	(0.925)
N	111	114	114	114	114	-	114
	Municipalities with Full-time Mayors - Threshold 3,000						
Effect	-0.462	-0.109	-1.751	-0.321	0.856	-	-0.002
	(1.452)	(0.552)	(10.235)	(0.349)	(1.667)	-	(0.573)
N	270	276	276	276	276	-	276
	Municipalities with Full-time Mayors - Threshold 5,000						
Effect	0.102	0.311	-0.193	0.225	0.126	-	-0.396
	(0.623)	(0.327)	(5.906)	(0.252)	(0.875)	-	(0.298)
N	330	338	338	338	338	-	338
	All Municipalities (Part- and Full-time) - Normalized Threshold						
Effect	0.192	0.236	0.01	-0.581	-0.042	0.136	0.117
	(0.349)	(0.177)	(0.120)	(3.217)	(0.071)	(0.222)	(0.365)
N	689	705	705	705	705	705	390

Notes: Table 7 shows the effects of increasing remuneration on candidates' quality – estimating a Fuzzy RDD. For municipalities with part-time mayors close to the threshold 3,000 sharp RDD is estimated due to the fact that crossing the threshold indicates remuneration status perfectly. Quality is appointed according to the Federal Employment Office - taking education and experience into account. Highly Qualified is a quality dummy which takes the value of one for candidates in the highest quality category and zero otherwise. Age is measured in years. Female is a sex dummy. Jurisdictional Service is a dummy for jobs including judges, lawyers and legal assistants. Public Service is a dummy for jobs including teachers and other public employees. Estimation with Local Polynomial Regression (LPR) as in equation (3); LPR due to data limitations. Standard errors robust to clustering at the municipality level are in parentheses. ***, ** and * indicate that coefficients are significantly different from zero at 1%, 5% and 10%, respectively.

observations. For responding municipalities all running candidates are considered in analysis.[26] Similar to the sharp RDD, table 7 shows that for none of the six analyzed thresholds statistically significant effects are found. When analyzing a normalized population threshold, positive but not significant effects are found. My results do not support the hypothesis of effects caused by remuneration increases in general and do not indicate significant effects at differing thresholds.[27]

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[26] As independent pay steps account for qualifications and experience of elected politicians, the remuneration status is expected to be dependent only on the characteristics of the municipality.
[27] Figures 6, 7, and 8 in the appendix do support the empirical results.

Similar to the results found using the sharp RDD, no evidence was found that remuneration changes the quality in the political candidates' pool nor when focusing on elected mayors only.

4.3. Difference-in-Discontinuities Approach

For a second identification strategy several changes in the constitutionally defined thresholds that determine mayors' remuneration are utilized. Two threshold changes regarding full-time mayors are especially eligible for analysis: population threshold 2,000, newly introduced in 1990, and population threshold 7,000, which was in power for two election periods from 1978 to 1990.[28] These threshold changes allow to measure effects through comparing a treatment (after change) and a control group (before change). Causality is given because only the remuneration scheme changed, all other legal terms persisted. For both threshold analyses, municipalities were split in two groups, municipalities above the 2,000 (7,000) population threshold and municipalities below. Data of four election periods are considered (1978-2002), for both analyses two periods with and two periods without active treatment are analyzed. One scenario considers the candidates from all municipalities; another scenario considers only municipalities without a running incumbent.[29]

Because of the positive correlation of municipal size and quality of political candidates (see table 2), an adequate Difference-in-Differences approach must consider the size of municipalities. A first way to account for population issues is to restrict data to municipalities that are close to the thresholds (1,500 – 2,500 inhabitants and 5,250 – 8,750 inhabitants, respectively). Table 8 shows that the Difference-in-Differences regression does not uncover any significant effects for either of the two thresholds. An even better way to handle possible population issues is to use a Difference-in-Discontinuities approach, introduced by Grembi et al. (2012). Difference-in-Discontinuities combines the DD with the RDD. Whereas it seems that introducing a new population threshold (I) has a positive effect on the quality of political candidates and the suspension of a population threshold (II) has a negative effect on the quality of political candidates, the results are statistically not significant.[30]

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[28] See table 16 in appendix for an overview of threshold changes over time.

[29] A running incumbent might have an intense effect on the desire to run for election as incumbents are getting reelected normally.

[30] Following regression is estimated:

$$Q_{it} = \delta_0 + \delta_1\left(logN_{it} - logN_c\right) + J_i\left(\left(\gamma_0 + \gamma_1\left(logN_{it} - logN_c\right)\right) + T_t\left[\alpha_0 + \alpha_1\left(logN_{it} - logN_c\right) + \right.\right.$$
$$\left.\left. J_i\left(\beta_0 + \beta_1\left(logN_{it} - logN_c\right)\right)\right] + \epsilon_{it} \right. \tag{4},$$

where N_c does represent the population threshold, N_{it} is the population in municipality i at time t; J_i is a dummy with the value of one for municipalities bigger than N_c (zero otherwise), T_t is a dummy with the value of one when the year of observation does lie in the treatment period. For more details see Grembi et al. (2012).

Table 8   Differences in population thresholds are utilized - Full-Time Mayors

	(1) Diff-in-Diff	(2) Diff-in-Dis	(3) Diff-in-Diff Incumbent	(4) Diff-in-Dis Incumbent
I:			Threshold 2,000	
Effect	0.503*	0.504	0.217	0.047
	(0.294)	(0.530)	(0.179)	(0.339)
N	183	186	432	435
II:			Threshold 7,000	
Effect	-0.221	-0.079	-0.023	-0.039
	(0.174)	(0.321)	(0.086)	(0.159)
N	512	515	1619	1628

Notes: Table 8 shows results for Difference-in-Differences and Difference-in-Discontinuities estimations, comparing outcomes for treatment and control groups at times with and without treatment. The bandwidth around both population thresholds is 25%. Difference-in-Differences estimations in (1) and (3) include covariates (logarithm of average total expenditures and average total debt), in (1) all municipalities with running incumbents are excluded. Difference-in-Discontinuities approach is estimated for municipalities without running incumbents (2) and with running incumbents (4). Standard errors robust to clustering at the municipality level are in parentheses. ***, ** and * indicate that coefficients are significantly different from zero at 1%, 5% and 10%, respectively.

4.4. Validity, Robustness Tests and Discussion

A first test for robustness of RDD results is the adoption of different bandwidths around the thresholds. Lee and Lemieux (2010) presented some mechanisms for selection of the optimal bandwidth, but generally, it is widely-used to apply a variety of bandwidths. When using local polynomial regression, the choice of bandwidth is substituted by the choice of polynomial order. I followed both suggestions in my analysis, but have chosen to present only the regression results obtained using 10% bandwidth and local linear regressions for Sharp RD and the results obtained using third order polynomial regression for Fuzzy RD in the regression tables.[31]

One requirement for using RDD is that a considered threshold only determines one treatment.[32] The idea behind this requirement is that as soon as different treatments jump in to action with a crossed threshold causal effects cannot be deducted anymore. As constitutionally mandated population thresholds do affect a variety of rules and regulations in Bavaria, the population thresholds examined in the present analysis were restricted.[33] Still, all analyzed population thresholds (1,000; 2,000; 3,000; 5,000) are used to regulate the council size; most of them are used to regulate remuneration. Whenever two treatments come into effect because of an exogenous decision rule, identification of the causal implications of one treatment on its own is not

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[31] Additional regression tables are available on request.

[32] My analysis does focus on the treatment of increasing remuneration that comes with crossed population thresholds.

[33] Only Thresholds of up to 5,000 citizens were considered in the analysis because various legal differences appear bigger population thresholds (table 1). For further discussion, see Ade and Freier (2011).

Table 9   Effect of Crossing Population Threshold on Characteristics of Municipality and Politicians Quality - Sharp RDD Estimate - Municipalities with Part-time Mayors - Threshold 2,000

	Expenditure	Quality	Age	Female	No. Candidates	Jurisdic. Service	Public Service
				LLR - bandwidth 20%			
Effect	0.009	-0.045	-0.008	-0.986	-0.156*	-0.017**	0.015
	-0.027	(0.071)	(0.014)	(0.704)	(0.081)	(0.007)	(0.037)
N	2407	2333	2407	2399	2 407	2407	2407
				LPR - Third order - bandwidth 30%			
Effect	0.026	-0.045	-0.024	0.565	-0.139	-0.019	-0.045
	(0.051)	(0.134)	(0.019)	(1.335)	(0.144)	(0.011)	(0.071)
N	2407	2333	2407	2399	2 407	2407	2407

Notes: Effect of population threshold on characteristics of municipality. No remuneration increase with this threshold, only municipal council size increase. Sharp RDD. Expenditures stand for the total municipal expenditures. Quality is appointed according to the Federal Employment Office - taking education and experience into account. Age is measured in years. Female is a sex dummy. Jurisdictional Service is a dummy for jobs including judges, lawyers and legal assistants. Public Service is a dummy for jobs including teachers and other public employees. First estimate: Local Linear Regression (LLR) as in equation 1. Second estimate: Local Polynomial Regression (LPR) (third order). Standard errors robust to clustering at the municipality level are in parentheses. ***, ** and * indicate that coefficients are significantly different from zero at 1%, 5% and 10%, respectively.

possible.[34] In the present situation, increases in remuneration amounts and council size might each have independent influences on the characteristics of political candidates. A scenario in which the two treatments have opposite effects might conceal any existing influences. To test whether my empirical strategy is robust with regard to these concerns, I use a specific feature of the Bavarian constitution. Council size increases at each of the population thresholds analyzed (1,000; 2,000; 3,000; 5,000) but remuneration for part-time mayors does not increase at the population threshold of 2,000. This provides the opportunity to test whether an increase in council size has independent effects on the quality of political candidates. Table 9 shows that no effects were found for municipalities at the threshold at 2,000 residents with part-time mayors.

In addition to the overall similarity of constitutional status, all relevant covariates must follow a continuous trend around the threshold; relevant covariates for political selection in Bavarian municipalities might be expenditures, debt, and revenues. These variables were analyzed around population thresholds of 1,000, 2,000, 3,000 and 5,000 (for municipalities with full-time and half-time mayors, respectively). In addition, I generated a normalized threshold, as is common in this context. At thresholds 1,000 and 3,000, no significant gaps for linear or polynomial regression were found (see table 10 and figure 9 in the appendix). The regression table for threshold 2,000 reveals

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[34] As stated in a recent paper by Egger and Koethenbuerger (2010), there might be a relationship between spending and council size in Bavarian municipalities. If this finding holds in general, an increase in council size could indirectly influence mayor/candidate selection. While I found the effects predicted by Egger and Koethenbuerger (2010) when using my entire data set, these effects disappeared when using municipalities with less than 6,000 inhabitants (see table 13 in the appendix).

Table 10 Effects of population Thresholds on three covariates - Sharp RDD

	Expenditures	Debt	Revenues
	Threshold 1,000		
Effect	-0.039	0.045	-0.02
	(0.048)	(0.187)	(0.049)
N	656	619	656
	Threshold 2,000		
Effect	0.221***	0.296	0.242***
	(0.073)	(0.18)	(0.069)
N	198	189	198
	Threshold 3,000		
Effect	-0.04	0.115	-0.032
	(0.036	(0.126	(0.033
N	1348	1320	1348
	Threshold 5,000		
Effect	0.118***	0.386***	0.062
	(0.042)	(0.141)	(0.042)
N	1163	1128	1163
	Normalized Threshold		
Effect	0.016	0.172*	0.007
	(0.048)	(0.091)	(0.047)
N	3365	3256	3365

Notes: Effects of population Thresholds on municipal expenditures, debt and revenues. When covariates have a gap at the threshold causal statements are not possible. Sharp RDD. Standard errors robust to clustering at the municipality level are in parentheses. ***, ** and * indicate that coefficients are significantly different from zero at 1%, 5% and 10%, respectively.

significant discontinuous differences among the covariates for the individual municipalities, e.g. expenditures increased by 22% percent, holding other factors fixed. Similar results were found around the 5,000 threshold. That is remarkable on its own, but problematic for the intended analysis. Several motivations for political candidates might interfere at these two thresholds, and thus, a causal interpretation of potential results for thresholds of 2,000 and 5,000 might not be feasible. The problem is that discrepancy in the municipality's socioeconomic or financial situation (e.g. population size, age structure of population, female population share, expenditures, revenues, debt) could constitute incentives for potential candidates. These covariates can be used to control for the specific characteristics of the municipalities being compared.

Essential preconditions for using RDD are that treatment status is determined exogenously and that treatment assignment cannot be perfectly manipulated by the persons affected by possible treatment (i.e. candidates). These conditions are most easily fulfilled if the assignment rule is not known in advance. However, in the examination of the selection mechanisms for politicians, knowledge of the assignment rule is obviously necessary for there to be any causal effect. In order to manipulate the maximum remuneration cap of mayors, manipulation of population size would be necessary. Considering that it is not possible to perfectly predict population growth, manipulation threats in this context are small. To ensure that manipulation has not occurred, the distribution of

Table 11:   McCrary Density Test - Municipalities near Thresholds

	Dataset 10%	Dataset 20%	Dataset 30%
	Threshold 1,000		
Effect	0.163	0.125	0.046
	(0.174)	(0.148)	(0.118)
	Threshold 2,000		
Effect	-0.182	-0.335	-0.157
	(0.488)	(0.307)	(0.254)
	Threshold 3,000		
Effect	0.218	0.041	-0.056
	(0.159)	(0.113)	(0.087)
	Threshold 5,000		
Effect	0.301	0.2446	0.256
	(0.158)	(0.127)	(0.108)
	Normalized Threshold		
Effect	0.151	0.121	0.060
	(0.083)	(0.075)	(0.059)

Note: Point estimates. Data sets differ in the number of municipalities; e.g. Dataset 10% includes all municipalities within the range of 900 - 1100. For each dataset bandwidth selection for regression followed McCrary (2008). Standard errors robust to clustering at the municipality level are in parentheses. ***, ** and * indicate that coefficients are significantly different from zero at 1%, 5% and 10%, respectively.

municipal populations around the thresholds was examined. Figure 11 of the appendix, illustrates that municipalities are, in fact, not unevenly distributed around these thresholds. This result was confirmed using a density test, as proposed by McCrary (2008). Thus, no evidence exists that manipulation of population size has occurred (see table 11).

For my Fuzzy RDD approach I surveyed data from Bavarian municipalities. With 12% responding municipalities the response rate is sufficient for analysis. Still, a selection bias might have occurred if only municipalities with specific characteristics chose to answer the query. To address this concern, I conducted a unit non-response analysis where I did contrast the characteristics of municipalities that did answer my query with the characteristics of non-responding municipalities. Considered variables are a qualification dummy (Highly Qualified), the incumbents age, population, age structure of population, municipal expenditures, municipal debt, municipal revenues and municipal tax revenues (mean of years 2009 till 2012), political competition (measured in candidates running for office of mayor), political interest of inhabitants (measured in turnout), approval rate of mayor (measured in vote share) and mayors status (part-time/full-time). Table 14 in appendix shows that mayors with higher qualifications and more support of voters tend to respond more often.

Many findings in the literature emphasize the relevance of the presence of incumbent candidates in analyses of the political domain (e.g. Freier, 2011). The results of my analysis underline the influence of incumbent politicians. Observations show that in 61.12 % of Bavarian mayoral election since 1990, the incumbent was running for reelection. What's more, in 91.45 % of these

Table 12 Municipalities with at least two candidates and no incumbent running - Effect of Crossing Population Threshold on Politicians Quality - Sharp RDD Estimate - Bandwidth 10%

	Quality	Highly Qualified	Age	Female	No. Candidates	Jurisdic. Service	Public Service
	Municipalities with Part-time Mayors - Threshold 1,000						
Effect	-0.115	-0.017	-2.886*	-0.032	0.034	-0.004	-0.005
	(0.164)	(0.077)	(1.693)	(0.033)	(0.127)	(0.024)	(0.081)
N	447	464	457	464	464	464	464
	Municipalities with Part-time Mayors - Threshold 3,000						
Effect	0.12	0.038	-0.238	-0.027	-0.119	0.02	-0.066
	(0.142)	(0.075)	(1.333)	(0.034)	(0.139)	(0.022)	(0.070)
N	643	656	655	656	656	656	656
	Municipalities with Full-time Mayors - Threshold 2,000						
Effect	-0.027	-0.008	0.906	-0.043	-0.159	-0.032*	-0.059
	(0.184)	(0.094)	(1.582)	(0.051)	(0.176)	(0.018)	(0.094)
N	390	401	398	401	401	401	401
	Municipalities with Full-time Mayors - Threshold 3,000						
Effect	0.016	-0.046	-1.192	-0.045	-0.08	0.041	0.095
	(0.141)	(0.077)	(1.341)	(0.040)	(0.133)	(0.030)	(0.075)
N	623	642	641	642	642	642	642
	Municipalities with Full-time Mayors - Threshold 5,000						
Effect	-0.028	0.053	0.917	0.023	0.118	0.001	-0.002
	(0.128)	(0.070)	(1.156)	(0.026)	(0.150)	(0.023)	(0.071)
N	765	785	782	785	785	785	785
	All Municipalities (Part- and Full-time) - Normalized Threshold						
Effect	0.009	0.017	-0.529	-0.015	-0.031	0.006	0.007
	(0.070)	(0.037)	(0.657)	(0.016)	(0.070)	(0.011)	(0.037)
N	2 591	2 662	2 646	2 662	2 662	2662	2662

Notes: Municipalities with lack of political competition are excluded. Effect of remuneration increase on Candidates. Sharp RDD. Quality is appointed according to the Federal Employment Office - taking education and experience into account. Highly Qualified is a quality dummy which takes the value of one for candidates in the highest quality category and zero otherwise. Age is measured in years. Female is a sex dummy. Jurisdictional Service is a dummy for jobs including judges, lawyers and legal assistants. Public Service is a dummy for jobs including teachers and other public employees. Estimation with Local Polynomial Regression (LPR) as in equation (3); LPR due to data limitations. Standard errors robust to clustering at the municipality level are in parentheses. ***, ** and * indicate that coefficients are significantly different from zero at 1%, 5% and 10%, respectively.

cases incumbents were re-elected. An incumbent running for reelection did have strong effects on several variables.[35] This could mean that potential candidates shy away from running against an incumbent, the selection mechanism might be less affected by monetary rewards. Another bias might result from municipalities in which only one person is running for office. Compared to municipalities with tough political competition, these single-candidate municipalities might be dominated by one political party (with unobserved selection mechanisms within that political party)

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[35] See table 15 of the appendix.

or might simply be unattractive for potential candidates. If such municipalities were unequally distributed around the population thresholds, my analysis would clearly provide biased results. Excluding observations with either only one candidate or an incumbent candidate did slightly alter the results (see table 12), but still did not provide evidence of a causal relationship between remuneration and politician quality.

This paper tests the hypothesis that an increase in remuneration affects political selection very differently depending on the individual characteristics of municipalities (see Caselli and Morelli, 2001). My empirical findings on the influence of discontinuous remuneration changes do not support the hypothesis. My results show mostly positive, but insignificant effects on politicians' selection.

In contrast to my results Ferraz and Finan (2009) uncover positive rewards on higher payment for Brazilian legislators. Using a fuzzy regression discontinuity design they show that increased remuneration caps for Brazilian politicians at the communal level lead to increased numbers of candidates, better educated candidates, better support of common goods, and longer times in office. Nevertheless the research by Ferraz and Finan has some severe differences to my study. Whereas I study mayors with much power and managerial responsibilities they study municipal legislators with very limited decision-making powers. Even though legislators in Brazil do not face term limits, the more powerful mayors face term limits.[36] What's more, the authors analyze all Brazilian municipalities, using a normalized threshold. Differences between Bavarian and Brazilian local politics include that Brazilian legislators get relatively high remuneration (2.6 times the average wage for workers) whereas Bavarian council members only get attendance fees.

A comparison of my results with empirical findings from Italian municipalities points to the relevance of term limits. Gagliarducci and Nannicini (2013) show that a discontinuous increase in remuneration for mayors of Italian cities with close to 5,000 inhabitants effects politicians' quality positively. Moreover, Gagliarducci and Nannicini (2013) find that better performance of mayors was driven by better qualification and not by re-election concerns. The clearest difference between the Italian and Bavarian legal frameworks is that Italian mayors can be re-elected only once (five year terms), whereas Bavarian mayors do not face any term limits (six year terms).[37] As Bavarian incumbents generally get re-elected, log odds of winning an election against a running incumbent might lead to a selection of intrinsically motivated candidates not influenced by monetary rents. Whether or not missing term limits and remuneration caps interfere with each other in Bavarian local politics is a question for further research.

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[36] Brazilian mayors have budgetary power, whereas the municipal budget must be approved by the legislators. Mayors can be reelected only once, for a second term of four years.
[37] Whereas full-time mayors face an age limit (not older than 65 when taking office), part-time mayor do not face any restrictions.

5. Conclusion

Contrary to the central prediction of the textbook citizen-candidate models, this paper does not find evidence that the rise in remuneration has a causal effect on the quality of political candidates in Bavaria. To establish causality, I rely on two identification strategies.

First, I use a regression discontinuity approach that exploits population threshold rules determining eligibility for higher remuneration caps. The RD approach can be seen as an instrumental variable 2SLS estimation which is based on rich communal-level data from the Bavarian statistical body. Increases in full-time mayors remuneration caps of 11 percent (threshold 2,000), of 13 percent (threshold 3,000), and of 11 percent (threshold 5,000) did not significantly increase quality. Several robustness checks confirm the validity of the empirical approaches.

Second, I apply Difference-in-Differences techniques exploiting the changes on population thresholds for full-time and part-time mayors in Bavaria from 1972 to 2002. The recently developed Difference-in-Discontinuities approach was applied in the context of politicians' selection mechanisms for the first time. Both identification strategies could yield neither positive nor negative statistically significant effects of increased remuneration caps on politicians' quality.

In sum, my results show that constitutionally defined population thresholds do not influence the quality in the candidates' pool of local politics in Bavaria. A comparison of the effects of increasing remuneration at the different layers of government might yield potential for future research. Also, it would appear worthwhile to more rigorously extend the scope of research on interactions of term limits and remuneration caps to separate overlaying effects on quality.

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Appendix - Figures

Figure 2   Correlations of Quality and Population
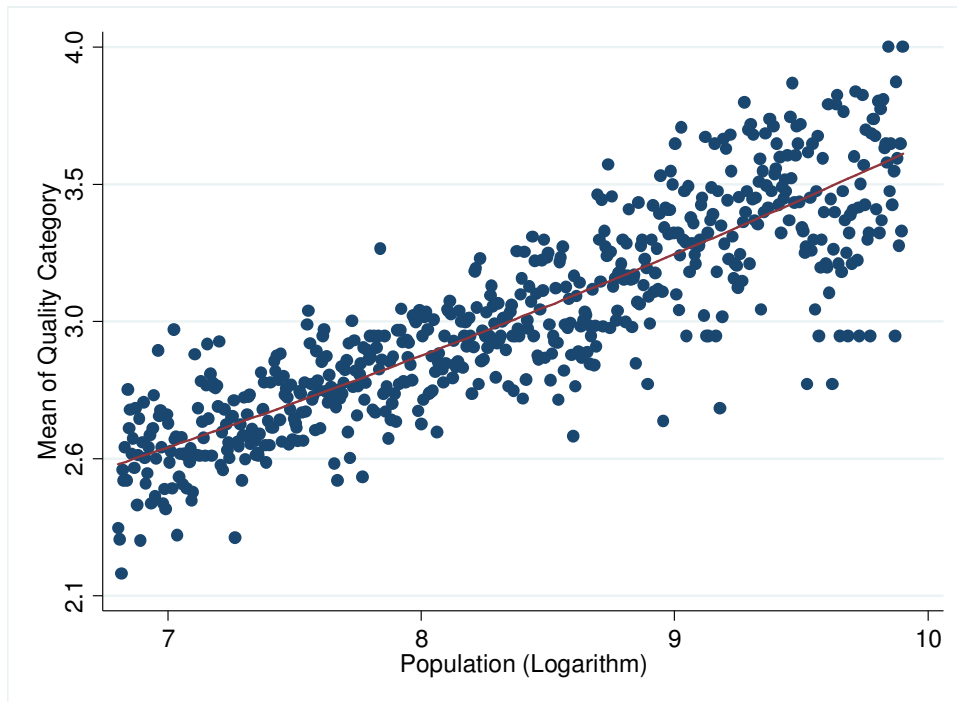
Notes: The figure shows the correlation between the quality of political candidates and population using data from 1990 to 2012. Data restricted to municipalities with more than 900 and less than 20,000 inhabitants. Scatter points are averaged over 600 bins.

Figure 3   Effect of Normalized Threshold on Quality of Political Candidates
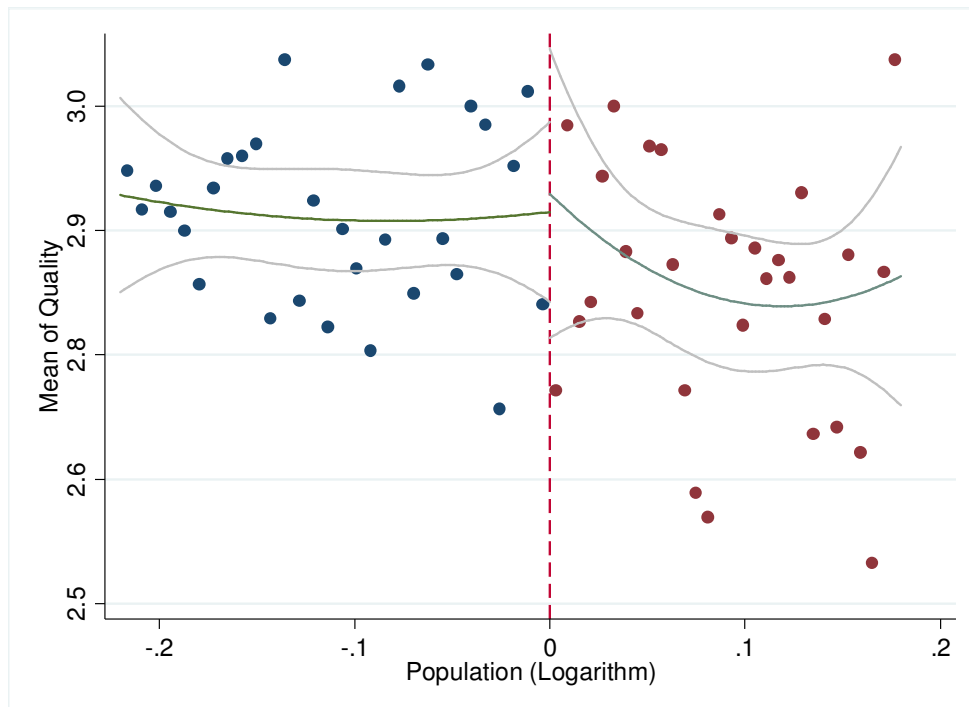
Notes: The figure shows the quality of political candidates close to the normalized population threshold of municipalities up to 6,000 inhabitants. The central line is a spline linear fit; the lateral lines represent the 95% confidence interval. Scatter points are averaged over 60 bins.

Figure 4   Effect of Normalized Threshold on Treatment Status (remuneration increase)
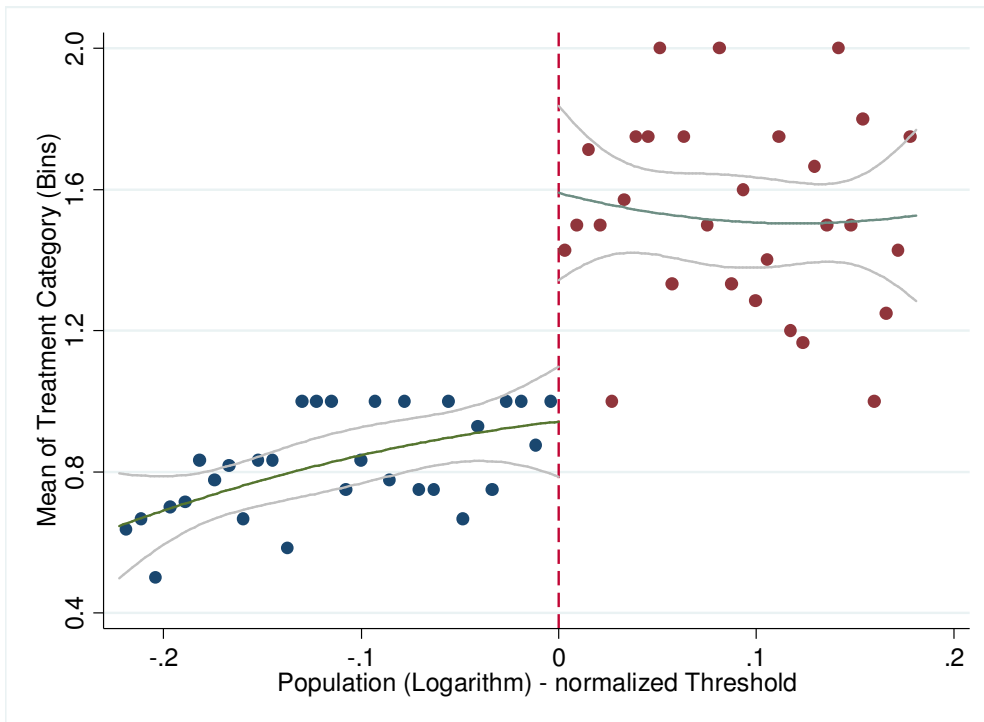
Notes: The figure shows values of the remuneration treatment category close to the normalized population threshold of municipalities up to 6,000 inhabitants. The central line is a line of best fit (quadratic); the lateral lines represent the 95% confidence interval. Scatter points are averaged over 60 bins.

Figure 5   Effect of Normalized Threshold on Treatment Status (remuneration increase) for municipalities with full-time and part-time Mayors
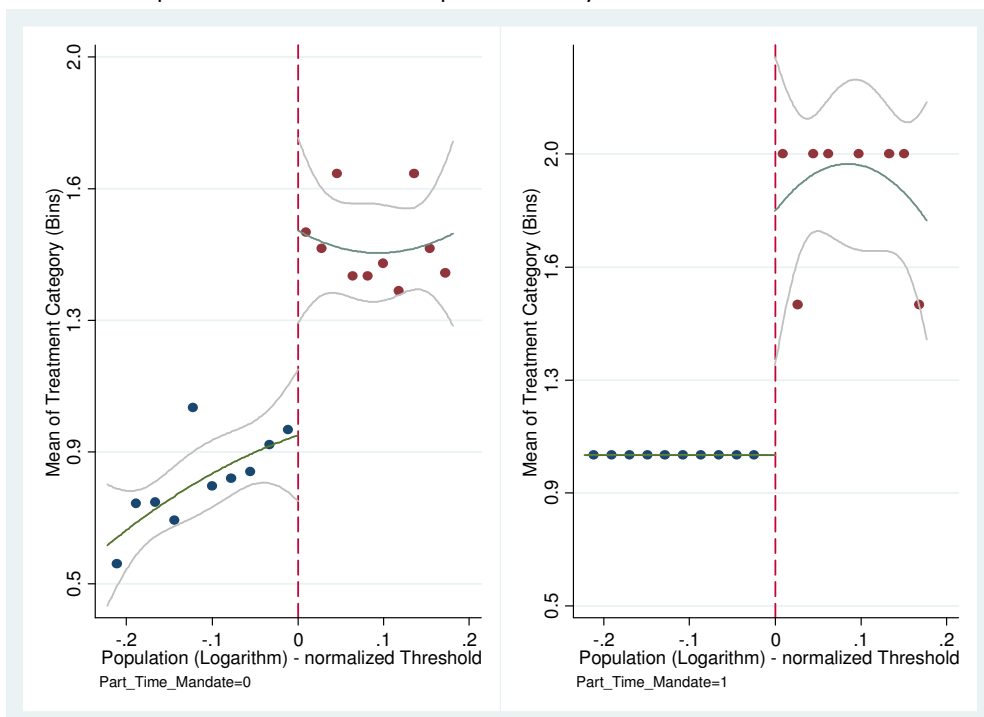
Notes: The figures show values of remuneration treatment category close to the normalized population threshold of municipalities up to 6,000 inhabitants – for municipalities with full-time and part-time mayors. The central line is a line of best fit (quadratic); the lateral lines represent the 95% confidence interval. Scatter points are averaged over 60 bins.

Figure 6   Fuzzy RDD - Threshold 1,000 (Part-time Mandate) and Threshold 2,000 (Full-time Mandate)
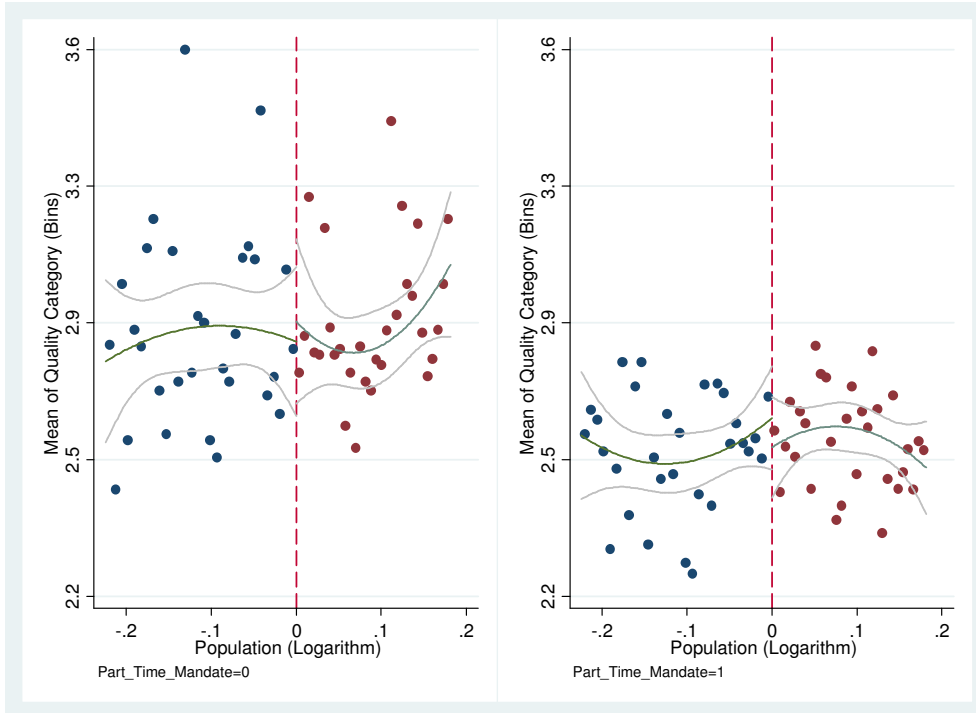
Notes: The figures show values of quality category close to the population threshold 1,000 and 2,000. The central line is a line of best fit (quadratic); the lateral lines represent the 95% confidence interval. Scatter points are averaged over 60 bins.

Figure 7   Fuzzy RDD - Threshold 3,000 (Part-time Mandate and Full-time Mandate)
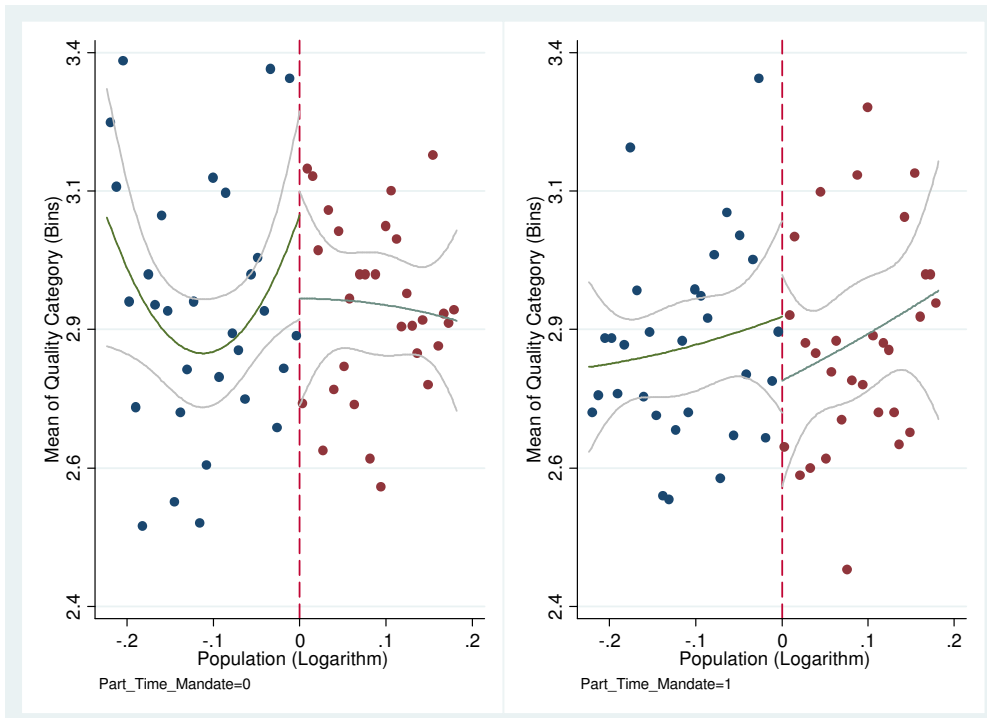
Notes: The figures show values of quality category close to the population threshold 3,000 – for municipalities with full-time and with part-time mayors. The central line is a line of best fit (quadratic); the lateral lines represent the 95% confidence interval. Scatter points are averaged over 60 bins.

Figure 8   Fuzzy RDD - Threshold 5,000 (Part-time Mandate and Full-time Mandate)
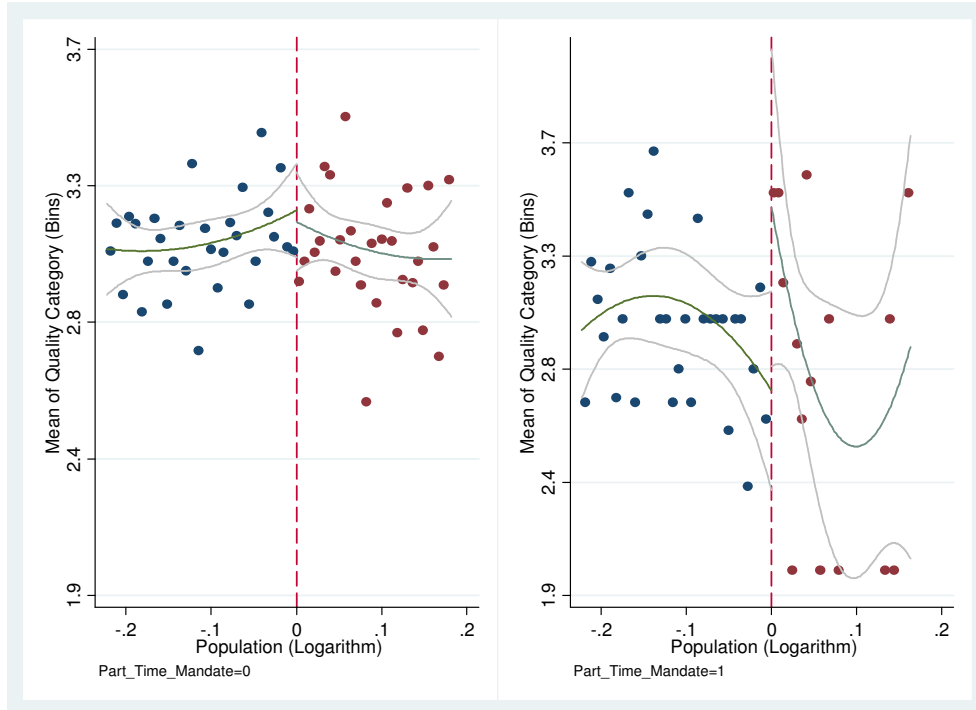
Notes: The figures show values of quality category close to the population threshold 5,000 – for municipalities with full-time and with part-time mayors. The central line is a line of best fit (quadratic); the lateral lines represent the 95% confidence interval. Scatter points are averaged over 60 bins.

Figure 9   Covariates at Threshold
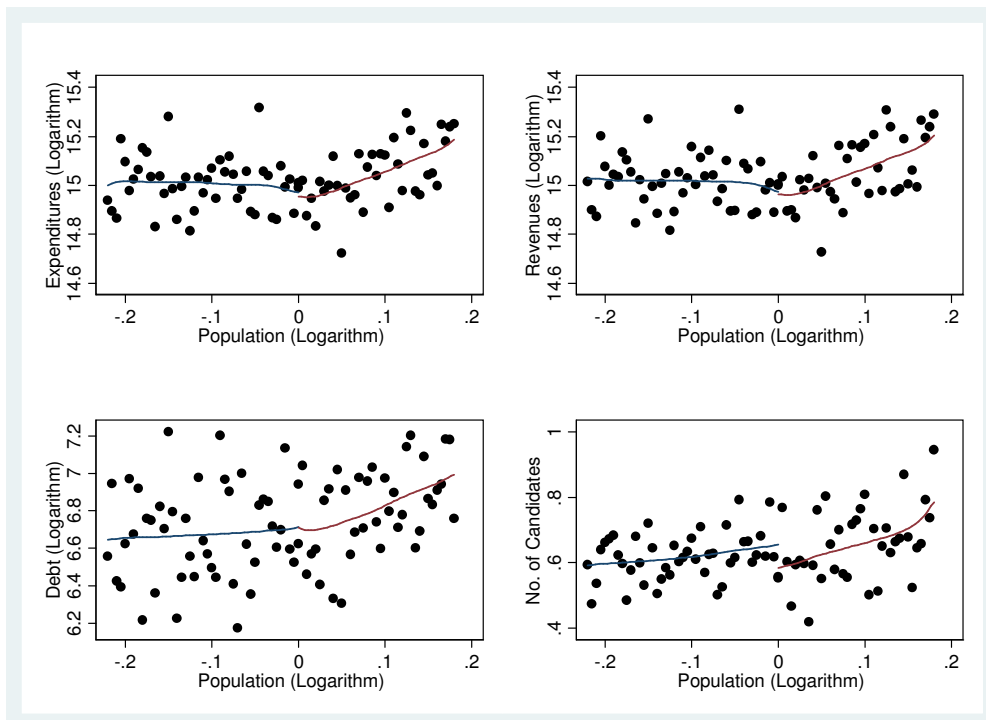
Notes: The figures show values of different municipal covariates (expenditures, revenues, debt, and number of candidates running) close to the normalized population threshold of municipalities up to 3,600 inhabitants.

Figure 10   Histogram Densities around Normalized Threshold
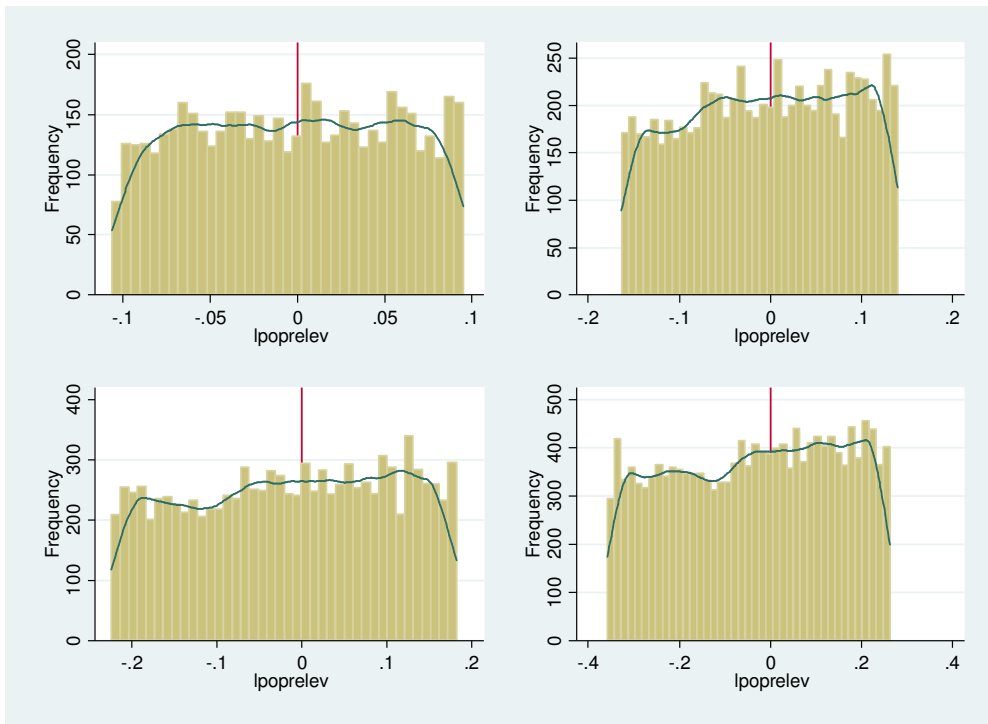
Notes: The figures show the density of municipalities around population thresholds (bandwidth 10, 15, 20, and 30).

Figure 11   McCrary Density Test
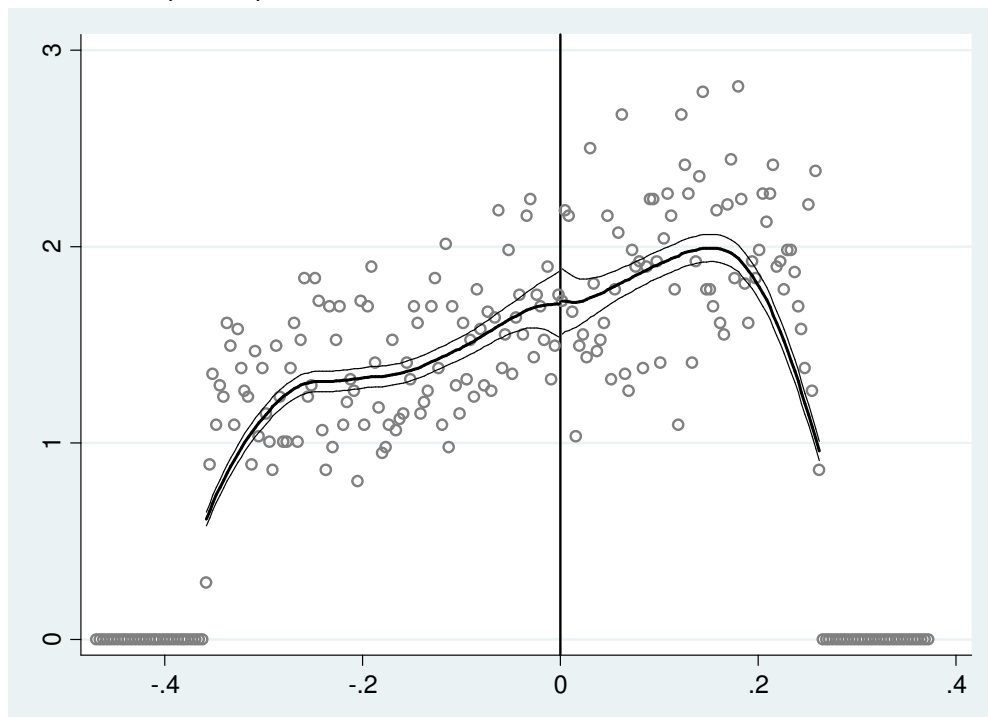
Notes: The figure shows the density test of McCrary. The central line is a spline 3rd –order polynomial fit; the lateral lines represent the 95% confidence interval.

Appendix - Tables

Table 13 Influence of council size on municipal expenditures

	Bandwidth around Population Thresholds			
	± 0.10	± 0.15	± 0.20	± 0.20 (polynomial)
(I) Egger and Kothenbuerger (2010)	0.176***	0.086***	0.043*	0.121***
	(0.032)	(0.026)	(0.022)	(0.045)
N	15137	22604	29768	29768
(II) All Municipalities	0.144***	0.080***	0.066***	0.100**
	(0.032)	(0.025)	(0.022)	(0.044)
N	15137	22805	30320	30320
(III) Municipalities < 6,000 inhabitants	0.040*	0.004	0.023	0.052
	(0.023)	(0.019)	(0.016)	(0.033)
N	13061	19751	26162	26162

Notes: Estimating the Effect of municipal size increase on expenditures in three different scenarios: (I) uses original data from Egger and Koethenburger (2010) and indicates strong significant effects. (II) follows the strategy of Egger and Koethenbuerger but using my own dataset. Fairly similar significant effects are uncovered. When restricting my dataset two small municipalities (last population threshold considered is 5,000) the strong effects disappear. Standard errors robust to clustering at the municipality level are in parentheses. ***, ** and * indicate that coefficients are significantly different from zero at 1%, 5% and 10%, respectively.

Table 14 Unit Non-Response Analysis

Responding to query	coeff.	std. err.
Highly Qualified	0.238**	(0.238)
Mayors Age	0.001	(0.000)
Threshold Dummy	-0.181	(0.181)
Expenditures	0.000	(0.000)
Debt	0.000	(0.000)
Revenues	0.000	(0.000)
Tax Revenues	0.000	(0.000)
Population (Logarithm)	0.624**	(0.215)
Population Structure	2.613	(1.95)
Part-Time Mandate	0.185	(0.167)
No. Candidates	-0.129	(0.116)
Turnout	3.381**	(1.06)
Mayors Vote Share	0.620	(0.656)
Regional dummies (8)	yes	
N	845	
R^2	0.072	

Notes: Table 14 shows the results of comparing characteristics of responding municipalities with characteristics of non-responding municipalities (election period 2008-2014).   Source: own query

Table 15   Effect of running Incumbents on other features of elections.

	Quality	Quality	Female	Female	No. of Candidates	No. of Candidates	Newcomer	Newcomer
Effect	-0.13***	-0.14***	-0.01***	-0.01**	-0.31***	-0.32***	-0.22***	-0.22***
	(0.028)	(0.030)	(0.005)	(0.006)	(0.025)	(0.027)	(0.011)	-0.012
Covariates	no	yes	no	yes	no	yes	no	yes
N	4 482	3 843	4 532	3 887	4 532	3 887	4 532	3887

Notes: Effect on municipalities close to normalized thresholds (bandwidth 30%). Quality is appointed according to the Federal Employment Office - taking education and experience into account. Female is a sex dummy. No. of candidates gives the number of running politicians. Newcomer is a dummy for candidates running for the first time. Turnout stands for voter participation. Estimation with Local Linear Regression. Standard errors robust to clustering at the municipality level are in parentheses. ***, ** and * indicate that coefficients are significantly different from zero at 1%, 5% and 10%, respectively.

Table 16   Changes in Remuneration regulation over time

Election Year	1966	1972	1978	1984	1990
Population Thresholds defining Remuneration Thresholds for full-time Mayors					2000
				3000	3000
	5000	5000	5000	5000	5000
				7000	
		10000	10000	10000	10000
					15000
	20000	20000	20000	20000	
		30000		30000	30000
	50000	50000	50000	50000	50000
Population Thresholds defining Remuneration Thresholds for part-time Mayors	250	250	250	250	
	500	500	500	500	
	1000	1000	1000	1000	1000
	2000	2000			
	3000	3000	3000	3000	3000
	4000	4000			
	5000	5000	5000	5000	5000

Notes: Table 16 presents an overview of changes in the constitutionally defined population thresholds. Thresholds are unchanged since 1990.   Source: Bayerisches Gesetz- und Verordnungsblatt; own research

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