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Government Spending and Legislative Organization: Quasi-Experimental Evidence from Germany†

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This paper presents empirical evidence of a positive effect of council size on government spending using a dataset of 2,056 municipalities in the German state of Bavaria over a period of 21 years. We apply a regression discontinuity design to avoid an endogeneity bias. In particular, we exploit discontinuities in the legal rule that relate population size of a municipality in order to council size to identify a causal relationship between council size and public spending, and find a robust positive impact of council size on spending. Moreover, we show that municipalities primarily adjust current expenditure in response to a rise in council size. (*JEL* D72, H72, R51)

The notion that legislative organization affects government spending features prominently in recent work on the political economy of fiscal policy.[1] One reason for an overspending bias in the public sector, as seen in the literature, is the districting of political jurisdictions. The key argument for the latter is that legislators internalize the benefit of public projects targeted at their district, but due to cost sharing underestimate the cost of project provision. The size of government is hence positively related to the number of legislators. The phenomenon is frequently referred to as *pork-barrel spending*, the *fiscal commons problem*, or the *law of* $1/n$ (see, e.g., Barry R. Weingast, Kenneth A. Shepsle, and Christopher Johnsen 1981).

Empirical work on the relationship between legislature size and public spending includes Alison F. DelRossi and Robert P. Inman (1999), John Charles Bradbury and W. Mark Crain (2001), Reza Baqir (2002), Per Pettersson-Lidbom (2007), and Christoph A. Schaltegger and Lars P. Feld (2009). The corresponding evidence relies on the variation of governments across countries (Bradbury and Crain 2001), across US states (DelRossi and Inman 1999), across US counties/cities (Baqir 2002), across Swiss Cantons (Schaltegger and Feld 2008), or across Swedish and Finnish local governments (Pettersson-Lidbom 2007). The data used and methods applied

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[1] See, e.g., Timothy Besley and Anne Case (2003), Torsten Persson and Guido Tabellini (2003), and Daron Acemoglu (2005) for a review of the literature.

in such works are as diverse as the results, pointing only partly to evidence in favor of the pork-barrel spending hypothesis. However, there are two potential problems with existing evidence. First, most of the contributions apply empirical methods that do not support an identification of causal effects.[2] Second, in most studies, inference relied on relatively small numbers of cases supporting identification.

We deliver causal inference of the impact of council size on government spending in an unusually large dataset, comprising relatively homogeneous municipalities in just one state of Germany, namely Bavaria. Using data of the universe of 2,056 Bavarian municipalities from 1984 to 2004, we identify a positive impact of an increase in council size on municipality-level expenditures. The principal problem with identification is that council size may be correlated with other variables determining expenditures. This may result in an endogeneity bias if relevant variables that are correlated with council size are omitted. For instance, council size may reflect the general preferences of voters for a fine-grid representation in legislature. At the same time voters may want to see high levels of public spending. Hence, council size and spending might be positively associated without any causal relationship.[3]

In this paper, we base causal inference upon two institutional features of the political system in the state of Bavaria. First, in Bavaria, as well as in other jurisdictions, municipalities have a limited influence on their council size, because the latter is formulaically related to population size. Second, council size is a positive but discontinuous function of a jurisdiction's population size. Bavarian state law defines 13 thresholds that relate municipality population size to council size. Similarly sized municipalities with a marginally smaller or marginally larger population than the legally defined threshold have starkly different council sizes. The law-induced, discontinuous change in council size may be up to 50 percent. We argue that municipalities that are close to the threshold are randomly assigned to the right or to the left of the threshold. The discontinuity in the formula hence constitutes a quasi-natural experiment. A focus on municipalities in the neighborhood of thresholds enables us to draw causal inference, i.e., to determine whether council size and government spending are causally linked, with causality running from council size to spending.[4] Our empirical results suggest that an average municipality increases its total expenditures by about EUR 74,850 or by about EUR 29,192 per new council seat when crossing a threshold.

We find a positive effect of council size on fiscal spending both in a political environment of single-district jurisdictions (at-large systems) and in one of a mayor-council legislature. Either political institution has been argued to be inherently exclusive

[2] For instance, since council size changes are relatively infrequent, identification in existing empirical studies relies mostly on cross-sectional variation in council size. This precludes the use of panel data analysis to address problems of endogeneity.

[3] See Acemoglu (2005) for a general discussion of problems of endogeneity in empirical analysis of political economy.

[4] Such an approach is referred to as regression-discontinuity design (see Guido W. Imbens and Thomas Lemieux 2008, David S. Lee 2008, and Lee and Lemieux 2009). It has only recently been applied in political economy. See, e.g., Matz Dahlberg, Heléne Lundqvist Nilsson, and Eva Mörk (2008); Lee, Enrico Moretti, and Matthew J. Butler (2004); Lee (2008); Pettersson-Lidbom (2007, 2008); Fernando Ferreira and Joseph Gyourko (2009); and Claudio Ferraz and Frederico Finan (2009).

toward the spending effect of council size in previous research. In an at-large system only a single political district exists, and political candidates compete for votes from the whole population. The at-large system hence removes the overspending bias due to geographical cost sharing. In a mayor-council system, the mayor is directly elected. The mayor will more likely internalize the overall cost of projects and, provided the mayor has a politically strong position, the mayor can counteract the overspending bias of council members.[5] Baqir (2002) finds evidence for mayor-council systems to break the relationship between council size and spending in US cities.

We look further into the financing implications of politically motivated spending hikes. Bavarian municipalities, like other German municipalities, have some taxing authority. Tax instruments available to municipalities are property taxes and a tax on business profits. We find that, in particular, property taxes change with council size. Suggestively, municipalities use the profit tax to compete for mobile firms and are thus reluctant to increase it to finance politically induced spending hikes.[6] As to the expenditure side, it is primarily current expenditure rather than infrastructure investment that changes with the number of council members. The finding may reflect a preference by council members for spending increases which can be implemented in the short run.

This paper proceeds by providing a description of municipal finance and politics in Bavaria in Section I, followed by the empirical strategy in Section II. The results are shown in Section III (baseline results) and Section IV (robustness analysis and extensions). A summary of the main results and some conclusions are presented in Section V.

I. Municipal Finance and Politics in Bavaria

Bavaria is comprised of 2,056 municipalities that have a considerable degree of fiscal autonomy. On the revenue side, they can set property taxes and a business tax. Own-source tax revenues are approximately 55 percent of total (own-source plus shared, but federally determined) tax revenues and roughly 30 percent of total revenues (i.e., tax revenues plus transfer income). Municipalities can borrow to the extent that the amount of borrowing does not exceed infrastructure outlays (Golden Rule of Public Finance). In contrast, current spending has to be financed by current receipts. On the expenditure side, municipalities provide important public services such as sports facilities, kindergartens, nursing homes, elementary schools, as well as utility and infrastructure services.

[5] A mayor-council system is implemented, e.g., at the municipal level in some German states and in a number of US cities (most notably in small and large cities). See, e.g., James H. Svara (1990) for a review of the US experience. The idea that a politically strong legislator imposes fiscal discipline is conceptually related to the discussion of a "strong" finance minister in government and its effect on public debt policy (e.g., Jürgen von Hagen 2005, 2006), and to the economic comparison of presidential and parliamentary systems (e.g., Persson and Tabellini 2003). A strong finance minister most likely internalizes the overall costs of pork-barrel spending, with the consequence of vetoing some of the expenditure proposals of cabinet ministers. In a presidential system, the president is elected directly into office and has independent authority (both equally apply to mayors in Bavaria). By contrast, in a parliamentary system, the prime minister is elected by the parliament and is accountable to it.

[6] The finding is consistent with the basic prediction of the literature on fiscal competition, which is that competing jurisdictions will generically abstain from financing additional spending by taxing mobile resources such as capital or firms (see, e.g., Geoffrey Brennan and James M. Buchanan 1980 and Hans-Werner Sinn 2003).

Table 1—Council Size as a Discontinuous Function of Population Size

Population size (pop)			Council size
0	< pop <=	1,000	8
1,000	< pop <=	2,000	12
2,000	< pop <=	3,000	14
3,000	< pop <=	5,000	16
5,000	< pop <=	10,000	20
10,000	< pop <=	20,000	24
20,000	< pop <=	30,000	30
30,000	< pop <=	50,000	40
50,000	< pop <=	100,000	44
100,000	< pop <=	200,000	50
200,000	< pop <=	500,000	60
	Nueremberg		70
	Munich		80

Municipalities have the right of self-management. The municipal political system in Bavaria is a mayor-council system (the so-called *Süddeutsche Ratsverfassung*).[7] The system features direct elections of the mayor and council members (mayor-council system), which are held every six years. The mayor has a strong position in municipal politics, being the chief executive of the municipality who is solely responsible for its operation. The mayor is also a chairman of the council, endowed with voting rights and the prerogative to veto actions of the council (in particular of subcommittees implemented by the council).[8]

The legislature comprises candidates of national parties and candidates who have no affiliation with national parties, and independent candidates may be politically organized either on a stand-alone basis or may have joined a voter association. An important feature of the political system is that the council size is related to the population size of the municipalities.[9] Table 1 summarizes the mapping of population size into council size as prescribed by law. The number of council members may take is different values; see the last column in Table 1. The council size in the cities of Munich and Nuremberg is directly prescribed by law. Otherwise, the council size is formulaically related to the population size of the municipality at a specific date (determined by law) prior to the election. In particular, the number of legislators elected in the years 1984, 1990, 1996, and 2002 depended on the population size in the third quarter of the year prior to the election. Hence, the size of 2,063 out of 2,065 councils is formulaically determined by the population size, thus representing a sharp assignment of municipalities to council size in Bavaria.

The data we use comprise fiscal data on spending and revenues, data on population size, and data on the size of municipal councils. The municipal data come

[7] Interestingly, after World War II (WWII), the military government in the British occupation zone (comprising the northern states of former West Germany) implemented a council-manager system, in which the mayor was elected by the council and accountable to it (the so-called *Norddeutsche Ratsverfassung*). Recently, these states have gradually transitioned to a mayor-council system. The expenditure effects of the political reform are analyzed in Egger, Koethenbuerger, and Michael Smart (2007).

[8] See http://www.stmi.bayern.de/service/gesetze/ for more information (in German).

[9] The relevant population metric is comprised of only individuals who have their first place of residence in the respective municipalities. Hence, an individual may not be registered to reside in more than one municipality.

Table 2—Observations, Total Expenditures, and Per-Capita Expenditures across Council Size Classes in Bavaria (*2,056 municipalities over the period 1984–2004*)

Council size (seats)	Observations	Total expenditures mn. euro	Per capita expenditures euro
8	4,032	1.3	1,511.11
12	13,671	2.3	1,516.25
14	7,304	3.8	1,504.63
16	8,115	6.1	1,531.17
20	6,033	11.3	1,589.51
24	2,850	22.8	1,621.28
30	492	38.1	1,571.05
40	318	78.9	1,981.20
44	210	142.0	2,254.15
50	87	301.0	2,562.88
60	21	559.0	2,185.36
70	21	1,330.0	2,729.53
80	21	4,190.0	3,404.98

from the Bavarian statistical office and are publicly available.[10] Table 2 may help in gathering some impression of the distribution of observations across different council size levels. Almost 91 percent of the data refer to municipalities with a pre-election-year population size not exceeding 20,000 inhabitants and, hence, with a council size of 24 seats or less.

The last two columns of Table 2 show total public expenditure and per capita public expenditure over the sample period. Expenditures increase by council size, which, per se, does not allow the inference of any causal relationship between council size and government spending. Because council size is formulaically related to population size, Table 2 may display a spurious correlation. The rise in expenditures with council size may reflect a higher demand for public spending following a rise in population size, yielding higher total amount and per capita values of public spending. The former response is straightforward. The latter is consistent with the "Brecht Law," which stipulates that a higher concentration of population raises per capita spending due to, e.g., increased crowding in the consumption of public services.[11] Disentangling the effect of population size from other causes of spending growth, such as legislative organization, is a nontrivial task in empirical analysis (see Acemoglu 2005). In our empirical analysis, we address that concern by employing a regression-discontinuity design as explained in the next section.

[10] See http://www.statistik.bayern.de/.

[11] In the Web Appendix, we provide a scatter plot of total log expenditure and per capita log expenditure of municipalities over the sample period. As one may expect, the distribution is somewhat skewed toward smaller municipalities (and, consequently, council sizes) and total log expenditures, as well as total log expenditures per capita rise in population size.

II. Empirical Strategy

As previously mentioned, the focus of this paper is on the causal impact of council size on the amount of expenditures at the municipality level.[12] In our case, council size is a step function which discontinuously maps population size onto council size. The key problem of identifying the causal effect of council size on expenditures is to discern the discontinuous relationship between log population size and log expenditures through discrete changes in council size, as suggested by Table 1, from a continuous relationship between log population and log expenditures. Proper inference should obey endogeneity of council size along with its discontinuity about population size.

Ideally, causal inference relies on a randomized design or experiment where the number of legislators is changed randomly across municipalities. Such an experiment is not available for municipality council size and its impact on municipality expenditures. However, one may adopt a quasi-experimental design to approximate real randomization. In particular, with the discontinuous relationship of population size to council size, application of a regression-discontinuity-design (RDD) seems natural. (See Joshua D. Angrist and Victor Lavy 1999, Wilbert Van der Klaauw 2002, A. Colin Cameron and Pravin K. Trivedi 2005, Angrist and Jörn-Steffen Pischke 2009. In particular, Imbens and Lemieux 2008 and Lee and Lemieux 2009 provide a very useful guide for practitioners.) In our application, the nexus between population size and council size entails a *sharp design*. Hence, assignment of municipalities to different council sizes in election years (such as 1984, 1990, 1996, and 2002), and five years thereafter, is solely determined by population size in the years prior to the elections (i.e., 1983, 1989, 1995, 2001).

Let us describe the RDD model in formal accounts for a cross-section of data around a single discontinuity d as follows.[13] First, let us refer to population size for any municipality i by N_i, to critical population size at the threshold by N_d, and to normalized population size by $\tilde{N}_i \equiv N_i/N_d$. Then, $\ln \tilde{N}_i = 0$ at a population size of $N_i = N_d$, i.e., at the threshold. Then, we can define an indicator variable for observations i as

$$D_i = \begin{cases} 1 & \text{if } \ln \tilde{N}_i > 0 \\ 0 & \text{if } \ln \tilde{N}_i \leq 0. \end{cases} \tag{1}$$

[12] Subsequently, we use total public expenditures as the dependent variable. David M. Primo and James M. Snyder (2008) show that a rise in the number of legislators may not necessarily increase the size of the expenditure package each legislator proposes. This, for instance, prevails for pure public goods. However, even with this type of public expenditure the rise in the number of legislators in itself raises total public spending. It is the combined effect of legislature size on the intensive and extensive margin of public spending which is put to a test here.

[13] In our case, several discontinuities, $d = 1, \dots, 13$, where $d = 1$ is associated with a council size of 8; $d = 2$ corresponds to a council size of 12; and so on; and $d = 13$ corresponds to a council size of 80 (see Table 1 for the different size classes). As illustrated by Table 1, the critical population sizes at which discrete changes in council size occur are 1,000, 2,000, 3,000, 5,000, 10,000, 20,000, 30,000, 50,000, 100,000, 200,000, and 300,000 inhabitants, respectively. As indicated by Table 1, Nuremberg and Munich have specific council sizes independent of their population. We will normalize population sizes and total expenditures such that the data are centered around a single threshold, and we can estimate the average treatment effect for all discontinuities.

The RDD model for observations i may be formulated as

$$\ln \tilde{G}_i = \alpha + \beta D_i + k(\tilde{N}_i) + \cdots + \varepsilon_i, \tag{2}$$

where $\ln \tilde{G}_i$ is the logarithm of normalized (i.e., centered around the threshold) expenditures of municipality i; $k(\cdot)$ is a polynomial function of $\ln \tilde{N}_i$, which is supposed to capture the continuous relationship between $\ln \tilde{N}_i$ and $\ln \tilde{G}_i$; α is a constant; β corresponds to a discontinuous effect of council size at $N_i = N_d$; and ε_i is a disturbance term. Inference about the regression discontinuity at $\ln \tilde{N}_i = 0$ for all i can be made by means of local polynomial regression plots where the polynomial function about population size, $k(\cdot)$, is based upon a kernel smoothing algorithm (see, e.g., Lee and Lemieux 2009). In the benchmark analysis, we employ an Epanechnikov kernel smoother for $k(\cdot)$ in equation (2), where the optimal bandwidth is determined endogenously. In our robustness analysis, we also use alternative kernel smoothing algorithms and bandwidths.

To estimate the regression discontinuity β and, hence, the causal impact of a change in council size at the threshold $\ln \tilde{N}_i = 0$, one may use all data as suggested by equations (1) and (2) or data within a more narrowly defined window only. Using data only within a certain window around $\ln \tilde{N}_i = 0$ exhibits the advantage that misspecification of the functional form of the polynomial is less likely than when using all data (see Angrist and Pischke 2009). We will return to the issue in more detail in Section III.

III. Benchmark Results

Our dataset covers log expenditures and council size of 2,063 municipalities in Bavaria between 1984 and 2004, where the council size is determined by the population size in the year prior to the election year. Figures 1 and 2 show local polynomial regression plots of log normalized population $\ln \tilde{N}_i$ and log normalized total expenditures $\ln \tilde{G}_i$ of all municipalities to the right and the left of the population thresholds in the data. In general, the data points are represented by local averages in $\ln \tilde{N}_i$-space.[14]

Figure 1 applies a window size of ± 0.15 so that only observations in the interval $\ln \tilde{N}_i \in [-0.15, 0.15]$ are included. Figure 2 uses a window size of ± 0.30.[15] Notice that the latter is relatively large, given the distance between the different population thresholds. For local polynomial smoothing, referred to as $k(\cdot)$ in equation (2), we apply an Epanechnikov kernel with an endogenously determined bandwidth.

Figures 1 and 2 suggest the following conclusions. There are enough data points available for identification even within a window of ± 0.15 around $\ln \tilde{N}_i = 0$. The discontinuity amounts to approximately 0.10. The polynomial function is less nonlinear with a smaller window.

[14] Hence, each data point represents an average value of $\ln \tilde{G}_i$ for values of $\ln \tilde{N}_i$ in a certain interval.
[15] Regression plots with intermediate window sizes (± 0.20 and ± 0.25) can be found in the Web Appendix.

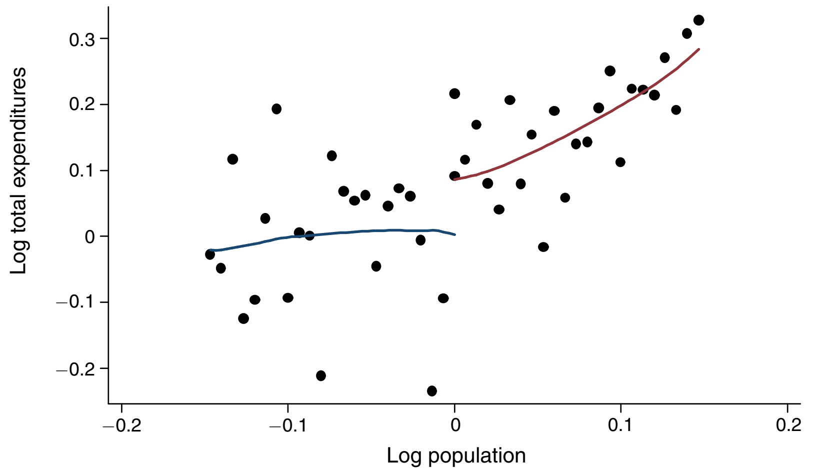

Figure 1. Log Expenditures and Log Population around Normalized Thresholds
Window = 15 Percent, Epanechnikov Kernel

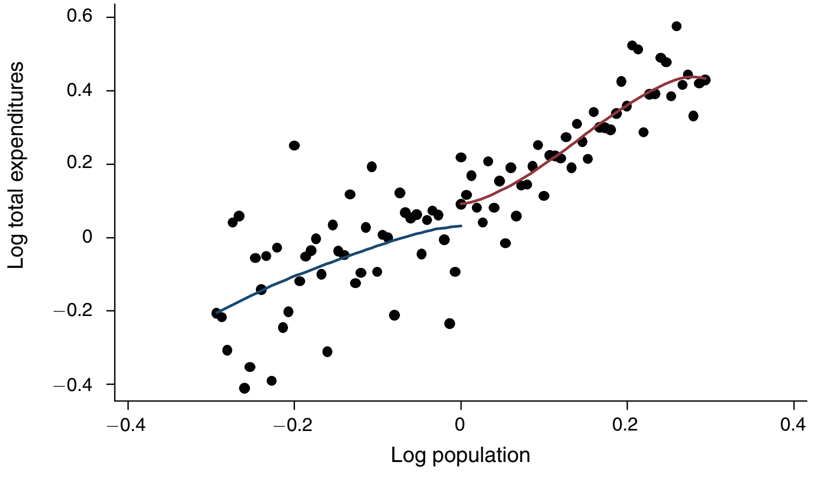

Figure 2. Log Expenditures and Log Population around Normalized Thresholds
Window = 30 Percent, Epanechnikov Kernel

Let us summarize the information contained in Figures 1 and 2 in a different way by means of estimates of the regression discontinuities in Table 3. Therein, we also report results for alternative window sizes of 0.20 and 0.25. The table additionally provides information on the average number of observations to the left and to the right of $\ln \tilde{N}_i = 0$ for each chosen window, and on the average change in the number of council seats when crossing $\ln \tilde{N}_i = 0$ from the left. Similar to Figures 1 and 2, we allow for different parameters of the local polynomial function to the right and to the left of $\ln \tilde{N}_i = 0$. In general, we use a third-order polynomial in Table 3. At the bottom of the table, we report the *p*-values of *F*-tests about the joint significance of the third-order, the second- and third-order, and all polynomial terms together.

Table 3—The Effect of Council Size on Total Municipal Expenditure

	Window size around the population thresholds determining council size			
Explanatory variable	±0.15	±0.20	±0.25	±0.30
Treatment: council size to the right versus to the left of a threshold in election year t	0.108**	0.121***	0.149***	0.202***
	0.052	0.045	0.041	0.037
Implied increase in seats (from below to above threshold)				
Average increase in number of seats	2.56	2.32	2.20	2.02
Average increase in percent	18.21	16.28	15.35	13.98
Observations				
Total within window around population threshold	22,604	29,768	37,157	44,276
Total within window below population threshold	10,914	14,499	18,288	21,858
Total within window above population threshold	11,690	15,269	18,869	22,418
Joint significance of log population polynomial terms (p-value of F-statistics)				
First-order, second-order, and third-order terms together	0.007	0.000	0.000	0.000
Second-order and third-order terms together	0.013	0.000	0.000	0.000
Third-order terms only	0.170	0.003	0.002	0.000

Notes: Standard errors are robust to heteroskedasticity, autocorrelation and clustering. ***, **, and * indicate that coefficients are significantly different from zero at 1 percent, 5 percent and 10 percent, respectively, according to two-tailed t-statistics. Third-order local polynomial regressions are estimated to the left and the right of the threshold separately.

Most importantly, point estimates of the magnitude of the discontinuities are provided along with their standard errors in the table. We correct the variance-covariance matrix of the parameters for clustering, heteroskedasticity, and autocorrelation of arbitrary form throughout. We should note that using a third-order polynomial is more than enough with a window of ± 0.15. Higher order polynomial terms tend to display smaller p-values with larger windows. Hence, misspecification of the polynomial function is more likely with larger windows.[16] The results in Table 3 suggest that municipality expenditures increase by approximately 11 percent (or 4 percentage points per council seat) when crossing the average threshold from below (see the results in the first column of Table 3 with a window of ± 0.15). According to Table 1, average municipality expenditures amount to about EUR 654,928 per municipality. The point estimate of Table 3 suggests that an average municipality increases its total expenditures by about $654{,}928 \times (exp(0.108) - 1) \simeq$ EUR 74,850 or about EUR 29,192 per new council seat when crossing a threshold from below.

IV. Robustness Analysis and Extensions

Among the options of checking the robustness of the results, the choice of the kernel and, even more so, the bandwidth for the kernel smoothing algorithm of the local polynomial regressions are particularly important. Let us use Figure 1 as a reference point. There, we use an Epanechnikov kernel with an endogenously chosen bandwidth and a window of ± 0.15 around $\ln \tilde{N}_i = 0$. In our first robustness analysis, we

[16] Some efficiency could be gained by using a second-order polynomial function with a window of ± 0.15, but we suppress the corresponding results for the sake of brevity.

Table 4—The Effect of Council Size on Total Municipal Expenditure — Placebo Treatment (*window size* ± *0.20*)

	Placebo threshold relative to actual threshold			
Explanatory variable	0.035	−0.035	0.06	−0.06
Treatment: council size to the right versus to the left of a placebo threshold in election year t	0.095	−0.029	−0.465	0.144
	0.122	0.129	0.341	0.342
Observations				
Total within window around placebo threshold	29,768	29.768	29,768	29,768
Total within window below placebo threshold	17,382	11,955	19,319	10,134
Total within window above placebo threshold	12,386	17,813	10,449	19,634
Joint significance of log population polynomial terms (p-value of F-statistics)				
First-order, second-order, and third-order terms together	0.000	0.000	0.000	0.000
Second-order and third-order terms together	0.000	0.000	0.,000	0.000
Third-order terms only	0.268	0.000	0.062	0.000

Notes: Standard errors are robust to heteroskedasticity, autocorrelation and clustering. ***, **, and * indicate that coefficients are significantly different from zero at 1 percent, 5 percent and 10 percent, respectively, according to two-tailed t-statistics. Third-order local polynomial regressions are estimated to the left and the right of the placebo threshold separately.

use the same window and an endogenously determined bandwidth for a Gaussian, a Triangular, and a Parzen kernel, respectively. In a second analysis, we return to an Epanechnikov kernel, but choose a fixed bandwidth of 0.10, 0.05, and 0.02.[17] The alternative specifications provide a qualitatively similar result as the one shown in Figures 1 and 2. The corresponding figures are available in the Web Appendix.

As a further robustness check, we test for evidence of placebo effects in the vicinity of $\ln \tilde{N}_i = 0$ in Figures 1 and 2. In particular, we allow for placebo treatments to the left (-0.06 and -0.035) and to the right ($+0.06$ and $+0.035$) of $\ln \tilde{N}_i = 0$. These placebo treatments are useful to shed light on the question of whether significant regression discontinuities at legal thresholds are artifacts because similar discontinuities are found in their vicinity as well. Table 4 shows the regression results at the placebo thresholds, which are all insignificant at conventional levels.[18] Hence, we can interpret the statistical significance of the discontinuity at the actual thresholds as an indication of a causal effect of council size on expenditures.

Two interesting issues that remain to be considered are which expenditure type and revenue category predominantly responds to a rise in political spending demand. Table 5 shows results for the two main current expenditure categories (personnel expenditure and material spending) and for investment expenditure. The effect on current expenditure is larger in magnitude and is also statistically significant at a lower level. Suggestively, council size members are impatient with respect to the timing of spending hikes and, hence, prefer expenditure adjustments, which can be implemented in the short run.

[17] Even using an inadequate bandwidth of 0.5 would lead to a similar qualitative conclusion, but of a somewhat smaller treatment effect of approximately 8 percent.

[18] The corresponding graphs are relegated to the Web Appendix. See Figures 13–16.

Table 5—The Effect of Council Size on Municipal Expenditure Categories
(*15 percent window of log population size around thresholds*)

	Outcome		
Explanatory variable	Log investment expediture	Log material expenditure	Log personnel expenditure
Treatment: council size to the right versus to the left of a threshold	0.102*	0.141***	0.166***
	0.061	0.059	0.059
Joint significance of log population polynomial terms (*p*-value of *F*-statistics)			
First-order, second-order, and third-order terms together	0.387	0.004	0.002
Second-order and third-order terms together	0.418	0.033	0.013
Third-order terms only	0.568	0.429	0.356

Notes: Standard errors are robust to heteroskedasticity, autocorrelation and clustering. ***, **, and * indicate that coefficients are significantly different from zero at 1 percent, 5 percent and 10 percent, respectively, according to two-tailed *t*-statistics. Third-order local polynomial regressions are estimated to the left and the right of the threshold separately.

At this point one may wonder to what extent the increase in personnel expenditure is mechanically related to the direct cost of council members. The magnitude of the effect is much higher than the direct cost associated with a rise in the number of legislators. Council members are not employed by the municipality. Their political office is on an honorary basis and the allowance they receive is modest, not seldomly only about EUR 100 per month. Municipalities with a population of 10,000 and more can employ full-time civil servants (*Referenten*), which are part of the council, but have no voting right. Their remuneration depends on the population size and changes at population thresholds 15,000, 30,000, 50,000, and 100,000. To test whether the change in remuneration is responsible for the identified change in personnel expenditure, we have restricted the dataset to municipalities with less than 10,000 inhabitants, which are 76 percent of all municipalities. Repeating the analysis with a window of ± 0.15 yields an effect on log personnel expenditure of 0.132 which is significant at the 1 percent level. That result is similar to the one reported for the universe of municipalities in Table 5.

As to the revenue side, municipalities can issue debt and set tax instruments independently. There are three types of tax rates municipalities can determine: taxes on agricultural land (Property Tax A), taxes on business and private land (Property Tax B), and taxes on business profits.

As shown in Table 6, property tax rates change significantly, on average, with council size, while the profit tax reacts less than the property taxes, both in magnitude and statistical significance. Presumably, municipalities use profit taxes as the prime instrument to compete for mobile firms. Hence, they may be reluctant to increase the profit tax burden on mobile firms (see Brennan and Buchanan 1980, and Sinn 2003).[19] Differences in debt financing across council size classes are not highly significant. Municipalities do not predominantly finance higher council

[19] The prediction of the tax competition literature is of particular relevance at the municipal level where firms can avoid taxes at relatively low cost (as compared with cross-national tax avoidance) by relocating economic activities to neighboring municipalities.

Table 6—The Effect of Council Size on Municipal Debt and Tax Rates
(*15 percent window of log population size around thresholds*)

	Outcome			
Explanatory variable	Log debt	Log property tax rate A	Log property tax rate B	Log profit tax rate
Treatment: council size to the right versus to the left of a threshold	0.136*	0.055***	0.059***	0.009**
	0.074	0.009	0.008	0.004
Joint significance of log population polynomial terms (p-value of F-statistics)				
First-order, second-order, and third-order terms together	0.004	0.000	0.000	0.005
Second-order and third-order terms together	0.001	0.000	0.000	0.004
Third-order terms only	0.082	0.000	0.000	0.004

Notes: Standard errors are robust to heteroskedasticity, autocorrelation and clustering. ***, ** and * indicate that coefficients are significantly different from zero at 1 percent, 5 percent and 10 percent, respectively, according to two-tailed t-statistics. Third-order local polynomial regressions are estimated to the left and the right of the threshold separately.

size-induced expenditures by raising debt, a finding that somehow contrasts with predictions of political economy models of legislative decision-making (see, e.g., von Hagen 2006). The finding is, however, consistent with the budgetary legislation municipalities face. Higher public debt levels are only feasible to the extent that investment expenditures increase at the same amount (so called Golden Rule of Public Finance). Table 4 shows that this expenditure category reacts only mildly in terms of statistical significance.

V. Conclusions

This paper provides evidence for a positive effect of council size on government spending. We use panel data from 2,056 municipalities over a period of 21 years and a quasi-experimental design to identify the causal effects of a change in municipality council size on spending. The quasi-experimental design rests upon discontinuities in the legal rule that relates population size to the number of council members.

Interestingly, we find a positive effect of council size on fiscal spending in a political environment of single-district jurisdictions (at-large systems) and of a mayor-council legislature. Both political institutions are argued to be inherently exclusive toward the spending effect of council size in previous literature. Furthermore, among the set of available financing options, municipalities primarily rely on property taxes rather than profit taxes and public debt to finance council size-related spending hikes.

The results have implications for the policy discussion of how to restrain the pro-spending bias inherent to legislature size. A frequently voiced recommendation is to introduce a "strong" legislator (i.e., a legislator who is endowed with a wide range of authority, possibly including a veto right). The recommendation is akin to a mayor-council system for which we still find a quantitatively important impact of the number of legislators on spending. Our results also suggest that legislators might perceive a higher political cost of financing pork-barrel expenditure by taxes on mobile resources such as a profit tax. From that perspective, exposing municipalities to fiscal competition undermines legislators' incentive to unhesitatingly approve each others spending proposals.

REFERENCES

Acemoglu, Daron. 2005. "Constitutions, Politics, and Economics: A Review Essay on Persson and Tabellini's 'The Economic Effects of Constitutions.'" *Journal of Economic Literature*, 43(4): 1025–48.

Angrist, Joshua D., and Victor Lavy. 1999. "Using Maimonides' Rule to Estimate the Effect of Class Size on Scholastic Achievement." *Quarterly Journal of Economics*, 114(2): 533–75.

Angrist, Joshua D., and Jörn-Steffen Pischke. 2009. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton, NJ: Princeton University Press.

Baqir, Reza. 2002. "Districting and Government Overspending." *Journal of Political Economy*, 110(6): 1318–54.

Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan. 2004. "How Much Should We Trust Differences-in-Differences Estimates?" *Quarterly Journal of Economics*, 119(1): 249–75.

Besley, Timothy, and Anne Case. 2003. "Political Institutions and Policy Choices: Evidence from the United States." *Journal of Economic Literature*, 41(1): 7–73.

Bradbury, John Charles, and W. Mark Crain. 2001. "Legislative Organization and Government Spending: Cross-Country Evidence." *Journal of Public Economics*, 82(3): 309–25.

Brennan, Geoffrey, and James M. Buchanan. 1980. *The Power to Tax: Analytical Foundations of a Fiscal Constitution.* Cambridge, UK: Cambridge University Press.

Cameron, A. Colin, and Pravin K. Trivedi. 2005. *Microeconometrics: Methods and Applications*. New York, NY: Cambridge University Press.

Dahlberg, Matz, Heléne Lundqvist Nilsson, and Eva Mörk. 2008. "Intergovernmental Grants and Bureaucratic Power." Munich Society for the Promotion of Economic Research (CESifo) Working Paper 2430.

DelRossi, Alison F., and Robert P. Inman. 1999. "Changing the Price of Pork: The Impact of Local Cost Sharing on Legislators' Demands for Distributive Public Goods." *Journal of Public Economics*, 71(2): 247–73.

Egger, Peter, Marko Koethenbuerger, and Michael Smart. 2007. "Disproportionate Influence? Special-Interest Politics under Proportional Majoritarian Electoral Systems." Unpublished.

Ferraz, Claudio, and Frederico Finan. 2009. "Motivating Politicians: The Impacts of Monetary Incentives on Quality and Performance." National Bureau of Economic Research Working Paper 14906.

Ferreira, Fernando, and Joseph Gyourko. 2009. "Do Political Parties Matter? Evidence from U.S. Cities." *Quarterly Journal of Economics*, 124(1): 399–422.

Imbens, Guido W., and Thomas Lemieux. 2008. "Regression Discontinuity Designs: A Guide to Practice." *Journal of Econometrics*, 142(2): 615–35.

Lee, David S. 2008. "Randomized Experiments from Non-Random Selection in U.S. House Elections." *Journal of Econometrics*, 142(2): 675–97.

Lee, David S., and Thomas Lemieux. 2009. "Regression Discontinuity Designs in Economics." National Bureau of Economic Research Working Paper 14723.

Lee, David S., Enrico Moretti, and Matthew J. Butler. 2004. "Do Voters Affect or Elect Policies? Evidence from the U.S. House." *Quarterly Journal of Economics*, 119(3): 807–59.

Persson, Torsten, and Guido Tabellini. 2003. *The Economic Effects of Constitutions.* Munich Lectures in Economics. Cambridge, MA: MIT Press.

Pettersson-Lidbom, Per. 2007. "Does the Size of the Legislature Affect the Size of Government? Evidence from Two Natural Experiments." Unpublished.

Pettersson-Lidbom, Per. 2008. "Do Parties Matter for Economic Outcomes? A Regression-Discontinuity Approach." *Journal of the European Economic Association*, 6(5): 1037–56.

Primo, David M., and James M. Snyder. 2008. "Distributive Politics and the Law of 1/n." *Journal of Politics*, 70(2): 477–86.

Schaltegger, Christoph A., and Lars P. Feld. 2009. "Do Large Cabinets Favor Large Governments? Evidence on the Fiscal Commons Problem for Swiss Cantons." *Journal of Public Economics*, 93(1–2): 35–47.

Sinn, Hans-Werner. 2003. *The New Systems Competition*. Oxford, UK: Blackwell Publishing.

Svara, James H. 1990. *Official Leadership in the City: Patterns of Conflict and Cooperation*. New York, NY: Oxford University Press.

Van der Klaauw, Wilbert. 2002. "Estimating the Effect of Financial Aid Offers on College Enrollment: A Regression-Discontinuity Approach." *International Economic Review*, 43(4): 1249–87.

von Hagen, Jürgen. 2005. "Fiscal Rules and Fiscal Performance in the EU and Japan." Center for Economic Policy Research (CEPR) Discussion Paper DP5330.

von Hagen, Jürgen. 2006. "Political Economy of Fiscal Institutions." In *The Oxford Handbook of Political Economy*, ed. Barry R. Weingast and Donald A. Wittman, 464–78. New York, NY: Oxford University Press.

Weingast, Barry R., Kenneth A. Shepsle, and Christopher Johnsen. 1981. "The Political Economy of Benefits and Costs: A Neoclassical Approach to Distributive Politics." *Journal of Political Economy*, 89(4): 642–64.