More Federal Legislators Lead to more Resources for their Constituencies: Evidence from Exogenous Differences in Seat Allocations*

Marco Frank[a] David Stadelmann[a,b]

RFCs for Ostrom Workshop participants

RFC#1: We are interested in feedback on our presentation of the institutional background (the German voting system; p. 5-6). Is it presented in a way such that readers who are not aware of the electoral system can understand how seats are allocated?

RFC#2: We would like to get feedback on our identification strategy (p. 6-10) and on our argument that the number of representatives is exogenous from the perspective of voters in a constituency.

RFC#3: How relevant do you consider the research question (contribution to the low of 1/n)? Do you have suggestions on how to frame the results? Have we included the relevant literature on the topic?

RFC#4: Is the motivation, the main results and the basic identification strategy already clear after reading the introduction?

September 2019

Abstract

Electoral district magnitude varies across German electoral constituencies and over legislative periods due to Germany's electoral system. The number of seats in parliament per constituency is effectively random. This setting permits us to investigate exogenous variations in district magnitude on federal resource allocation. We analyse the effect of having more than one federal representative per constituency on federal government resources by exploiting information from 1,375 German constituencies from 1998 to 2017. More representatives per constituency lead to statistically significantly more employment of federal civil servants in the respective constituencies. The size of the effect corresponds to about 34 federal civil servants once a constituency is represented by additional legislators from party lists. A battery of robustness tests support our results. Further evidence points to some heterogeneity of the effect. In particular, constituencies represented by additional legislators who are experienced and who are members of larger, competing parties obtain more federal resources.

Keywords: District magnitude, political processes, redistribution mixed-member system

JEL Classification: D72, F50, H41

---

* We would like to thank the participants of the Graduate Seminar in Economics at the University of Bayreuth and participants of the workshop insights into political economy at the University of Bayreuth. We thank Nicola Maaser and Stefan Napel for thoughtful comments.

[a] University of Bayreuth, Bayreuth, Germany. Corresponding authors: Marco Frank: marco.frank@uni-bayreuth.de; David Stadelmann david.stadelmann@uni-bayreuth.de

[b] CREMA – Center for Research in Economics, Management and the Arts, Zurich, Switzerland.

I. INTRODUCTION

When allocating common federal resources, a constituency's share may not only depend on *who* represents it in parliament but also on *how many* legislators represent it. We investigate how electoral district magnitude, i.e. the number of legislators per constituency, affects political representation. In particular, we analyse whether more federal legislators per constituency lead to more federal resources for the respective constituency.

Legislators aim to target their electoral districts with public projects to improve their re-election probability.[1] Since these projects are often financed from the common budget, the costs are shared among all constituencies which leads to a common pool problem (Weingast et al. 1981, Velasco 2000). The well-known *law of 1/n* stipulates that a higher number of legislators leads to excessive government spending and an increasing public sector if legislators do not internalize the shared financing costs.

While there is ample evidence that the local electorate profits from more political representatives (e.g. Egger and Köthenbürger 2010; Aidt and Shvets 2012; Jennes and Persyn 2015; Fiva and Halse 2016; Maaser and Stratmann 2016; Fritz and Feld 2018; Gehring and Schneider 2019), there is also evidence to the contrary (see e.g. Pettersson-Lidbom 2012; Berry and Fowler 2016). The modern literature tries to account for endogeneity issues when analysing political representation by employ methods of quasi-randomization. However, such approaches do not always fulfil all requirements for identification and institutional details may matter (Eggers et al. 2018).

We contribute to the literature by investigating a setting at the German federal level which allows us to identify the effect of having more legislators on federal resources that a constituency receives. The exogeneity of the number of legislators per district is institutionally assured through the German mixed-member electoral system where direct candidates for each constituency and party list candidates enter parliament. Every constituency is represented by exactly one directly elected legislator in the *Bundestag* (federal parliament). Next to the directly elected legislators, representatives who did not win a plurality in their district race may still enter parliament through state-wide party lists. This is possible since they are allowed to be direct candidates and list candidates at the same time. The actual number of representatives per

[1] Analyzing more than 150 studies on distributive politics, Golden and Min (2013) highlight that "[s]tudies overwhelmingly find that incumbent politicians are rewarded by voters for distributive allocations".

constituency is effectively random from the point of view of a constituency as it is unclear in advance how many legislators from the constituency enter parliament through state-wide party lists. Thus, we can analyse the effect of exogenous differences in legislative representation of constituencies.

We employ a dataset of 1,375 German constituencies between 1998 and 2017 to analyse the impact of the number of legislators per constituency on the allocation of federal resources employing fixed effects. Federal resources are captured by the number of federal civil servants who work in a constituency. Additional federal representation by legislators elected through the party lists increase the number of federal civil servants by 0.22 per thousand inhabitants or roughly 34 more civil servants on average in comparison to constituencies that have only one directly elected legislator. The impact of more legislators is statistically significant and remains robust to the inclusion of a variety of political control variables and in diverse subsample estimations. Regarding mechanisms, constituencies particularly profit when they are represented (1) by more experienced legislators, (2) by legislators who also live in the constituency or (3) by legislators who are from the larger parties and who compete to win the direct seat of the constituency.

The remainder of this paper is organized as follows. Section II relates our contribution to the literature. Section III describes the institutional setting, the identification strategy and our data. Estimation results, robustness checks, and mechanisms are presented in Section IV. Section V summarizes our results and concludes.

II. LITERATURE REVIEW

This paper contributes to the literature on the effects of electoral district magnitude and political representation on the distribution of public spending.[2] The pure number of representatives may affect the size of the public sector (Weingast et al. 1981; Velasco 2000). Essentially, the argument is that public expenditure in their constituency increases legislators' re-election chances. The costs of providing local public goods are shared by tax payers across *n* constituencies which leads to a common pool problem. Hence, overall spending, debts and

[2] Generally, legislative bargaining models help to understand public resource distributions arising from representation asymmetries (see e.g., Baron and Ferenjohn 1987, 1989; Snyder et al. 2005, or, more recently Mattozzi and Snowberg 2018; Pecorino 2018; Maskin and Tirole 2019). Golden and Min (2013) provide a magisterial overview on the literature on distributive politics.

inefficiencies increase with the overall number of legislators (Yared 2019) and targeted expenditures in a specific constituency also increase with the number of legislators representing it. This result is commonly referred to as the *law of 1/n,* as the cost of one additional unit from the constituency's perspective is *1/n* of the total cost.

The underlying common pool problem of the law of *1/n* is extensively discussed and broadly applied (e.g. Primo and Snyder 2008; Golden and Min 2013; Alesina and Passalaqua 2016; Yared 2019). Empirical evidence highlights its relevance (e.g. Schaltegger and Feld 2009; Egger and Köthenbürger 2010; Gehring and Schneider 2019). More generally, differences in political representation are shown to matter for the allocation of common resources within countries (Atlas et al. 1995; Pitlik et al. 2001, 2006; Lee 1998; Knight 2008; Fink and Stratmann 2011; Jennes and Persyn 2015; Halse 2016). Similar to this literature, we investigate the relevance of district magnitude as a causal factor for legislative representation (Lancaster 1986; Lizzeri and Persico 2001; Portmann et al. 2011).[3]

Political institutions might either aggravate or mitigate the fiscal commons (Baqir 2002; Lee 2015) and some results for the *law of 1/n* suggest that larger legislatures might even induce lower expenditures (e.g. Pettersson-Lidbom 2012; Höhmann 2018).[4] It is noteworthy that increasing the number of representatives from the same constituency makes it more difficult for each of them to be recognized for their personal commitment (e.g. Lancaster 1986; Carey and Shugart 1995; Lizzeri and Persico 2001; Portmann et al. 2011; Carey and Hix 2011). Thus, the *law of 1/n* is more likely to hold when overall electoral district magnitude is small and individual responsibility of legislators more clearly defined (Milesi-Ferretti et al. 2002; Edwards and Thames 2007; Primo and Snyder 2008; Carey and Hix 2013).

The challenge of the empirical literature on the *law of 1/n* consists in identifying a causal link between the number of legislators and resource allocation (e.g. Aidt and Shvets 2012; Pettersson-Lidbom 2012). Discontinuous changes in legislature sizes have been employed in regression discontinuity designs (Egger and Köthenbürger 2010; Pettersson-Lidbom 2012; Höhmann 2017; Lewis 2019). Compound treatment, sorting and small institutional details can

[3] District magnitude usually depends on the electoral system (see Portmann et al. 2011 and Stadelmann et al. 2019 for a discussion). Under majoritarian rule in single member districts, convergence to the median voter is usually predicted (Downs 1957; Cox 1997; Persson and Tabellini 2002, 2005). As district magnitude increases, some form of proportional allocation of seats and diverging political positions usually become the norm (see e.g. Taagepera and Shugart 1989; Carey and Shugart 1995).

[4] Some studies suggest no effects of distinct magnitude (MacDonald 2008; Baskaran 2013; Bel et al. 2018).

make identification challenging even in such settings (Eggers et al. 2018). We add to the empirical literature by leveraging the German mixed-member electoral system where district magnitudes randomly differ both between constituencies and within constituencies over legislative periods. Moreover, overall district magnitude is small, i.e. one legislator per district is guaranteed in our setting and usually only a second or a third legislator are added due to the electoral system.[5] Related to our contribution, Maaser and Stratmann (2016) analyse the impact of differences in political representation on resource allocation by exploiting a mixed electoral system within three German states. They find a positive link of legislators residing in a constituency and the share of government transfers.

III. INSTITUTIONAL BACKGROUND, IDENTIFICATION STRATEGY AND DATA

Germany's federal electoral system

Elections for the German Federal Parliament (the *Bundestag*) are held every four years. There are many institutional subtleties characterizing the electoral system but the main mechanism for the allocation of seats to constituencies is relatively simple: German voters cast two ballots referred to as the "first vote" and the "second vote". The first vote is for a direct candidate of a constituency, who must achieve a plurality in his/her constituency to be elected. There are currently 299 constituencies in Germany of roughly similar population size. The second vote allows voters to vote for a closed party list in each of the 16 German states. Party lists are proposed by the states' party associations in a secret ballot prior to federal elections. The *Bundestag* comprises exactly one direct legislator from each constituency and the remaining half of the seats is allocated from the closed party lists at the state level to achieve proportionality based on the second vote.[6] In contrast, representation is, of course, not proportional at the level of constituencies within the states.

---

[5] We are below the electoral sweet spot referred to by Carey and Hix (2011, 2013) and Portmann et al. (2013) such that our results should not depend on it. Hence, we avoid issues linked to non-linearities of district magnitude discussed in the literature.

[6] There are subtleties at the federal level: Parties need to achieve at least five percent of second votes to participate in the allocation of seats by proportional rule. Alternatively, three direct candidates of a party must win. Moreover, usually more seats than half need to be filled through the party list to achieve proportionality (overhang seats).

It is common that direct candidates are also list candidates at the same time. Their list position is seen as the fallback option if they do not win the direct mandate in their constituency. Hence, direct candidates who lose the district race may still obtain a seat in the *Bundestag* through the party list. Direct candidates who win a direct mandate, on the other hand, have to accept it and are then skipped on the party list when allocating the remaining seats. The total number of direct mandates a party wins is subtracted from its total amount of seats it is entitled in each state to have in the *Bundestag* according to its second vote share. Candidates from the closed state party list ranked highest fill the remaining seats.[7] Thereby, first vote (constituency level) and second vote (state level) jointly determine who is finally elected from state-wide party lists.

To summarize, members of the *Bundestag* are either directly elected by plurality or enter it through the party list. Each party is allowed to appoint only one candidate to be elected by the first vote in each constituency. Every constituency is represented by exactly one directly elected legislators and further candidates from the state party lists may supervene. District magnitude is generally small. In our sample district magnitude has a mean of 1.94 and a median of 2. If legislators entered the *Bundestag* because they achieved a plurality, they need not have been list candidates (about 6.8 in our sample) or they were also list candidates who won the direct seat (about 39.7% in our sample). If candidates entered the *Bundestag* through the party list, they may only be list candidates (about 5.7 % in our sample) or party list and direct candidates at the same time (about 47.8 % in our sample) who did not achieve a plurality in their constituency.

Identification strategy

While every constituency is represented by exactly one directly elected legislator, the actual number of legislators representing it may increase due to additional legislators who lost the direct election in the constituency. These additional legislators may enter the *Bundestag* through their respective party list. The allocation of list candidates to constituencies is neither

[7] There is another subtlety at the state level: It is possible that the number of direct mandates that a party wins exceeds the number of seats it is entitled by proportional rule. From 1998 to 2009, the respective parties kept so called overhang mandates as a bonus. From 2013 on, other parties are compensated with leveling seats to restore overall proportionality.

uniform nor can it be predicted reliably for all constituencies. Thus, from the perspective of a constituency the number of legislators in the *Bundestag* is externally given.

The ranking of candidates on closed state party lists is traditionally determined by representative assemblies at the state level in advance of the election (Wessels 1997). Delegates from the party decide on the ranking of candidates position by position in secret ballots. Representation of constituencies plays a minor role, if any in these ballots (Korte 2009), as geographical representation is assured by the direct candidates from the point of view of parties. Instead, popular and well-known politicians tend to seize the first positions on the list. Often direct candidates are rewarded with high ranks for the efforts in their campaigns (Gschwend et al. 2009). The ranking also is shaped by interest groups within the parties such as trade unions or the youth wing that claim positions for their members. Gender considerations play a role too as parties imposed quotas on themselves[8] or try to achieve a certain number of female candidates on their state-wide lists.

The second vote result in the state determines each party's total number of seats. Whether a candidate who lost a direct race is finally elected depends on his/her position on the closed state party list, first vote results in other constituencies and second vote results. As party lists are closed and elected at the state level, voters are not able to strategically influence this second stage allocation of candidates from the party lists in favor of their constituency during the election.[9] Thus, differences in the number of legislators per constituency exclusively stem from the allocation of legislators from the party list who *lost* their district race (Appendix A1 and Figure A1 for an illustration). This leads to exogenous differences in district magnitudes between constituencies, i.e. additional legislators in a constituency next to the directly elected legislator can be viewed as a treatment variable.

All legislators who compete for a direct seat in their constituencies (about 94.3%) have incentives to cater for their constituency's interest. Legislators have reelection prospects in mind irrespective of being directly elected or finally entering parliament through the party list. The provision of local public goods can enhance their local visibility and their chance to win the next direct election in their constituency (Maaser and Stratmann 2016). Candidates who ran for direct election but did not win, have often made promises to gain the support of their

[8] On the party lists of The Greens, for example, every odd rank (including the leading position) is supposed to be allocated to a woman.

[9] This holds even if voters were able to strategically organize at the level of the constituency.

local electorate. Despite their defeat, they need to keep some political credibility within their constituency (Gagliarducci et al. 2011). Poor performance for the constituency in the *Bundestag* can also be punished by neglecting the politician in the nomination as a district candidate or allocating a low rank on the party list in the next election.[10] Finally, politicians may have ties to their geographic constituency for personal or professional reasons and they often have offices in their constituency (Gschwend et al. 2009; Maaser and Stratmann 2016). Conversely, if legislators had no incentives to cater for their constituency after election, we should not find any effect of the number or representatives per constituency such that our setting serves as conservative test for the *law of 1/n*.

Data and estimation equation

Our institutional setting allows us to identify the effects of additional legislators per constituency elected through the state-wide party list on the provision of federal resources at the level of constituencies.[11] We compile data for five legislative periods between 1998 and 2017 obtaining 1,375 observations. Our unit of observation is constituency-legislative period specific. We employ the following model and use an OLS fixed effects to estimate

$$Federal\ civil\ servants\ per\ 1{,}000\ capita_{it} = \beta_0 + \beta_1 Additional\ Legislator_{it} + X_{it}\gamma + \lambda_i + \mu_t + \varepsilon_{it}$$

Our main dependent variable is the number of *Federal civil servants per 1,000 capita* in constituency i in legislative period t which serves as a measure for the allocation of federal resources to the constituency. Federal civil servants include employees of the political administration, federal defense administration and armed forces, federal police force, financial administration, research institutes, meteorological service, etc.), and they represent a relevant

[10] Anecdotal evidence for this is abound: Representative Marieluise Beck ran for election as direct candidate and led The Green party list in Bremen. She was elected from the state party list. However, she was said to have neglected her geographic constituency. After having lost her party association's support she abstained from another candidacy (see https://www.welt.de/politik/deutschland/article157645892/Marieluise-Beck-weicht-dem-gruenen-Zwergenaufstand.html, accessed November 07. 2018).

[11] We consider the universe of legislators who were in parliament for at least half a legislative period (96% of all legislators).

indicator for the allocation of common resources (Carsey and Rundquist 1999; Baqir 2002; Golden and Min 2013).[12] Federal civil servants are comprised of *federal officials* (tenured and constitutionally protected from dismissal) and *federal employees* (no special protection from dismissal). Being subordinated to federal authorities, location and personal decisions are prone to the discretionary influence of legislators. Indeed, numerous examples of discretionary influence to gain additional civil servants exist.[13] Constituencies have a mean total amount of federal civil servants of 1080 (4.88 per thousand inhabitants), of which 761 are federal officials and judges.

To measure the effect of additional political representation on federal resource allocation (the *law of 1/n*), we include the binary variable *Additional Legislator*. It takes a value of one if a constituency i in period t is represented by two or more legislators. To obtain the variable *Additional Legislator*, we link eventually elected legislators to the constituency in which they ran for direct election and count the total number of representatives per constituency. Note that the variable *Additional Legislator* precisely maps the German electoral system which grants exactly one directly elected legislator to each constituency and additional representatives who lost the direct election and may enter the *Bundestag* through the party lists. The archive of the *Bundestag* provides information on all legislators running for direct election in their constituency and on whether they were actually directly elected (with a plurality) or through the party list.[14] We expect the coefficient of interest β_1 to be positive and statistically

[12] An alternative measure of federal resources would be funds for the construction of federal roads. Renewal, maintenance and other federal infrastructure spending are not included in federal infrastructure reports such that this measure is not reliable. Legislators' incentives to campaign for federal road construction are not as clear as in the case of employment as road construction cannot be realized quickly and it is not unequivocally supported by the population in the constituency.

[13] To give just two examples: In 2017 the mayor of Freyung in Bavaria thanked the federal representative Bartholomäus Kalb for his commitment to bring 20 additional jobs of the federal police to the city (see https://www.freyung.de/blog/20-neue-arbeitsplaetze-bei-der-bundespolizei-mdb-kalb-erreicht-staerkung-des-standortes-freyung.html, accessed 09 August 2019). Representative Silke Launert achieved 56 new tenured positions for in the federal police department in her constituency (see https://www.silke-launert.de/aktuelles/archiv/bundespolizei-standort-ist-sicher accessed 09 August 2019).

[14] 5.7% of legislators in the Bundestag presented themselves only on the party list and did not run for direct election. We assign these legislators according to their residency to a constituency in a separate specification test below. We assign a value of zero for *Additional Legislator* to eight observations of constituencies in which the directly elected legislator dropped out early in the first half of the legislative period and no more legislators from the party lists are present (there are no replacement elections).

significant, i.e. additional legislators increase the resource allocation to their constituency. Overall, 27.9% of the constituencies do not receive additional legislators from the state-wide party list, 49.5% have one, 18.6% two and 3.7% three additional legislators from the closed state party list. Less than 0.3% have the maximum number of four additional representatives. Thus, in most cases we are moving from a single legislator per constituency to two legislators, i.e. the number of representatives doubles. In all cases the total number of legislators representing a constituency remains at most five, i.e. below any potential "sweet spot" (Carey and Hix 2011).

The matrix $X_{i,t}$ includes time-variant constituency and political characteristics. The *Federal Statistical Office* provides controls at district level including measures for area in square kilometers, population, gross domestic product and the number of unemployed persons.[15] We complement these controls with constituency-specific political variables from the manual *'Kürschners Volkshandbuch'* on personal and political biographies of all members of the *Bundestag*. These characteristics include age, gender, seniority, vote margin in first vote results, residence, education, committee membership, party posts, offices, party affiliation, birthplace and political experience at the local level. Closed party list ranks are supplemented from Bergmann et al. (2018). Short descriptions and summary statistics of all our variables can be found in Table A2 in the Appendix.

We include *constituency fixed effects* λ_i to account for unobserved constituency heterogeneity that is constant over time such as prevailing political culture or historically determined locations of federal authorities. In addition, we include *legislative period fixed effects* μ_t to account for common developments or shifts in political agenda like federal reforms that entail the reduction or increase of federal civil servants. $\varepsilon_{i,t}$ constitutes the error term. Standard error estimates are clustered at the constituency level.

[15] Districts according to the *Federal Statistical Office* do not always coincide with (electoral) constituencies' boundaries and constituencies may change their boundaries due to changes in population size and dissolution. We combine districts to constituencies of which they are part of (see Appendix B).

IV. EMPIRICAL EVIDENCE FOR THE LAW OF 1/N

Main results

Figure 1 provides descriptive evidence that the number of federal civil servants per 1,000 inhabitants is 14.0% higher (corresponding to an additional 0.62 civil servants per 1,000 inhabitants) in constituencies that have been allocated more than one legislator in the *Bundestag* due to the electoral system.

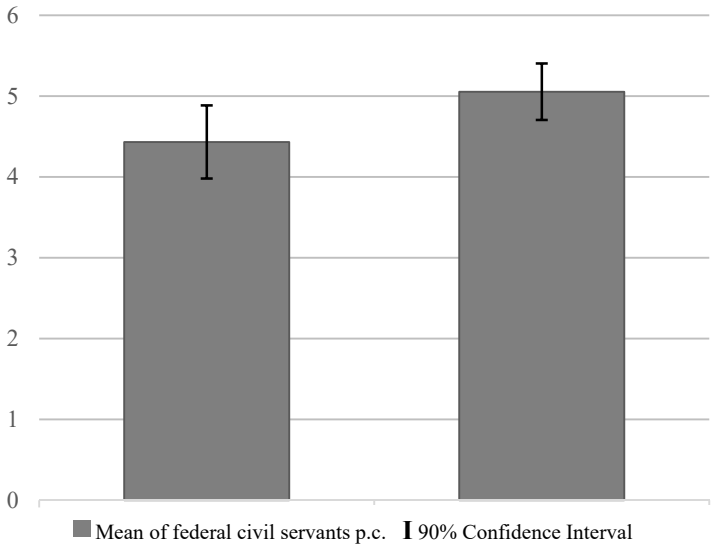

Figure 1: Mean of federal civil servants per 1,000 capita according whether constituencies have additional legislators in the *Bundestag* or not

Table 1 provides econometric evidence for the *law of 1/n*. Specification (1) employs the number of federal civil servants per 1,000 capita as a dependent variable and includes time and constituency fixed effects. The variable *Additional Legislator* is positive and statistically significant. Specification (2) includes a large set of constituency-specific and political control variables. The effect of having an additional legislator representing the constituency apart from only the directly elected one remains positive, statistically significant and similar in size to specification (1).[16]

[16] The small difference in the size of the coefficient from the specification (1) without controls to specification (2) is suggestive for the exogeneity of our main independent variable *Additional Legislator* (see also further robustness checks below and Oster 2017).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Federal civil servants			Federal officials		Federal employees	
	p.c.	p.c	total	p.c.	total	p.c.	total
Additional Legislator (treatment)	0.220**	0.217*	33.87*	0.173	28.77	0.078**	13.72***
	(0.108)	(0.117)	(19.38)	(0.116)	(18.37)	(0.035)	(5.162)
District time variant controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Political controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constituency Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.11	0.13	0.11	0.05	0.05	0.22	0.22
# Observations	1,375	1,375	1,375	1,375	1,375	1,375	1,375
# Constituencies	478	478	478	478	478	478	478

Notes: District time variant controls include gross domestic product per capita (*GDPPC*), population density (*Density*) and the number of unemployed (*Unempl*). Political controls include gender (*Female*), age (*Age*), vote margin (*Margin*), Seniority (*Seniority Avg*) and Residence (*Residence*). Robust standard error estimates are clustered at the constituency level and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 1: The effect of additional legislators per constituency on the allocation of federal civil servants, federal officials and federal employees

In column (3), we analyze the effect of *Additional Legislator* on the total number of civil servants in a constituency. This is sensible since constituencies are required to be of roughly similar population size according to German constitution. Once again, a positive and statistically significant effect emerges. In terms of magnitudes our results suggest that constituencies with more than one legislator due to the allocation from the state-wide party list profit from an increase of 0.22 federal civil servants per thousand capita or 34 in absolute numbers respectively. It is noteworthy that the magnitude of the effect closely corresponds to anecdotal evidence provided by legislators themselves when advertising their achievements for the constituency.

Specifications (4) to (7) present separate estimations with federal officials (4 and 5) and federal employees (6 and 7) as dependent variables. Point estimates of *Addítional Legislator* are positive in all specifications. Statistically significant results at conventional significance levels emerge for the dependent variable federal employees. The results suggest that federal employees tend to be used more systematically to target funds for constituencies, which is consistent with the view that discretionary scope of legislators is higher for federal employees than in the case of federal officials.

The results of Table 1 support the view that larger district magnitude, i.e. more legislators per constituency, translates into a higher provision of federal resources for the respective constituency. The institutionally driven variation in the number of legislators in our setting allows to identify the relevance of the *law of 1/n*.

Robustness checks

We provide a large array of robustness checks in Tables 2 to 4. All our results and interpretations regarding the effect of more legislators per constituency remain unchanged.

a. Political control variables

Table 2 effectively summarizes different robustness tests including control variables from personal and political biographies. Every specification is presented in a separate row and a short description of each test is given. In particular, we take account of education, committee membership, electoral incentives, party offices, positions at the federal and state level, political presence at the local level, local ties, and party affiliation, all of which have been shown to be of relevance for the allocation of federal resources in the literature. We always include the control variables of the most stringent setting of Table 1.

	Test	Description	(1) Federal Civil Servants p.c.	(2) Federal Employees p.c.
(1)	Education	Baseline regression controlling for education (*Doctorate*)	*0.210* (0.117)* **Confirmed**	*0.079** (0.035)* **Confirmed**
(2)	Committee membership	Baseline regression controlling for committee membership in the committees for defense, interior, agriculture and infrastructure.	*0.185* (0.112)* **Confirmed**	*0.070* (0.038)* **Confirmed**
(3)	Electoral incentives	Baseline regression controlling for representatives that only run for election as district candidates (*Only direct candidate*) and representatives listed on the first three state list places (*Rank 3*).	*0.243** (0.122)* **Confirmed**	*0.086** (0.038)* **Confirmed**
(4)	Party offices	Baseline regression controlling for actual party offices held at the local (*Local Party*), state (*State Party*) and national level (*Nation Party*) and engagement in youth organization (*Youth Orga*).	*0.196* (0.118)* **Confirmed**	*0.067** (0.034)* **Confirmed**
(5)	Offices	Baseline regression controlling for offices held at the national level (*Member Government*) and past offices at the state (*State Office*) and national level (*Nation Office*).	*0.213* (0.120)* **Confirmed**	*0.077** (0.036)* **Confirmed**
(6)	Local politicians	Baseline regression controlling for offices held at the local level (*Actual Local Exp)* and past offices at the local level (*Past Local Exp*).	*0.248** (0.125)* **Confirmed**	*0.078** (0.039)* **Confirmed**

Table continues on next page.

	Test	Description	(1) Federal Civil Servants p.c.	(2) Federal Employees p.c.
(7)	Birthplace	Baseline regression controlling for representatives' birthplace (*Birth*).	*0.222* (0.118)* **Confirmed**	*0.071** (0.035)* **Confirmed**
(8)	Party affiliation	Baseline regression controlling for representatives' party affiliation (*CDU, CSU, SPD, FDP, Grüne* and *Linke*)	*0.239* (0.142)* **Confirmed**	*0.098** (0.039)* **Confirmed**
(9)	All	Include all control variables from this table	*0.215 (0.139)* **Marginally confirmed**	*0.086* (0.046)* **Confirmed**

Notes: The regressions estimate the baseline model including district time variant controls and personal characteristics. District time variant controls include gross domestic product per capita (GDPPC), population density (Density) and the number of unemployed (Unempl). Political controls include gender (Female), age (Age), vote margin (Margin), Seniority (Seniority_Avg) and place of residence (Residence). In all regressions we employ constituency and time fixed effects. Column (1) shows the results for the dependent variable Federal civil servants, p.c. and column (2) for Federal employees, p.c. The remark "Confirmed" below the point estimates indicates whether the main results remain robust in comparison to the baseline results. All regressions include the full sample of 1,375 observations. Standard error estimates are clustered at the constituency level and reported in parentheses. Significance levels are indicated by *p<0.1; **p<0.05; ***p<0.01.

Table 2: Robustness checks for the effect of additional legislators on federal resource allocation using data from self-reported personal and political biographies of the legislators

We report the regression coefficient for our main independent variable *Additional Legislator* employing the number of federal civil servants per 1,000 population (specification 1) and federal employees per 1,000 population (specification 2) as dependent variables.[17]

In all regressions, the point estimates of the *Additional Legislator* variable is positive and statistically significant. Regarding the magnitude of the coefficient estimates, they are within a range of less than 0.5 standard errors of the point estimates presented in Table 1, i.e. the results of Table 2 closely mirror those of Table 1. Higher district magnitude due to additional legislators entering the Bundestag for their constituency through the state-wide party lists always lead to an increase in the number of federal civil servants.

b. Subsets and list-only legislators

In Table 3, we investigate different subsets of our dataset.

Larger cities might be places where federal civil servants work. (Some) Politicians might prefer to run for election in cities with a larger variety of cultural offers (Lancaster and Patterson 1990 or Maaser and Stratmann 2016). Our main results and interpretations are not affected when we drop Bonn and Berlin-Mitte, i.e. constituencies where the seat of government is located (row 1). Furthermore, we drop district-free cities (row 2) and gradually exclude constituencies that are cities or include cities with more than 200,000 or 150,000 inhabitants (rows 3 and 4). As constituencies do not always correspond to statistical districts, we drop statistical districts and cities that consist of several constituencies in row (5). Throughout all specifications our results remain robust and even of similar magnitude in comparison to earlier specifications.

When exploring constituencies whose boundaries correspond exactly to statistical districts in row (6) and constituencies that remain unchanged for all five legislative periods in row (7), we again find that additional legislators have a positive and statistically significant effect on the number of federal civil servants. Again, it is noteworthy that the quantitative results are similar to our main results and, if anything, even slightly larger in magnitude.

[17] When employing federal officials as a dependent variable, respective coefficients remain positive and statistically insignificant as in our baseline results.

	Test	Description	#Obs	(1) Federal Civil Servants p.c.	(2) Federal Employees p.c.
(1)	Drop seats of government	Drop the constituencies Bonn and Berlin-Mitte as seats of government	1,366	*0.208* (0.116)* **Confirmed**	*0.079** (0.035)* **Confirmed**
(2)	Drop district free cities	Baseline regression for a subsample that only includes constituencies without district free cities	813	*0.234* (0.135)* **Confirmed**	*0.059 (0.036)* **Marginally confirmed**
(3)	Drop cities with more than 200,000 inhabitants	Baseline regression for a subsample that only includes constituencies that consist of or contain a city with more than 200,000 inhabitants	1,032	*0.238* (0.144)* **Confirmed**	*0.085* (0.044)* **Confirmed**
(4)	Drop cities with more than 150,000 inhabitants	Baseline regression for a subsample that only includes constituencies that consist of or contain a city with more than 150,000 inhabitants	969	*0.241* (0.149)* **Confirmed**	*0.090** (0.045)* **Confirmed**
(5)	Drop cities with more than one constituency	Baseline regression for a subsample that drops constituencies from statistical districts with several constituencies within its boundaries	1,140	*0.246* (0.145)* **Confirmed**	*0.090** (0.042)* **Confirmed**
(6)	Constituencies correspond to statistical districts	Baseline regression for a subsample that only includes constituencies corresponding to their statistical districts	490	*0.402** (0.170)* **Confirmed**	*0.178*** (0.065)* **Confirmed**

Table continues on next page.

	Test	Description	#Obs	(1) Federal Civil Servants p.c.	(2) Federal Employees p.c.
(7)	Constituency in all 5five periods	Baseline regression for a subsample that only includes constituencies that existed for 5 periods	445	*0.349* (0.170)* **Confirmed**	*0.097*** (0.036)* **Confirmed**
(8)	5.7% of legislators entering through the party list	We consider legislator who are only on the party list and do not present themselves as direct candidates. We link them to constituencies according to the reported place of residence.	1,375	*-0.062 (0.161)* **Different independent variable**	*0.039 (0.038)* **Different independent variable**

Notes: The regressions estimate the baseline model including district time variant controls and personal characteristics. District time variant controls include gross domestic product per capita (*GDPPC*), population density (*Density*) and the number of unemployed (*Unempl*). Political controls include gender (*Female*), age (*Age*), vote margin (*Margin*), Seniority (*Seniority_Avg*) and place of residence (*Residence*). In all regressions we employ constituency and time fixed effects. Column (1) shows the results for the dependent variable Federal civil servants, p.c., column (2) for Federal employees, p.c. The remark "Confirmed" below the point estimates indicates whether the main results remain robust to the respective changes. Standard error estimates are clustered at the constituency level and reported in parentheses. Significance levels are indicated by *p<0.1; **p<0.05; ***p<0.01.

Table 3: Robustness checks for the effect of additional legislators on federal resource allocation using different subsamples and list-only legislators

About 5.7% of German legislators enter the *Bundestag* through the party list *without* running as direct candidates in a constituency. Our estimations employed directly elected candidates and legislators from the state party lists who simultaneously ran for direct election but lost it. We now assign legislators who were not running as direct candidates to constituencies according to their reported place of residence and rerun our main estimation counting only them as the additional legislators in the constituency. Legislators who do not run as direct candidates should be less connected, if at all, to geographical constituencies (Manow 2012). Constituencies do not profit in terms of federal resources from legislators who only run for election on state-wide party lists and report their place of residence in its respective boundaries as shown in row (8). This strengthens our interpretations by showing that only additional legislators who present themselves as direct candidates for their constituency lead to more federal resources.

c. Selection on unobservables

Our baseline results remain robust to the inclusion of control variables from legislators' biographies and in different subsets. To investigate whether unobserved variables are likely to drive our findings, we perform a robustness test following Oster (2017). This test aims to reveal potential endogeneity problems that arise from unobserved variables. The basic idea of the test is to confront changes in the coefficient of interest and the explanatory power of the model captured by the R^2 when control variables are included to a model without any controls. A relatively constant point estimate and an important rise of the R^2 when adding further observable controls, is suggestive that unobservables are unlikely to affect the relationship under the assumption that the included controls are the most relevant ones (see Oster 2017 for further explanations or Arnold et al. 2016 for an application). Table A3 in the appendix provides the corresponding tests. We find that potential endogeneity problems arising from unobservables are unlikely in our setting. In fact, selection on unobservables would have to be at least 1.42 times stronger than selection on observables to make the effect of additional legislators on federal resources irrelevant. Indeed, the controlled and uncontrolled coefficients for the variable *Additional Legislator* are quantitatively highly similar throughout all our specifications. As the institutional setting determines district magnitude, these tests make us confident that the effect of additional legislators on federal resources is well identified.

d. Placebo tests for civil servants at state and municipal level

A positive effect of the number of legislators per constituency on the distribution of public resources should only be found when federal legislators are able to influence its allocation. There should be *no* relationship between more federal legislators in a constituency and resources that are *not* subject to federal authority. Table 4 shows that this is indeed the case. We investigate the number of civil servants, officials and employees working in a constituency who are employed by states or municipalities as a placebo test. Federal legislators have no discretionary power over state or municipal funds. Results show that there is *no* effect of additional federal legislators on either state or municipal civil servants, officials, and employees. The coefficient estimates for the variable *Additional Legislator* is always statistically insignificant and point estimates are close to zero.

	(1)	(2)	(3)	(4)	(5)	(6)
	State civil servants p.c.	State officials p.c	State employees p.c	Municipal civil servants p.c.	Municipal officials p.c.	Municipal employees p.c.
Additional Legislator	-0.022	-0.031	-0.003	-0.050	-0.002	-0.072
	(0.137)	(0.072)	(0.083)	(0.088)	(0.010)	(0.074)
Constituency time variant controls	Yes	Yes	Yes	Yes	Yes	Yes
Political controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Constituency Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.20	0.16	0.06	0.42	0.30	0.52
#Observations	1,272	1,272	1,272	1,272	1,272	1,272
# Constituencies	435	435	435	435	435	435

Notes: The regressions estimate the baseline model including district time variant controls and personal characteristics and employing civil servants, officials and employees at the state and municipal level as dependent variables. District time variant controls include gross domestic product per capita (*GDPPC*), population density (*Density*) and the number of unemployed (*Unempl*). Political controls include gender (*Female*), age (*Age*), vote margin (*Margin*), Seniority (*Seniority_Avg*) and place of residence (Residence). In all regressions we employ constituency and time fixed effects. Standard error estimates are clustered at the constituency level and reported in parentheses. Significance levels are indicated by *p<0.1; **p<0.05; ***p<0.01.

Table 4: Placebo test – No influence of additional federal legislators on resources decided at the state and the municipal level

Mechanism and effect heterogeneity

To explore the potential heterogeneity of the effect of more legislators, we divide constituencies into subgroups with regard to different characteristics and recode the variable *Additional Legislators* to reflect the subgroups. Results are reported in Table 5.

We start by exploring the relevance of seniority vs. being new to parliament. Conditional on being represented by additional legislators, one subgroup comprises constituencies where all legislators are new to parliament (binary variable *Additional Legislator (New to parliament=1)*). The second subgroup consists of constituencies represented by legislators with an average seniority that is larger than one legislative period (binary variable *Additional Legislator (New to parliament=0)*). We then include the two variables in the regression. Constituencies with only one legislator form the reference category, as before. In columns (1) and (2) of Table 5, the point estimates of the coefficient referring to the group of constituencies with additional legislators who are unexperienced and new to parliament are not different from zero. In contrast, positive effects from additional legislators emerge in constituencies with more experienced legislators. Similar results are obtained when employing two indicators to construct subgroups by age of legislators (not reported). These results suggest that constituencies' advantages of additional representation come through additional legislators with more experience in the *Bundestag*.

In columns (3) and (4), we concentrate on the legislators' place of residence (Maaser and Stratmann 2016). The results suggest that legislators who also live in constituency where they were elected (*Additional Legislator (Residence=1)*) are more engaged in securing federal resources in comparison to constituencies which have legislators who ran there as candidates but do not live there (*Additional Legislator (Residence=0)*). Birthplace as a proxy for local ties yields similar results (not reported). This is consistent with the view that legislators who also live in the constituency where they run for direct election are tied more closely to the constituency for personal reasons (Gschwend et al 2009; Maaser and Stratmann 2016; Önder et al. 2018).

	(1) Federal Civil Servants p.c.	(2) Federal Employees p.c	(3) Federal Civil Servants p.c	(4) Federal Employees p.c.	(5) Federal Civil Servants p.c.	(6) Federal Employees p.c.	(7) Federal Civil Servants p.c.	(8) Federal Employees p.c.	(9) Federal Civil Servants p.c.	(10) Federal Employees p.c.
Additional Legislator (New to parliament=1)	0.009	0.023								
	(0.196)	(0.053)								
Additional Legislator (New to parliament=0)	0.233**	0.082**								
	(0.117)	(0.035)								
Additional Legislator (Residence=0)			0.030	-0.002						
			(0.131)	(0.042)						
Additional Legislator (Residence=1)			0.241*	0.088**						
			(0.131)	(0.038)						
Additional Legislator (Party in government=0)					0.249	0.090**				
					(0.167)	(0.041)				
Additional Legislator (Party in government=1)					0.210*	0.075**				
					(0.113)	(0.037)				
Additional Legislator (Vote margin<=2.5%)							0.076	0.144**		
							(0.167)	(0.069)		
Additional Legislator (Vote margin>2.5%)							0.237*	0.068*		
							(0.128)	(0.039)		
Additional Legislator (Represented by both legislators from CDU/CSU and SPD)									0.308**	0.100**
									(0.142)	(0.046)
Additional Legislator (Not represented by both legislators from CDU/CSU and SPD)									0.099	0.048
									(0.122)	(0.031)
District time variant controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Personal characteristics controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constituency Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.13	0.22	0.13	0.22	0.13	0.22	0.13	0.22	0.13	0.22
#Observations	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375
# Constituencies	478	478	478	478	478	478	478	478	478	478

Notes: Notes: The regressions estimate the baseline model including district time variant controls and personal characteristics and recoding the variable *Additional Legislator* to reflect the subgroups according to several characteristics. District time variant controls include gross domestic product per capita (*GDPPC*), population density (*Density*) and the number of unemployed (*Unempl*). Political controls include gender (*Female*), age (*Age*), vote margin (*Margin*), Seniority (*Seniority_Avg*) and place of residence (*Residence*). In all regressions we employ constituency and time fixed effects. Standard error estimates are clustered at the constituency level and reported in parentheses. Significance levels are indicated by *p<0.1; **p<0.05; ***p<0.01

Table 5: Exploring mechanisms and the heterogeneity of the effect of additional legislators

Results from column (5) and (6) show no unequivocal results when considering whether constituencies are represented by additional legislators from parties in government. Both constituencies with additional legislators from parties in government (*Additional Legislator (Party in government=1)*) and constituencies with additional legislators from the opposition (*Additional Legislator (Party in government=0)*) see more federal funds allocated to them. This suggests geographical representation incentives of legislators from opposition parties in view of the next election are relevant.

Narrow direct elections are potential incentives for legislators to focus more on their constituency to improve future election prospects. Empirically, there are no substantial differences between constituencies with additional legislators and a narrow margin (*Additional Legislator (Vote margin<=2.5%)*) and those who won with a wider margin (*Additional Legislator (Vote margin>2.5%)*) according to specification (7) and (8). However, a more apt measure for competition in the German institutional setting is the simultaneous representation of a constituency by legislators from the Christian conservative parties (CDU/CSU) and the social democrats (SPD) who both usually had the most chances of winning pluralities in a constituency in the past. Thus, it may pay off for candidates from these parties to target their constituencies. Indeed, results from columns (9) and (10) show point estimates significantly different from zero for additional legislators for constituencies from the treatment group represented by both CDU/CSU and SPD legislators. In contrast, there is no effect for constituencies that obtained additional legislators from smaller parties in comparison to constituencies with only one directly elected legislator.

V. CONCLUSIONS

We analyze differences in political representation of constituencies arising from the German mixed-member electoral system and investigate their impact on the allocation of public resources. We argue that the allocation of these additional legislators from the closed party lists is exogenous to the constituencies. This allows us to identify the effect of an increase in the number of legislators per constituency on the allocation of federal resources, i.e. we provide a test for the original *law of 1/n*. In our sample of 1,375 constituencies from 1998 and 2017, we find that more federal civil servants are employed in constituencies with more than one legislator in the *Bundestag*. Quantitatively, having more than one legislator per constituency leads to an increase of 0.22 civil servants per thousand inhabitants or roughly 34

civil servants in absolute numbers. The magnitude of the effect corresponds closely to anecdotal evidence from German federal politicians who advertise their success in targeting federal funds in newspapers and on their websites.

Our result highlights the relevance of political representation for the allocation of public resources (Jennes and Persyn 2015; Maaser and Stratmann 2016). It is fully consistent with the *law of 1/n*, i.e. that public expenditures increase in legislature size (Weingast et. al 1981; Schaltegger and Feld 2009; Egger and Köthenbürger 2010). The empirical result is robust to numerous sensitivity checks. Placebo tests reveal that additional federal legislators cannot affect expenditures outside of their power. Moreover, experienced legislators as well as legislators from larger parties that compete for a direct seat in the constituency are likely to gain more federal resources for their constituency.

Our analysis points to many research avenues. Mixed-member electoral systems exist around the world. Depending on the institutional framework, legislators that enter parliament through party lists often have incentives to cater for their constituency. Thus, our identification strategy might be applied in other countries. Furthermore, our setting suggests that usually cumbersome contamination effects (Herron and Nishikawa 2001; Ferrera et al. 2005) of mixed-member electoral systems may be advantageously leveraged for alternative research questions. Since additional legislators who enter parliament through the party lists are elected by proportional rule, we should only find a positive result if they also cater for their constituency similarly to legislators elected by plurality rule. As mixed-member electoral systems can be frequently found in practice, applications of theoretical predictions which suggest stark differences between (pure) majoritarian and proportional systems need to be contrasted to the actual electoral system in place. This provides numerous opportunities for future research.

REFERENCES

Aidt, T. S., & Shvets, J. (2012). Distributive Politics and Electoral Incentives: Evidence from Seven US State Legislatures. *American Economic Journal: Economic Policy, 4(3)*, 1-29.

Alesina, A., & Passalacqua, A. (2016). The Political Economy of Government Debt. In *Handbook of Macroeconomics*. Elsevier.

Atlas, C. M., Gilligan, T. W., Hendershott, R. J., & Zupan, M. A. (1995). Slicing the federal government net spending pie: Who wins, who loses, and why. *The American Economic Review, 85(3)*, 624-629.

Baqir, R. (2002). Districting and Government Overspending. *Journal of Political Economy, 110(6)*, 1318-1354.

Baron, D. P., & Ferejohn, J. (1987). Bargaining and agenda formation in legislatures. *The American Economic Review, 77(2)*, 303-309.

Baron, D. P., & Ferejohn, J. A. (1989). Bargaining in legislatures. *The American Political Science Review, 83(4)*, 1181.

Baskaran, T. (2013). Coalition governments, cabinet size, and the common pool problem: Evidence from the German states. *European Journal of Political Economy, 32*, 356-376.

Bel, G., Raudla, R., Rodrigues, M., & Tavares, A. F. (2017). These rules are made for spending: testing and extending the law of 1/n. *Public Choice, 174(1-2)*, 41-60.

Bergmann, H., Bailer, S., Ohmura, T., Saalfeld, T., & Sieberer, U. (2018). BTVote MP Characteristics. Harvard Dataverse.

Berry, C. R., & Fowler, A. (2015). Cardinals or Clerics? Congressional Committees and the Distribution of Pork. *American Journal of Political Science, 60(3)*, 692-708.

Carey, J. M., & Hix, S. (2011). The Electoral Sweet Spot: Low-Magnitude Proportional Electoral Systems. *American Journal of Political Science, 55(2)*, 383-397.

Carey, J. M., & Hix, S. (2012). District magnitude and representation of the majority's preferences: a comment and reinterpretation. *Public Choice, 154(1-2)*, 139-148.

Carey, J. M., & Shugart, M. S. (1995). Incentives to cultivate a personal vote: A rank ordering of electoral formulas. *Electoral Studies, 14(4)*, 417-439.

Carsey, T. M., & Rundquist, B. (1999). Party and committee in distributive politics: Evidence from defense spending. *The Journal of Politics, 61(4)*, 1156-1169.

Cox, G. W. (28. 3 1997). *Making votes count.* New York: Cambridge University Press.

Downs, A. (1957). *An economic theory of democracy.* New York: Harper.

Edwards, M. S., & Thames, F. C. (2007). District magnitude, personal votes, and government expenditures. *Electoral Studies, 26(2)*, 338-345.

Egger, P., & Koethenbuerger, M. (2010). Government Spending and Legislative Organization: Quasi-Experimental Evidence from Germany. *American Economic Journal: Applied Economics, 2(4)*, 200-212.

Eggers, A. C., Freier, R., Grembi, V., & Nannicini, T. (2017). Regression Discontinuity Designs Based on Population Thresholds: Pitfalls and Solutions. *American Journal of Political Science, 62(1)*, 210-229.

Ferrara, F., Herron, E., & Nishikawa, M. (2005). *Mixed Electoral Systems.* Palgrave Macmillan.

Fink, A., & Stratmann, T. (2011). Institutionalized bailouts and fiscal policy: Consequences of soft budget constraints. *Kyklos, 64(3)*, 366-395.

Fiva, J. H., & Halse, A. H. (2016). Local favoritism in at-large proportional representation systems. *Journal of Public Economics, 143*, 15-26.

Fritz, B., & Feld, L. P. (2019). Common pool effects and local public debt in amalgamated municipalities. *Public Choice*.

Gagliarducci, S., Nannicini, T., & Naticchioni, P. (2011). Electoral rules and politicians' behavior: A micro test. *American Economic Journal: Economic Policy, 3(3)*, 144-174.

Gehring, K., & Schneider, S. A. (2018). Towards the Greater Good? EU Commissioners' Nationality and Budget Allocation in the European Union. *American Economic Journal: Economic Policy, 10(1)*, 214-239.

Golden, M., & Min, B. (2013). Distributive politics around the world. *Annual Review of Political Science, 16(1)*, 73-99.

Gschwend, T., Shugart, M. S., & Zittel, T. (2009). *Assigning committee seats in mixed-member systems: how important is "localness" compared to the mode of election?* Mannheim.

Halse, A. H. (2016). More for everyone: The effect of local interests on spending on infrastructure. *European Journal of Political Economy, 43*, 41-56.

Herron, E. S., & Nishikawa, M. (2001). Contamination effects and the number of parties in mixed-superposition electoral systems. *Electoral Studies, 20(1)*, 63-86.

Höhmann, D. (2017). The effect of legislature size on public spending: evidence from a regression discontinuity design. *Public Choice, 173(3-4)*, 345-367.

Jennes, G., & Persyn, D. (2015). The effect of political representation on the geographic distribution of income: Evidence using Belgian data. *European Journal of Political Economy, 37*, 178-194.

Knight, B. (2008). Legislative representation, bargaining power and the distribution of federal funds: evidence from the US Congress. *The Economic Journal, 118(532)*, 1785-1803.

Korte, K.-H. (2009). Das personalisierte Wahlrecht. Von http://www.bpb.de/politik/wahlen/bundestagswahlen/62524/personalisierte-verhaeltniswahl, consulted online on 19.11.2018 abgerufen

Lancaster, T. D. (1986). Electoral structures and pork barrel politics. *International Political Science Review, 7(1)*, 67-81.

Lancaster, T. D., & Patterson, W. D. (1990). Comparative pork barrel politics. *Comparative Political Studies, 22(4)*, 458-477.

Lee, D. (2015). Supermajority rule and the law of 1/n. *Public Choice, 164(3-4)*, 251-274.

Lee, F. E. (1998). Representation and Public Policy: The Consequences of Senate Apportionment for the Geographic Distribution of Federal Funds. *The Journal of Politics, 60(1)*, 34-62.

Lewis, B. D. (2019). Legislature Size, Local Government Expenditure and Taxation, and Public Service Access in Indonesia. *Studies in Comparative International Development, 54(2)*, 274-298.

Lizzeri, A., & Persico, N. (2001). The provision of public goods under alternative electoral incentives. *American Economic Review, 91(1)*, 225-239.

Maaser, N., & Stratmann, T. (2016). Distributional consequences of political representation. *European Economic Review, 82*, 187-211.

MacDonald, L. (2008). The impact of government structure on local public expenditures. *Public Choice, 136(3-4)*, 457-473.

Maskin, E., & Tirole, J. (2019). Pandering and pork-barrel politics. *Journal of Public Economics, 176*, 79-93.

Mattozzi, A., & Snowberg, E. (2018). The right type of legislator: A theory of taxation and representation. *Journal of Public Economics, 159*, 54-65.

Milesi-Ferretti, G. M., Perotti, R., & Rostagno, M. (2002). Electoral systems and public spending. *The Quarterly Journal of Economics, 117(2)*, 609-657.

Önder, A. S., Portmann, M., & Stadelmann, D. (2017). No place like home: Opinion formation with homophily and implications for policy decisions. *The Journal of Mathematical Sociology, 42(2)*, 47-76.

Oster, E. (2017). Unobservable Selection and Coefficient Stability: Theory and Evidence. *Journal of Business & Economic Statistics, 37(2)*, 187-204.

Pecorino, P. (2018). Supermajority rule, the law of 1/n, and government spending: a synthesis. *Public Choice, 175(1-2)*, 19-36.

Persson, T., & Tabellini, G. (25. 1 2002). *Political economics: explaining economic policy.* Cambridge: MIT Press Ltd.

Persson, T., & Tabellini, G. (2005). *The economic effects of constitutions.* Cambridge: MIT Press Ltd.

Pettersson-Lidbom, P. (2012). Does the size of the legislature affect the size of government? Evidence from two natural experiments. *Journal of Public Economics, 96(3-4)*, 269-278.

Pitlik, H., Schmid, G., & Strotmann, H. (2001). Bargaining power of smaller states in Germany's Länderfinanzausgleich 1979--90. *Public Choice, 109(1)*, 183-201.

Pitlik, H., Schneider, F., & Strotmann, H. (2006). Legislative malapportionment and the politicization of Germanys intergovernmental transfer system. *Public Finance Review, 34(6)*, 637-662.

Portmann, M., Stadelmann, D., & Eichenberger, R. (2011). District magnitude and representation of the majority's preferences: Evidence from popular and parliamentary votes. *Public Choice, 151(3-4)*, 585-610.

Portmann, M., Stadelmann, D., & Eichenberger, R. (2012). District magnitude and representation of the majority's preferences—a reply and new perspectives. *Public Choice, 154(1-2)*, 149-151.

Primo, D. M., & Snyder, J. M. (2008). Distributive Politics and the Law of 1/n. *The Journal of Politics, 70(2)*, 477-486.

Schaltegger, C. A., & Feld, L. P. (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.

Snyder, J. M., Ting, M. M., & Ansolabehere, S. (2005). Legislative bargaining under weighted voting. *American Economic Review, 95(4)*, 981-1004.

Stadelmann, D., Portmann, M., & Eichenberger, R. (2016). Preference Representation and the Influence of Political Parties in Majoritarian vs. Proportional Systems: An Empirical Test. *British Journal of Political Science, 49(1)*, 181-204.

Taagepera, R., & Shugart, M. S. (1989). *Seats and votes: The effects and determinants of electoral systems.* New Haven & London: Yale University Press.

Velasco, A. (2000). Debts and deficits with fragmented fiscal policymaking. *Journal of Public Economics, 76(1)*, 105-125.

Weingast, B. R., Shepsle, K. A., & Johnsen, C. (1981). The Political Economy of Benefits and Costs: A Neoclassical Approach to Distributive Politics. *Journal of Political Economy, 89(4)*, 642-664.

Wessels, B. (1997). Passages to power: Legislative recruitment in advanced democracies. In P. Norris (Hrsg.). Cambridge: Cambridge University Press.

Yared, P. (2019). Rising Government Debt: Causes and Solutions for a Decades-Old Trend. *Journal of Economic Perspectives, 33(2)*, 115-140.

APPENDIX – SUPPLEMENTARY INFORMATION
(Intended for online publication only)

Appendix A: Illustration of the allocation legislators to constituencies

Figure A1 shows a fictive German state that consists of five constituencies. Party A is the most successful party in the state. Suppose it obtained 50% of the second vote shares and it also wins all district races, i.e. all district direct candidates were elected with a plurality. By construction, the number of seats it obtains through the proportional share of second votes corresponds to the number of seats already occupied by district winners. Hence, party A neither sends additional representatives from their list nor profits from excess seats. All other parties do not win a constituency seat. However, their share of second votes (30% for Party B and 10% for Party C as well as D) allows them to send candidates from their respective lists to the *Bundestag*. In our example, all concerned candidates lost their district race but receive a seat through a high rank on the party list. Since parties are permitted to nominate just one candidate for direct election, there can only be one additional representative per district and party. Party B is the second most successful party according to the second votes. The first three positions on its list are occupied by the district race losers from the first, second and fourth constituency. The first constituency further receives another legislator from party C, whereas party D represents the fifth constituency. This illustrates a possible allocation of candidates leading to representation asymmetries. While four constituencies are treated with additional legislators next to their directly elected candidates, one district is left only with the direct candidate.

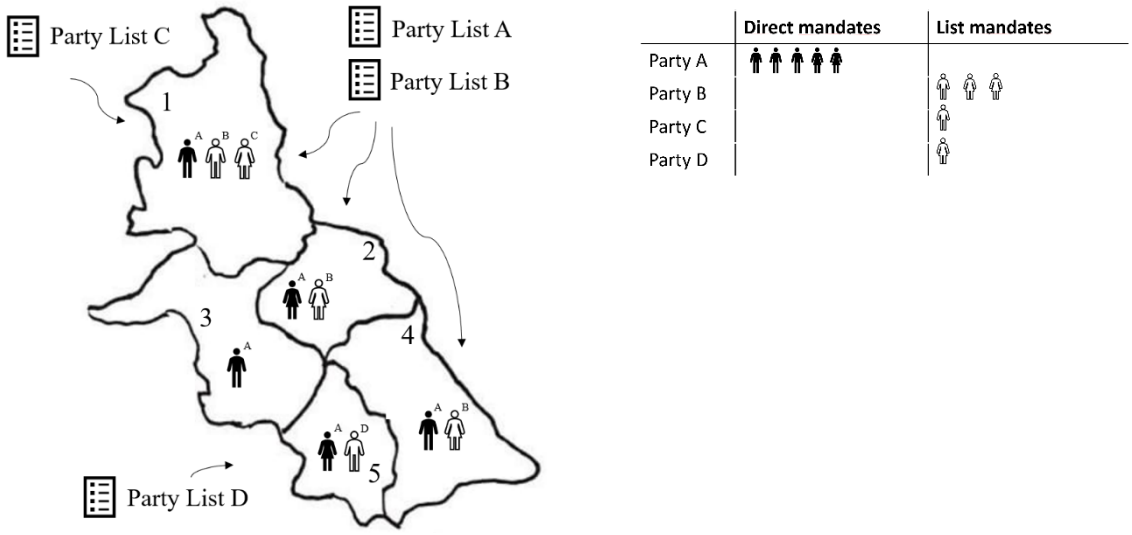

Figure A1: Illustration of the allocation legislators to constituencies

Appendix B: Merging statistical districts to electoral constituencies

Subsequent to the German reunification, the number of constituencies was reduced from 326 constituencies to 299 in 2002. The number of constituencies in each state is linked to its population size and a single constituency is not legally allowed to differ more than 25 percent from the average constituency's population size (see § 3 Absatz 1 Satz 1 Nummern 2, 3 und 5 BWG). Demographic developments lead to changes in the number of constituencies (e.g. Thuringia lost one constituency to Bavaria in 2005. In 2009, Lower Saxony and Baden-Wuerttemberg each received one constituency from Saxony and Saxony-Anhalt. Mecklenburg-Western Pomerania transferred one constituency to Hesse in 2013).

Constituencies do not always coincide with the boundaries of underlying statistical districts. Consequently, the following constituency forms can be observed:

1. The constituency exactly contains one whole statistical district and boundaries coincide.
2. The constituency contains more than one whole statistical districts and boundaries coincide.
3. The constituency contains at least one whole statistical and at least one statistical district that is split between more constituencies. Hence boundaries do not fully coincide.
4. The constituency contains at least one statistical district that is split between more constituencies. Hence boundaries do not fully coincide.

All our control variables are finally expressed in terms of population (per thousand). When merging statistical districts to constituencies, we add all statistical districts that are completely and partly within the constituency and divide it by the number of statistical districts. Thereby, we get an average value of all statistical districts that are included in the constituency. Some constituency information is missing due to lacks in regional data in some eastern German states prior to their respective district reforms.

Large district-free cities such as Berlin are divided into several constituencies. The corresponding district data from the *Federal Statistical Office* is provided for these cities as whole units. We divide data from these statistical districts by the number of constituencies they consist of and check for robustness to show that their exclusion does not affect our main results.

We run robustness tests where we only include constituencies where boundaries coincide.

Variable	Description	Source	N	Mean	SD	Min	Max
Additional Legislator (treatment)	=1 if constituency is represented by at least two legislators; =0 otherwise	Bundestag website	1,375	0.72	0.45	0	1
Actual Local Experience	=1 if at least 50% of constituency's representatives is mayor or currently holds a post in a local subdistrict or district council; =0 otherwise	Kürschners Volkshandbuch. own calculations	1,375	0.35	0.48	0	1
Age	Average age of the electoral constituency's parliamentarians	Kürschners Volkshandbuch. own calculations	1,375	49.78	7.30	26	69
Birth	=1 if at least 50% of constituency's representatives are born in the constituency; 0 otherwise	Kürschners Volkshandbuch. own calculations	1,375	0.53	0.50	0	1
CDU	=1 if at least 50% of constituency's representatives are member of the CDU (conservative party); =0 otherwise	Kürschners Volkshandbuch. own calculations	1,375	0.47	0.50	0	1
City	=1 if electoral constituency is or contains at least one district-free city; =0 otherwise	Kürschners Volkshandbuch. own calculations	1,375	0.48	0.50	0	1
Committee_*Topic*	=1 if constituency is represented by at least one parliamentarian in a committee including the topics defense, interior, agriculture and infrastructure; =0 otherwise	Bundestag website					
CSU	=1 if at least 50% of constituency's representatives are member of the CSU (conservative party); =0 otherwise	Kürschners Volkshandbuch. own calculations	1,375	0.13	0.34	0	1
Density	Population per square kilometer	Regional Statistics, own calculations	1,375	718.38	1098.73	17.31	4660.58
Doctorate	=1 if at least 50% of constituency's representatives have a doctoral degree; =0 otherwise	Kürschners Volkshandbuch. own calculations	1,375	0.21	0.41	0	1
FDP	=1 if at least 50% of constituency's representatives are member of the FDP (liberal party); =0 otherwise	Kürschners Volkshandbuch. own calculations	1,375	0.06	0.23	0	1

Table continues on next page.

Variable	Description	Source	N	Mean	SD	Min	Max
Federal Civil Servants	Federal civil servants	Regional Statistics	1,375	1,079.84	1,624.94	0	21350
Federal Employees	Federal employees	Regional Statistics	1,375	258.16	524.45	0	8007.50
Federal Officials	Federal officials and judges	Regional Statistics	1,375	761.05	1,081.99	0	13025.75
Female	=1 if all representatives from one constituency are female; =0 otherwise	Kürschners Volkshandbuch, own calculations	1,375	0.11	0.32	0	1
GDPPC	Gross domestic product per capita (output side) deflated to 2010 Euros	Regional Statistics, own calculations	1,375	31,770	12076	15591	92053
Green	=1 if at least 50% of constituency's representatives are member of the Bündnis/90 Die Grünen (green party); =0 otherwise	Kürschners Volkshandbuch, own calculations	1,375	0.06	0.23	0	1
Linke	=1 if at least 50% of constituency's representatives are member of the Linke (left party); =0 otherwise	Kürschners Volkshandbuch, own calculations	1,375	0.05	0.23	0	1
Local Party	=1 if at least 50% of constituency's representatives hold a party position at the local level (i.e. chairman or vice chairman of the local, city, regional, subconstituency or constituency group); =0 otherwise	Kürschners Volkshandbuch, own calculations	1,375	0.67	0.47	0	1
Margin	=1 if the difference of the direct vote share of the two first-placed candidates in a constituency is less than 2.5 percentage points; =0 otherwise	Kürschners Volkshandbuch, own calculations	1,375	0.12	0.32	0	1
Only district candidate	=1 if constituency winner didn't run for election via state list; 0 otherwise	Kürschners Volkshandbuch, own calculations	1,375	0.15	0.37	0	1

Table continues on next page.

Variable	Description	Source	N	Mean	SD	Min	Max
Member Government	=1 if constituency is represented by at least one parliamentarian who is actual member of government	Kürschners Volkshandbuch, own calculations	1,375	0.04	0.26	0	1
Municipal Civil Servants	Municipal civil servants	Regional Statistics	1,272	2,575.13	1,738.28	530	18585
Municipal Employees	Municipal Employees	Regional Statistics	1,272	1,837.11	1,208.44	225.44	11,262.75
Municipal Officials	Municipal Officials	Regional Statistics	1,272	501.77	456.64	48.33	2909.5
Nation Party	=1 if at least 50% of constituency's representatives hold a party position at the national level (i.e. chairman or vice chairman of the party, board member, presidium member, secretary general); =0 otherwise	Kürschners Volkshandbuch, own calculations	1,375	0.15	0.36	0	1
Parliamentary Group	=1 if at least 50% of constituency's representatives are currently board member of the parliamentary group or its chairman or vice chairman; =0 otherwise	Kürschners Volkshandbuch, own calculations	1,375	0.23	0.42	0	1
Past Local Experience	=1 if at least 50% of constituency's representatives was mayor or held a post in a local subconstituency or constituency council in the past; =0 otherwise	Kürschners Volkshandbuch, own calculations	1,375	0.77	0.42	0	1
Rank 3	=1 if at least 50% of constituency's representatives are positioned among the first three places on the state list; =0 otherwise	Bergmann et al. (2018), own calculations	1,375	0.24	0.43	0	1
Residence	=1 all representatives from one constituency state their main residence to be located in the constituency; =0 otherwise	Kürschners Volkshandbuch, own calculations	1,375	0.77	0.42	0	1

Table continues on next page.

Variable	Description	Source	N	Mean	SD	Min	Max
Seniority	Average seniority of the constituency's parliamentarians	Kürschners Volkshandbuch, own calculations	1,375	2.94	1.44	1	9
SPD	=1 if at least 50% of constituency's representatives are member of the SPD (social democrats); =0 otherwise	Kürschners Volkshandbuch, own calculations	1,375	0.50	0.50	0	1
State Civil Servants	State civil servants	Regional Statistics	1,272	3,728.19	3,261.29	525.17	32712
State Employees	State employees	Regional Statistics	1,272	1,035.25	1,437.51	51.13	14,218.33
State Office	=1 if at least 50% of constituency's representatives held a post as chancellor or minister in past legislative periods at the state level; =0 otherwise	Kürschners Volkshandbuch, own calculations	1,375	0.22	0.42	0	1
State Officials	State Officials	Regional Statistics	1,272	2,614.03	1,908.37	356.58	18,025.75
State Party	=1 if at least 50% of constituency's representatives hold a party position at the state level (i.e. chairman or vice chairman of the state group, board member, presidium member, secretary general); =0 otherwise	Kürschners Volkshandbuch, own calculations	1,375	0.28	0.45	0	1
Unemployed	Unemployed persons	Regional Statistics	1,375	9,867.51	6,688.25	1,464.56	66,271.66
Youth Organization	=1 if at least 50% of constituency's representatives were or are active in the respective party's youth organization; =0 otherwise	Kürschners Volkshandbuch, own calculations	1,375	0.50	0.50	0	1

Table A2: Description of data, sources and summary statistics

Proportional selection assumption	$\tilde{\delta} = 0.5$	$\tilde{\delta} = 0.75$	$\tilde{\delta} = 1$	$\tilde{\delta} = 0.5$	$\tilde{\delta} = 0.75$	$\tilde{\delta} = 1$
	District fixed effects included in baseline			District and time fixed effects included in baseline		
Uncontrolled $\dot{\beta}_1$	0.237	0.237	0.237	0.220	0.220	0.220
Controlled $\tilde{\beta}_1$	0.217	0.217	0.217	0.217	0.217	0.217
Uncontrolled $\dot{R}^2$	0.01	0.01	0.01	0.11	0.11	0.11
Controlled $\tilde{R}^2$	0.13	0.13	0.13	0.13	0.13	0.13
Time fixed effects	No	No	No	Yes	Yes	Yes
Identified set [$\beta_1^{*\prime}, \tilde{\beta}_1$]	[0.145, 0.216]	[0.108, 0.216]	[0.072, 0.216]	[0.152, 0.216]	[0.119, 0.216]	[0.087, 0.216]
Zero excluded from identified set?	Yes	Yes	Yes	Yes	Yes	Yes

Notes: We analyze changes in the coefficient of the *Additional Legislator* variable when adding constituency time variant controls and personal characteristics control to two baseline specifications, including district fixed effects, and district fixed effects as well as time fixed effects, respectively. The respective point estimates and R^2 can be found in Table A4 in the Appendix. The uncontrolled $\dot{\beta}_1$ and $\dot{R}^2$ are shown in row (1) and (2). row (3) provide the controlled $\tilde{\beta}_1$ and $\dot{R}^2$. The bias-adjusted $\beta_1^{*\prime}$ is the lower bound of the identified set and is calculated by solving $\beta_1^{*\prime} = \tilde{\beta}_1 - \tilde{\delta}\frac{(\dot{\beta}_1 - \tilde{\beta}_1)(R_{max} - \tilde{R})}{(\tilde{R} - \dot{R})}$. We use three different degrees of selection on unobservables $\tilde{\delta} = \{0.5, 0.75, 1\}$ a consistently assume $R_{max} = 1$. The identified set never includes zero which suggests robustness of the results with regard to endogeneity problems from omitted variables.

Table A3: Test for selection on unobservables regarding the effect of additional legislators on federal resources

	(1) Federal civil servants p.c.	(2) Federal civil servants p.c.	(3) Federal civil servants p.c.
Additional Legislator (treatment)	0.237** (0.111)	0.220** (0.108)	0.216* (0.116)
Constituency time variant controls	No	No	Yes
Personal characteristics controls	No	No	Yes
Time Fixed Effects	No	Yes	Yes
Constituency Fixed Effects	Yes	Yes	Yes
R-squared	0.01	0.11	0.13
#Observations	1,375	1,375	1,375
# Constituencies	478	478	478

Notes: The dependent variables and constituency time variant controls in per 1,000 people values. Constituency time variant controls include gross domestic product per capita (*GDPPC*), population density (*Density*) and the number of unemployed (*Unempl*). Personal characteristics controls include gender (*Female*), age (*Age*), vote margin (*Margin*), Seniority (*Seniority_Avg*) and Residence (*Residence*). Standard error estimates are clustered at the constituency level and reported in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A4: Estimations yielding coefficients and R^2 for robustness tests following Oster (2017) in Table A3